



ADVANCED TECHNOLOGICAL INNOVATIONS FOR THE PREVENTION AND MANAGEMENT OF BEHAVIOURAL ISSUES AMONG CHILDREN

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Abstract: Teachers, parents, and healthcare providers are increasingly worried about children's aggressive, impulsive, anxious, attention-deficit, defiant, emotionally dysregulated, and conduct-related problems. Problems with accessibility, affordability, support continuity, and parental participation are common with traditional methods of prevention and treatment. There are new possibilities for the early detection, prevention, monitoring, and treatment of children's behavioural issues brought about by technology advancements in recent times. Findings from the reviewed literature point to the many benefits of technology-assisted therapies in the following areas: parental awareness; parent-child communication; behavioural monitoring; early intervention; and access to evidence-based psychological and behavioural therapy. Results from guided online treatments and digital parenting programs in lowering emotional and behavioural issues have been encouraging, but they do vary in efficacy according to intervention kind, parental involvement, child traits, and time of usage. To sum up, new tech holds a lot of promise as a preventative measure, a personalised strategy, and a supplement to traditional behavioural treatments for children. Concerns about data privacy, digital inequality, and the proper use of artificial intelligence (AI) and other new technologies in child-centered behavioural treatment should guide future studies.

Keywords: Behavioural Issues, Children, Technological Innovation, Digital Interventions, Artificial Intelligence, Mobile Applications, Online Parenting Programmes, Behavioural Management, Child Development, Telehealth.

INTRODUCTION

“A state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” [1] is how mental health is defined by the World Health Organization (WHO). Maintaining good mental health promotes social capital and unity, which are crucial to any healthy society [2]. The state of a nation's mental health is the most important factor in its economic and social progress [3]. In addition, mental health is acknowledged as a basic human right by the Lancet Commission on global mental health and sustainable development [4].

Due to the fast maturation of the brain, the formative years of childhood are particularly important for psychological well-being [5]. Some examples of common mental health issues that may be identified in children are anxiety disorders, attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder (ASD), and developmental abnormalities of neurodevelopment [6].

Mental health issues are the primary cause of years lived with disability on a global scale, affecting one out of every eight persons [7]. Worldwide, the number of disability-adjusted life-years caused by mental health





disorders rose from 80.8 million (3.1%) in 1990 to 125.3 million (4.9%) in 2019 [8], despite a significant worldwide effort to prevent and treat mental health problems. A World Health Organization survey found that 10% of the world's youth suffer from mental health issues, with the majority of those affected going untreated [5]. Low- and middle-income countries (LMICs) are home to over 80% of the world's mentally ill population [9]. Furthermore, in low-income nations, mental illness accounts for 8.8 percent of the overall disease burden, whereas in lower-middle-income countries, drug use disorders account for 16.6 percent [10]. The problem is that 75 percent of those who suffer from mental, neurological, or drug use illnesses do not get the help they need [9].

Mental health issues like anxiety, mood disorders, ADHD, and conduct disorders are all part of emotional and behavioural difficulties (EBP), which are common in children [11]. As an example, research has shown that 6.5% of children globally suffer from an anxiety condition and 5.7% from a disruptive disorder [12], while it is impossible to assess the global incidence of EBP. For example, attention deficit hyperactivity disorder (ADHD) commonly manifests around 9.5 years of age and anxiety disorders from 5.5 years of age [13]. In children, EBP may lead to a variety of issues, such as social impairment [14] and intellectual impairment [15]. When EBP continues throughout adolescence and adulthood, it may negatively influence people's lives in many ways, including their ability to find work [16] and their likelihood of developing mental and physical health issues later in life [17].

Given the deleterious effects of EBP and its early development in infancy, it is crucial to intervene effectively during the preadolescent years. Cognitive behavioural therapy (CBT) for anxiety disorders [18] and depressive symptoms [19] and parent training programs for behavioural difficulties [20] are among the many therapies that are now accessible and have been shown to be beneficial in children. Long waiting lists and perceived stigma are some of the obstacles that prevent children and their families from accessing evidence-based therapies for EBP, even though these treatments do exist [21].

Digital interventions that are led by parents and designed to increase treatment access might be one solution to these problems. Pre-schoolers with evidence-based practice (EBP) often receive brief guided, parent-led interventions (i.e., where parents learn strategies to help their child at home; Jewell et al., 202 [22]). These interventions are effective, take less time to implement than child-focused approaches, and may help more adolescents get the treatment they need. Additionally, they may assist in lowering the stigma that both children and parents may have while seeking treatment; for instance, some parents have said that they do not want their kid to feel bad about themselves or those others will find out about their child's problems [25]. To circumvent these obstacles and guarantee that families get therapy when they need it, interventions should be delivered directly to the parent rather than asking the kid to attend, which would interrupt regular routines and may even cause them to miss school.

LITERATURE REVIEW

There is a dual strategy in parent and family programs. Helping families improve their lives and social skills is their main goal. In contrast, they lessen the likelihood of youngsters engaging in antisocial and problematic behaviours, increase protective variables, and decrease risk factors [26]. Gottfredson et al. [27] lays out some criteria that family programs should meet. These include being grounded in a scientific theory, having a manual that can be used to replicate the content, evaluating the program's effectiveness, evaluating the program's processes, and looking for ways to integrate them with social, educational, or health services to ensure their sustainability.





Following the effects of the COVID-19 epidemic, there has been a rapid shift toward online or mixed forms for family preventive programs that target harmful behaviours. Now that ICTs are becoming more prevalent, these resources may be used to augment or modify family competency programs that are founded on evidence [28]. When using ICTs to provide these programs, evaluating their efficacy becomes much more difficult [29].

Traditional programs that prioritise interpersonal connections and rely on participants' physical presence have begun to use these technology tools in different ways. On occasion, they use various forms of technology to supplement in-person meetings [30]. When families reside a long way from the session location, for example, technology may help remove a barrier to face-to-face attendance [31]. Some apps for programs are built from the ground up to rely on technology.

When it comes to treating behavioural problems linked to early childhood trauma, access to healthcare is crucial [32]. For good control of these disorders early intervention is required, along with access to specialist services and implementation of integrated care models. This study explores the key components of health service accessibility, health systems and organizations related to childhood trauma and behaviour issues. Early detection of trauma and behaviour issues is critical to help intervene and prevent long term negative affects [33]. Early help can make a huge difference to a child's future because it can help minimise the ongoing effect of trauma before it escalates to bigger behaviours. Screening is a key approach to the early detection of trauma and behavioural issues. Trauma specific instruments like The Trauma History Questionnaire (THQ) as well as general instruments like The Child Behaviour Checklist (CBCL), The Paediatric Symptomatology Checklist (PSC) may be used to identify children at risk. The effectiveness of these screening tools has been demonstrated in several studies such as the CBCL which is proven to be effective in identifying behaviour problems in children and adolescents of different age groups to facilitate age-specific intervention. Increasing the likelihood of favourable outcome through early screening includes both starting referrals to appropriate professionals and providing treatment interventions [34]. Access to mental health services that are specialised around trauma and behaviour management is important in order to help manage trauma and behavioural issues [35]. Mental health workers, like psychiatric councillors, trauma specialists and child psychologists are invaluable in complex disorder management that arises from childhood trauma [32]. Improving the mental health of traumatised children requires specialised programs that provide therapies based on research and tailored to their specific requirements. Brain-Based Trauma Reprocessing (TF-CBT), Eye Movement Desensitisation and Reprocessing (EMDR), and Cognitive Behavioural Therapy (CBT) are trauma therapies supported by evidence. For example, TF-CBT has a long history of successful use in treating PTSD in children by assisting them in making sense of their experiences and learning to cope. Similarly, eye movement desensitisation and reprocessing (EMDR) has helped alleviate anxiety and trauma symptoms in youngsters. For the purpose of treating behavioural problems and promoting recovery, it is crucial to have access to these specialised therapies [36].

ONLINE PARENTING PROGRAMS: EVIDENCE FOR THEIR EFFECTS AND COMPONENTS

Even programs that were originally meant to be given face-to-face are increasingly being offered online. The development of better technologies over the last several decades was the primary cause of this, although the COVID-19 pandemic has also had a role [37]. Programs offered via websites [38], apps [39] and videoconferencing platforms [40] are examples of popular kinds of online parental help. Expert or peer instruction, self-directed learning, or a mix of the two is all viable delivery methods for these programs. They provide greater scheduling flexibility and are easier to reach than in-person deliveries [41].





The impact of parenting programs that are accessible online on families and children have been the subject of many meta-analyses. Programs are successful in lowering emotional and behavioural issues in children and adolescents, according to results showing modest to moderate impact sizes immediately after intervention and at late follow-up assessments [29]. Parents' mental health issues are reduced, and parents' conflict, parent-child relationship quality, and social support are improved across parents of children and adolescents under the age of 18 [42]. Additionally, parents' parenting practices, self-efficacy, and behaviour are improved.

The content of online parenting programs is a key factor in their impacts, but further study is required to fully grasp this relationship. Studies of program content often focus on program components, such as the particular parenting practices that are taught inside the program [43]. We examine content in terms of the clusters of components that represent a program's theoretical approach [44]. This is because these strategies are organised inside programs according to their theoretical approach, such as learning theory vs relational views. More precisely, we test whether there is a correlation between program effects and the presence (or absence) of certain component clusters and if we can determine which cluster combinations are the most beneficial. Having a rating like this might be helpful since it shows families which parts of parenting programs are most likely to help them.

The effectiveness of in-person parenting programs in addressing child behaviour problems was found to be higher when these programs combined techniques to teach parents how to use time out, emphasise the importance of consistency in parenting, and encourage them to practise new skills with their children. The impacts of component clusters have only lately been the subject of study within the theoretical frameworks of psychoeducation, relationship improvement, behaviour management, and parental self-management. The results indicated that the best chance for reducing children's behavioural problems [46] and emotional problems [47] was in in-person parenting programs that included a behaviour management approach, either alone or in combination with parental self-management and relationship enhancement.

Online parenting programs' components have received less academic attention. A comprehensive evaluation by McAloon and de la Poer Beresford [48] found that reducing behavioural issues in children was associated with more targeted use of contingent reinforcement for good and bad behaviour, respectively. In order to alleviate emotional and behavioural issues in youngsters, Thongseiratch et al. [49] found groups of factors that worked together. Activities such as child-led play, parental self-emotion management, feedback from program facilitators, and program reminders were all part of the program. So far, studies have failed to determine whether the same sets of components work better or worse with behavioural and emotional issues in children, or if the material has to be distinct for each result.

INNOVATIVE COMMUNITY- BASED STRATEGIES

Reaching underprivileged groups in the area of child and adolescent mental health has led to the development of innovative tactics including outreach and mobile mental health units. Young people who may not seek treatment in conventional clinical settings for mental health issues are able to get the help they need via mobile programs, which provide flexible, on-the-ground support [50]. Mobile units can help increase participation and results by offering services in non-clinical environments that familiar to people, decreasing stigma.

Evidence to date suggests that these places are fostering greater comfortableness for children and youth accessing mental health supports and services, in turn improving engagement and reducing drop-outs [51]. Such programs can have a significant impact in low-income or rural areas where the use of traditional mental health services is limited.





As part of a comprehensive care plan, home visiting programs provide in-home interventions to vulnerable families with young children who have complex needs [52]. Home intervention delivery lowers attrition, fosters rapport and engages the entire family. Providers can be medical doctors, nurses, other medical practitioners as well as trained volunteers [52].

The mean standardised impact sizes ranged from -0.31 to 0.20 in a meta-analysis [53] of 22 home visiting programs that sought to improve the mental health and psychosocial outcomes of carers and developmental outcomes for children aged 0- 4 years in high-risk households. Statistically significant effects were only seen for one of the four outcomes, which was behavioural and/or social development (SMD=-0.31). Future studies should include more comprehensive assessments, reduced bias, and evaluations of diverse parent-child outcomes as well as elucidations on the effectiveness of different components of the programs and what they are best suited to address in terms of family needs.

There is an emerging trend to integrating community measures with digital measures, which could be impactful (see next section for more details). With the use of technologies such as augmented reality games like LINA [54] it is hoped that early adolescents will be more connected with their peers and more aware of the importance of mental health. These innovative approaches highlight the significance of integrating technology and community engagement as effective strategies to support and empower youth in mental well-being. Future research is needed to examine the scalability, cultural adaptation and long-term impact of such interventions to impact evidence-based practices in different contexts.

Telepsychiatry

The use of various electronic communication and information technology tools to deliver a mental health treatment remotely is frequently referred to as "telepsychiatry. Telepsychiatry" is a psychiatric assessment, psychiatric therapy treatment and medication counselling through an online video streaming platform using video conference software such as MTeams or Zoom [56].

These approaches could also be more effective when delivered through channels familiar to children and youth, such as mobile phones and internet tools [57], and may also be more effective with this age group as they are likely to be more familiar with and use digital technology. In fact, Telepsychiatry has been applied, particularly in the past decade, to treat children and adolescents in various countries [58] and the notorious outbreak of COVID-19 has contributed to the increase of the use of this technology. Top psychiatric diagnosis in the U.S. was attention deficit hyperactivity disorder (ADHD) followed by anxiety disorders, depression, trauma-related disorders and behavior/conduct disorders; in 2020, there was an 829.6 per cent increase in the use of telepsychiatry among children in Medicaid programmes compared to 2019 [59].

Patients in rural and distant locations, who sometimes have to travel great distances to visit the referral center, greatly benefit from telepsychiatry's most apparent advantage: improved access to mental health treatment [60]. Improved accessibility via virtual health care services potentially also help children and adolescents whose illnesses, such as autism, make it hard for them to leave the house. Patients also enjoy more seclusion, which protects them from potentially stigmatising opinions and attitudes of others [61].

But there are still several unanswered questions and challenges with telepsychiatry [326]. A portion of the population has substantial challenges when it comes to using telepsychiatry, such as an absence of digital gadgets, an ignorance of digital technology, and inadequate Internet access [62]. Also, keep in mind that compared to adults, kids and teens who use telepsychiatry services may have a harder time describing their symptoms to the other person, especially if they have sensory, cognitive, or behavioural issues. On top of that,





hyperactive kids and teens could have trouble staring at a screen for hours on end. Instead of using stationary integrated cameras with adults, a remote pan-tilt-zoom camera might be better in these situations [63]. Furthermore, it is crucial to refrain from conducting assessments in environments that are not deemed neutral for children and adolescents, such as an abusive household.

DEVELOPMENT AND APPLICATION OF ARTIFICIAL INTELLIGENCE

Machines that use artificial intelligence (AI) can learn and think 380 like people because of the integration of massive amounts of data, algorithms, and computer power.

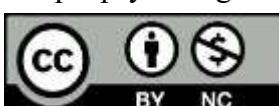
There is optimism that algorithms developed and implemented via AI research and development may enhance mental health diagnosis and therapy for children and adolescents. As a branch of artificial intelligence, machine learning is assisting in the transition from discovering statistical connections at the group level to making predictions at the individual level [64]. These methods under study are particularly for complex bio-psycho-social-ecological interactions and their potential to examine and test multiple possible predictors at the same time as well as nonlinear relationships within the context of neurodevelopment [65].

Machine learning algorithms have been used to answer questions concerning diagnosis, choice of therapy and prognosis in the field of mental diseases in children and adolescents [66]. Only 33 papers were eligible for inclusion in a systematic review [67] of research on clinical practice applied ML in the area of child and adolescent psychiatric research. A number of individuals researched on autism along with attention deficit hyperactivity disorder. The major focus of the research was on diagnostic applications. Since they use different data, algorithms and metrics to measure success, the outcomes varied across the board and ranged from moderate to high in predictive performance. However, some critical comments were the little number of patients as well as the lack of external validation and over fitting.

Two other areas where AI might prove valuable are improved access to treatment [68] and a better therapeutic connection [60]. Kids and teens have varying levels of involvement with their healthcare providers, utilise technology more often and extensively in their everyday lives, and may be able to avoid stigma thanks to the anonymity offered by the internet [70]. For instance, when it comes to sharing personal information, some teens may feel more comfortable doing so with a chatbot [71] as compared to a real doctor.

As previously stated, Canvas Dx has been approved by the FDA to assist with autism diagnoses in clinical settings. Nevertheless, care should be used before translating to the clinic [72]. It is crucial to take children's and teenagers' rights into account while creating new technology [73]. They could not know what might injure them, and AI systems that are out to exploit them could give them biased or unfair recommendations, making them even more vulnerable [74]. The United Nations and UNICEF have said that artificial intelligence systems employed in child and adolescent psychiatry must prioritise the minor's needs in terms of data privacy and openness, among other ethical considerations [75]. Compliance with the EU's General Data Protection Regulation, which establishes requirements for security, privacy, and permission, should be ensured by mental health providers using AI technologies [76].

In light of forthcoming studies, it is imperative that artificial intelligence models developed to assist mental health professionals in their work with children and adolescents undergo thorough training and demonstrate sufficient validation results on an external test set. This test set should include data from pertinent populations of children and adolescents. Only then should these models be put into use. Importantly, the majority of AI models that are now available were trained on adult populations, which means they are unable to understand the unique psychological and biological differences between adults and children/adolescents [77].





CONCLUSION

New technological developments are showing great promise as a means to control and prevent children's behavioural problems. According to the research, traditional behavioural and psychiatric treatments may be supplemented with digital interventions, online parenting programs, mobile apps, healthcare services, artificial intelligence, wearable gear, and interactive platforms. These technological advances will be the stepping stones to facilitating rapid response, more precise diagnosis of behavioral problems, more frequent monitoring, improved parent education and tailored assistance. Length of presentation: One area that indicates a considerable potential of better parenting and less emotional and behavioural problem of children is technology assisted parenting programs.

Technology should not be seen as a substitute for pro-evaluation, pro-therapy and pro-sense of connection with parents. Excessive and/or uncontrolled use of technology can result in inattention, emotional overload, and outward disruptive tendencies. Technology interventions, then, can only be of support if they follow the above parameters: they must be well designed, involve parents, be professionally led, be able to be personalised to the needs of the individual child, and be used appropriately.

Overall, new technology greatly provides an accessible and promising treatment and preventing approach to behavioural problems in children. Concerns like privacy, data security, accessibility, digital inequality, ethical usage, and the safety of children should inform future research on the evaluation of the long-term efficacy of technology-based therapies, especially digital interventions powered by AI and tailored to each individual's needs. A holistic, evidence-based, child-centred strategy that embeds technology and has family, school and professional involvement is probably the most effective in promoting healthy behaviour development in children.

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