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Delivering clinical evidence-based child–parent interventions for emotional development through a digital platform: A feasibility trial

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Abstract

As the prevalence of mental health conditions in childhood increases, there are growing concerns around the accessibility and scale of evidence-based support. However, barriers to referral, time commitment and engagement rates means recommended traditional group-based parenting programmes are unable to provide population level support at scale. The aim of this feasibility study was to establish whether a suite of purposively constructed animated films and digital resources could positively impact on parent and child outcomes in the early years. Families from a range of backgrounds (n = 129) participated in a mixed method evaluation of the digital programme. After completing online surveys and interviews, the test group was given access to the Embers the Dragon platform for 8 weeks whilst the control group continued as usual. 98% of test group parents showed an improvement in parental response in relation to effective parenting styles. During qualitative interviews, child participants verbally recalled an increased range of emotions and coping strategies highlighted in the programme. Digital interventions can be used to support children's emotional development independent of clinicians and may provide a solution to sustainable family psycho-education, thereby fulfilling a preventative agenda and potentially lessening the future impact on Child and Adolescent Mental Health Services.

Keywords

child, emotional well-being, parenting, early years, digital innovation

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Introduction

There continues to be increasing numbers of children and young people experiencing significant levels of mental distress. Mental ill health in children is at its highest rates, with 1 in 8 children receiving a formal diagnosis and three times that number being referred to specialist services for assessment (Sadler et al., 2018). Within primary health care settings, GPs are seeing an increased number of pre-school children presenting with behavioural concerns (Mughal & England, 2016).

Whilst a variety of behavioural presentations in response to different circumstances and environments is considered a normal part of childhood emotional and social development, it is essential that caregivers feel able to respond appropriately to help children model and learn alternative ways of communicating their emotions and needs (O'Connor et al., 2013). Community studies have shown that over 80% of pre-school children have tantrums regularly (Hong et al., 2015) and that failure to support children in developing emotional regulation skills increases the risk of developing Conduct Disorder (Belden et al., 2008). With 60% of 3-year olds with conduct disorder continuing to exhibit challenging behaviour in adolescence (including substance misuse, criminality and significant mental health problems), early years intervention is paramount for long-term outcomes (Broidy et al., 2003). Research by Thomas et al. (2013) supports this, showing that NICE recommended Social Learning Theory Based programmes are most effective when delivered with younger children (NICE, 2013).

There are currently several well-known parenting programmes such as The Incredible Years (Webster-Stratton, et al., 2004) and the Triple P parenting programme (Sanders, 1999). These group programmes are traditionally delivered weekly over a few months, either by clinicians or specialist providers. Whilst both group programmes have shown efficacy, a scoping study exploring overall effectiveness in population prevention highlighted several barriers as a preliminary preventative offer. These included high cost, time commitment and accessibility for working parents (Lindsay et al., 2011). Many of these groups are run by Child and Adolescent Mental Health Services (CAMHS), meaning that many families do not meet the threshold for support and therefore miss out, not benefiting from this level of expertise.

Little et al. (2012) reviewed several parenting interventions. The Incredible Years programme showed good effect, but high cost implementation and high drop-out rates. The Triple P programme showed no effect, and this was partially ascribed to the fact that they were working with slightly older children up to the age of nine, where difficult behaviours become more entrenched. Khan et al., (2015) found that group parenting courses cost on average £1200 per family whilst individual parenting programmes cost around £1800 to deliver. In comparison, school-based programmes cost on average £108 per child (Khan et al., 2015). Despite the cost of delivery, the impact on future life outcomes represents an average return of around £13 for every £1 invested in early years' interventions. The Children's Commissioner is now advocating a 'whole school approach' to early intervention support, focusing on the improvement of well-being of all pupils and providing wrap around support for families when needed. With only 18% of schools identifying clinical modules to be introduced, and with the average spend on low level services just £14 a child, it is reasonable to speculate that clinically underpinned digital tools may be the only way to achieve this (Children's Commissioner, 2021).

The issue of early childhood mental health has been further compounded by the global COVID-19 pandemic. Young children and single parents were some of the most effected by COVID-19. 63% of single parents reported high levels of worry or anxiety whilst 66% of primary school aged children reported sign of anxiety (Kousoulis et al., 2020). Due to measures implemented to manage the pandemic, the demand for children's mental health services increased (Children's

Commissioner, 2021). The COVID-19 pandemic also caused further disruption to service provision, with face-to-face appointments significantly reduced and the majority of parental support groups cancelled or moved to live video sessions that often clashed with home schooling and childcare.

With growing concerns around early years' emotional development, digital tools provide a feasible alternative to early intervention and preventative responses. The Children's Commissioner's report (2021) recognised that even with changes in specialist mental health provisions, over a million children with emerging needs would need early or preventative intervention each year. Clinically underpinned digital tools are highlighted as one such way of doing this. Digital health interventions for depression and anxiety in adolescents and young adults have shown some promising signs (Hollis et al., 2017); however, little research has been conducted into digital solutions in the early years and family space.

As very little research has been done into the digital delivery of early years well-being tools, the aim of this feasibility trial was to evaluate the use of a programme of digital tools for supporting emotional development, aimed at children, parents, and teachers, to establish a) if digital content would affect parent reported markers of childhood emotional well-being and b) if digital content would affect parental responses to behaviour.

Methods

Design

The study used a mixed method approach using a combination of a randomised control trial to test the efficacy of the intervention on parental outcomes and semi-structured interviews conducted at two time-points to explore parental and child perceptions of the intervention.

Within the randomised control trial, the dependent variable of interest was the parental responses to the behaviour of their child, operationalised by their total score on The Parental Scale (Arnold, et al., 1993). Parental responses are the common baseline measure collected by all early years' well-being programmes supporting parenting approaches in order to improve children's outcomes. Four subscales of this measure were also investigated: Laxness Factor (LF), Overreactivity Factor (OF), Hostility Factor (HF) and No Factor (NF). A within-subjects comparison of scores was also investigated to explore the change within parents from baseline to the period post-intervention in both the intervention and control groups.

Sample

Information about the trial was disseminated to 50 schools across the country as well as after school clubs, social network recruitments and children provisions. Parents were asked to self-identify an interest in taking part and 129 families provided informed consent to participate in the study covering the regions of London, Essex, Leeds, Blackburn and Plymouth (Table 1). Families were randomly allocated to either the intervention (n = 65) or control group (n = 64). Of the original sample, 18 families withdrew from the study leaving a final allocation of intervention group (n = 60) and control group (n = 51).

To be eligible to participate in the study, families needed to include one child aged between 2 and 7, an active internet connection and parents had to be able to speak English fluently to participate in the semi-structured interview element of the study. Exclusion criteria included individuals who did not have the capacity to provide informed consent to participate in the study.

Table 1. Participant demographic.

Primary child's age	% of sample	Male, %	Female, %	Lower SES, %	Upper SES, %
2–3	13.51	62	38	73	27
4–5	46.85	37	63	75	25
6–7	38.74	57	43	71	29

Of the original sample, 60 participants were invited to take part in two semi-structured interviews before and after the intervention to share their experiences and perceptions of the intervention. A total of 44 participated in the qualitative element of the study.

Data collection

Quantitative measures. Parents from the intervention group and the control group were asked to complete electronic versions of The Parenting Scale (Arnold, et al., 1993) at two intervals. Initial data was collected at baseline (week 0) prior to the commencement of the intervention. This process was repeated by all parents immediately at the end of the intervention (week 8). The Parenting Scale (Arnold, et al. 1993) is a 30-item validated questionnaire used to identify parental responses to common childhood behaviours. Parents responded to each item using a 7-point Likert scale identifying how they would likely reaction to the behaviour. The Parenting Scale by Arnold et al. (1993) categorises parental responses to particular behaviours into four different categories. These are Laxness Factor (a lenient response to a situation), Overreactivity Factor (a strict response to a situation), Hostility Factor (an aggressive response to a situation) or a No Factor Score (which indicates behaviour styles which do not fit into one of these three categories but shows overall parental responses). The Parental Scale (Arnold, et al., 1993) has a relatively high level of internal validity (Rhoades and O'Leary, 2007).

Semi-structured interviews. A sub-sample of the families from the intervention group (N = 44) participated in a telephone interview to explore both their perceptions and experience of the digital intervention. This consisted of a child-led interview followed by a parent-focused interview. Following consultation with our advisory group of parents, clinicians and teachers, an interview schedule of 8 semi-structured questions was drawn up, with four questions aimed at the children and four questions aimed at the parents/carers. Questions were designed to elicit details from the children and parents about their current emotional well-being and coping strategies. For example:

Q6. Identify and elicit details from the parent on perceived strengths and difficulties in relation to supporting children's emotional well-being.

Examples of good practice.

Things they find difficult.

Differences in the way they and partners respond to the children.

Interviews lasted between 40 minutes to an hour, following an interview schedule of semi-structured questions which were co-selected with representatives from our patient and public participation group.

The Embers the Dragon intervention

Following completion of measures at week 0, the intervention group was then given access to The Embers the Dragon programme. The programme is underpinned by social learning theory and self-determination theory. All content was accessed via the website using an access code. Two, 6 minute

children's animations were created, with story lines exploring a key emotional development point and outcome. 'Hurry Up Embers' explores the physical reaction to the fight and flight response, the type of scenario in which a child might experience this sort of reaction, and positive coping strategies, whilst 'Buzz Off' explores the importance of difference and competence building. Each episode was accompanied by explanation videos for parents and activities that could be downloaded and completed with children. Each episode introduces constructs such as colours for emotions and practical communication and coping strategies and carries these themes forward through ideas for games, discussion themes and reward tokens in the form of associated lesson plans and downloadable parenting resources. These lesson plans are linked to the Early Years Foundation Stage (EYFS) statutory framework (Department for Education, 2017).

During the testing period, schools used the platform to underpin emotional resilience in the classroom delivering one themed lesson a week and introducing the tools in daily classroom routines and setting home practice activities. Parents accessed the content from home as desired. The control group continued with school delivery of PHSE as usual. Measures were repeated after 8 weeks.

Data analysis

Data was initially screened to determine whether the data met the necessary assumptions to run a parametric statistical test. Independent *t*-tests were then used to compare the mean scores between the intervention and control group at baseline and post-intervention. Related *t*-tests were also used to explore differences within participants' baseline responses and post-intervention scores for both the intervention condition and the control group.

Thematic Analysis was used to analyse the qualitative data collected through the semi-structured interviews. Researchers followed the guidance of Braun and Clarke (2006) following a six-stage approach to analysis. To become familiar with the data, the transcripts of each interview were read multiple times by members of the research team. Following this, each transcript was coded highlighting descriptive and conceptual elements of the interview. Once all the interviews had been coded, the research team developed a coding framework to identify candidate themes. These candidate themes were then critically questioned concerning the extent to which they conceptually represented the data. Once the researchers had satisfied their critical reflections, the themes were finalised and conceptually labelled. Separate frameworks were created for child responses and parental responses to assist the systematic interpretation of the interviews.

Ethical considerations

Ethical approval for this study was granted by the Manchester Metropolitan University Research Ethics and Governance Committee.

Results

Parenting measure outcomes

The quantitative result summaries in Table 2 indicate significant benefits from the Embers the Dragon programme when offered as a digital parent/child tool for parental response in emotional development. Whilst there was no significant difference in baseline outcomes between the two groups, the intervention group showed a significant improvement across all four parenting styles. Parents in the intervention group showed a mean improvement of 0.49 in laxness factor and a mean

improvement of 1.04 in over-reactivity. These improvements suggest that the intervention was effective in changing parenting style in comparison to the control group where parents demonstrated a mean difference of 0.10 laxness factor and 0.12 in over-reactivity. Overall, parents in the intervention group showed a mean 0.58 difference in parenting score whereas parents in the control group showed a mean difference of just 0.04 (Table 3).

Prior to the intervention, 44 out of 60 parents in the intervention group scored above the recommended clinical cut off score for intervention across at least one category. After the intervention, only 1 parent scored above the clinical cut off score for at least one category. Meanwhile, the control group, who did not receive the Embers the Dragon programme, showed no significant changes over the 8-week period as shown in Table 3 and 31% of parents continued to score above clinical threshold after the 8 weeks was up.

Semi-structured interviews

Children's interview outcomes. Upon analysis of the child-led interviews, two themes were identified from the data set: Emotional Identification (EI) and Coping Strategies (CS).

Table 2. Intervention group parenting outcomes.

Mean Factor Scores					
	Pre-intervention (n = 60)	Post-intervention (n = 60)	Estimated mean difference (95% CI)	Statistical significance	Effect size (d)
Laxness Factor	3.0	2.5	0.49 (0.24–0.75)	P<.01	0.51
Over-Reactivity Factor	3.0	1.9	1.04 (0.74–1.34)	P<.01	0.89
Hostility Factor	1.5	1.1	0.36 (0.09–0.17)	P<.01	0.48
No Factor	61.0	52.2	8.84 (1.71–5.42)	P<.01	0.67
Scale Score	3.2	2.6	0.58 (0.09–0.39)	P<.01	0.81

Arnold and O'Leary Patenting Scale (higher scores equate to greater problems).

Table 3. Control group patenting outcomes.

Mean Factor Scores					
	Pre-intervention (n = 51)	Post-intervention (n = 51)	Estimated mean difference (95% CI)	Statistical significance	Effect size (d)
Laxness Factor	2.6	2.5	0.10 (0.00–0.19)	P>.05	0.30
Over-Reactivity Factor	2.9	2.8	0.12 (0.00–0.25)	P>.05	0.27
Hostility Factor	1.3	1.2	0.07 (−0.01–0.15)	P>.05	0.25
No Factor	57.0	57.2	−23 (−1.57–1.1)	P>.05	0.49
Scale Score	2.9	2.9	0.04 (−0.02–0.99)	P>.05	0.17

Emotion identification. From the children's interviews at baseline, there were key themes identified around emotion identification. The majority of children were unable to identify more than two emotions or find language or non-verbal communications that might describe an emotional state.

> 'Some things make you happy, like when you play and when you get in trouble you get sad and might cry'.

The majority of children could only identify happy or sad as feelings and could give examples of what made you feel that way but not what to do about it or any other feelings.

During the children's interviews completed in week 8, there was a marked increase in the number of codes created around emotional identification and a change in communication emerged.

> 'You can feel lots of different ways and sometimes you can feel two ways at the same time, like angry and sad'.

> 'Sometimes you don't know how you feel but your body feels all funny and you can feel sick or shaky and it means your body is telling you something'.

Over half of the children identified more than four feelings, with the majority of children describing, either verbally or non-verbally how their body feels when they get a certain feeling. All of the children referred to learning they had seen in the episodes.

> 'When I'm annoyed, I get silly feet that tap and move until my teacher says to jump the feeling out or run like Embers'

For example, both the animations and activity sheets feature the 'Keiki Tree' whose leaves change colour to reflect different emotional states. Many children made reference to using the 'Keiki colours' to describe different feelings.

> 'When your angry you can feel red and you can show that colour to your mummy'.

Coping strategies

During the initial interview none of the children were able to identify an independent coping strategy to manage a difficult emotion.

> 'I cry or have a hug from mummy'.

All of the children described seeking comfort from parents as the only way to manage 'sad' feelings, indicating that they had not yet developed awareness of essential emotional regulation skills which are important for school and other areas where they are independent of their parents.

Upon analysis of the interviews conducted post-intervention, children had developed creative ways of communicating their emotions and appeared to have developed their own coping strategies.

'You can run really fast on the spot'

'I like to use my glitter bottle and do *dragon breaths*'

Some of the children were able to give unique ideas that had not featured in the programme, like giving a friend a flower or petting their dog, demonstrating they had potentially expanded on the initial learning and suggestions to autonomously consider other things that can help them feel good.

Parents' interview outcomes

Upon analysis of the parent interviews, two themes were identified from the data set: Parental self-efficacy (PS) and Developing closer familial relationships (FR).

Parental self-efficacy

During baseline interviews many parents reported feeling uncertain that they knew the best ways to support their children.

'I really worry about her, she's a very shy child and sometimes I don't know if I'm making it worse'.

Almost all parents expressed feelings of uncertainty during their baseline interviews, regardless of how they described their children, using words like worried, unsure and scared.

However, during the parent interviews completed in week 8, all the parents interviewed descried feeling more confident in their parenting. An example includes this feedback from a mother of two children, 'I just feel reassured that I know how to do a good job'.

Reassurance was a common word amongst the parents, suggesting that knowledge was not necessarily new, but having it delivered through a programme of content underpinned by clinical professionals provided an authenticity, which in turn created empowerment.

During baseline interviews, parents seemed unsure of talking about emotions.

'I'm not sure you need to really, he's a bit young to understand surely?'

This perception that children were too young to talk about emotions, or that parents were unsure of how to talk about emotions, reflected the children's interviews where they were unsure of more than two emotional states.

However, post intervention, as the children's identification of emotions improved, so did parents confidence in communicating them.

'I would always try to put on a happy face, but now if I'm a bit upset I tell my children how I am feeling, why I might feel that way and what I'm going to do to make myself feel better. They really seem to take it on board and even copy me sometimes'

The identification of strategies that promotes awareness and problem solving in children suggests a shift from previous thought patterns around an unwillingness to discuss emotional states: a key element when considering a change to authoritative parenting.

Developing closer familial relationships

During base line interviews, parents described a variety of temperaments including 'shy', 'energetic' and 'anxious'. Parents expressed a lot of worry over their children's emotional state. However, through an increase in play and time spent together, parents not only described more confident children but also a closer bond

> 'We play every day now, even if it's just for a bit and [child's name] love's it'.

Whilst the programme is delivered digitally, much of the content encourages parents to engage in child-led play and activities away from the screen, and in engaging with these, parents started to notice a chance in their children's behaviour.

> 'Since we started having that dedicated time, I really feel like she's come out of her shell. She's happy to lead the game and tell me what to do and she's more patient if I need a moment away with the baby'.

This demonstrates an important emotional regulation skill for children and the importance in parental play in reinforcing this.

It was not just child–parent relationships that appeared closer. During baseline interviews, many parents reported having differing views on parenting approaches.

> 'I think I'm quite good at trying to praise them but their dad doesn't believe in that and thinks it can spoil them'.

Different approaches to behaviour can be confusing for children and exacerbate behavioural challenges. However, whilst the first interviews highlighted a key theme of parental differences in approach, secondary interviews showed that this had substantially reduced with many parents reporting that they now felt they had similar approaches.

> 'I just think we understand between us now how important it is to act together on this and so we do'.

This dynamic shift is essential to creating stable boundaries for children to explore and grow, developing more autonomy and awareness of their world and the opportunity to celebrate successes as a family.

Over half of the parents described an improvement in the overall family communication, reporting positive effects on adult-to-adult as well as adult-to-child relationships. Parents also described new strategies their children had developed to explain feelings, using examples from the programme where their child had practiced a skill and they had celebrated together.

> '[Child's name] has really taken to using his squeezy ball and we tell him how proud we are of him for not hitting anymore and he just lights up. The whole house is just more enjoyable'.

Implementing celebration into the culture of the family is not just important for developing relationships and creating stable attachments but also for encouraging autonomy and curiosity in children who feel safe and loved.

Discussion

This feasibility trial aimed to explore the effect of a systemic digital platform in supporting children and parents to identify and respond constructive to developmental emotions and behaviours, enhancing children's perceived emotional development and parental self-efficacy.

The themes from the children's interviews showed a clear change in their identification of emotions and a demonstration of knowledge of key learnings from the programme. The findings revealed that many children of nursery and school readiness age need support to identify positive coping strategies that can be used independently or with minimal support. Jones et al. (2005) showed that there is a significant association between social-emotional skills at age 5 and well-being in adulthood. Children who were able to regulate their emotions at age 5 were also less likely to use substances or engage in criminal activity. Importantly, our findings demonstrated that children could identify at least one coping strategy after use of the programme. Further longitudinal follow-up into the implementation of these skills would further enhance our understanding of the programme's effect.

Meanwhile, the parental responses showed a significant improvement in their parental self-efficacy and confidence to respond to their children's emotional development needs. There was a significant improvement in the presentation of both lax (lenient) and over reactive (authoritarian) parenting responses. Parenting style is widely attributed to long-term outcomes for a child's emotional development. The concept of parenting styles originated with Baumrind (1967) who established four core categories of parenting style: 'Authoritarian' (low warmth, high conflict and coercion), 'Authoritative' (high warmth, positive autonomy promoting control), 'Permissive' (high warmth but low control attempts) and 'Disengaged' (low warmth and low control attempts). These are still held to be relevant today. O'connor & Scott, 2007 demonstrated children of authoritative parents are more likely to be prosocial, academically and socially competent, whereas children of authoritarian or permissive parents are more like to display behaviours of concern and significantly worse life outcomes. Therefore, the reduction in both over reactive and lax parenting responses is preferential in influencing children's outcomes.

Furthermore, parental feedback showed an increase in their perceived confidence of supporting their children and in a joint approach to parenting. A consistent approach to parenting responses is essential in supporting children to feel safe and contained and preventing the development of coercive behavioural cycles (McMahon & Forehand, 2005). Supporting parents to feel empowered to follow consistent response patterns that are further reinforced by complementary school responses is an important step in supporting early childhood outcomes.

This study suggests that significant results can be gained through the digital delivery of a social learning theory-based tool, with potential benefits to children's emotional and behavioural development by educating both children and parents. As a feasibility trial, this study shapes our understanding of potential benefits associated with an inclusive preliminary intervention that can reach population scale in a way that traditional parenting interventions cannot. Further research is now needed to explore the scope of this approach both in terms of context and reach. Further research into the efficacy of the programme on child reported outcome measures will improve our understanding of the programme's effect. Further content development exploring key childhood development points will enable us to understand the wider potential for this systemic approach to early intervention in the early years, whilst a large-scale longitudinal evaluation will allow us to explore benefits and limitations in a large population cohort over a prolonged period.

Conclusion

Our early years' experiences are pivotal to our future life outcomes. With parenting style and emotional development providing a core foundation to children's futures, it is essential that scalable solutions are developed to empower all families to access clinically underpinned, evidence-based and accessible support. With increasing concerns regarding the development of childhood mental health issues, early intervention is more imperative than ever and a cost-effective means of engaging the community as a whole is essential in creating a social change in the support of children.

Whilst the digital design allowed for a wider scale and a more autonomous uptake, accessibility for lower income families could be a limitation. Ready access to an active internet connection could limit the potential impact of digital programmes in areas of social deprivation. Further research into the accessibility of internet services to low-income families was however, outside the scope of this study, as was any language implications.

The overwhelmingly positive response of participants to the animated characters and the request for future stories showed a connectivity to the programme and the content. Participant feedback showed a real enjoyment of the programme and a desire to see more topic areas covered in future work. Whilst further research is needed to explore the expansion of this pilot into a full programme and a larger scaled adoption, these findings do suggest that a digitally enabled systemic approach to parenting and children's emotional development can be effective in improving outcomes for families instead of, or as an adjunct to, traditional, in-person, therapeutic intervention.

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Ethical information

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