

RUNNING HEAD: Wellbeing among children with dyslexia

Piloting ‘Clever Kids’: A randomised-controlled trial assessing feasibility, efficacy, and acceptability of a socioemotional wellbeing program for children with dyslexia

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Conflicts of Interest

Mandy Nayton is the Chief Executive Officer of the Dyslexia-SPELD Foundation. Suze Leitão is a board member of the Dyslexia-SPELD Foundation. Mark Boyes and Mary Claessen are members of the Dyslexia-SPELD Foundation.

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Abstract

Background: Children with dyslexia are at elevated risk of internalising (emotional) and externalising (behavioural) problems. Clever Kids is a nine-week socioemotional wellbeing programme developed specifically for upper primary school children with dyslexia. **Aims:** In a small randomised-controlled trial, we tested the feasibility, efficacy, and acceptability of the Clever Kids programme. **Sample:** Forty children ($M_{age} = 10.45$ years, 65% male) with clinically-diagnosed dyslexia. **Method:** Children were randomised to either attend Clever Kids ($n = 20$) or to a wait-list control condition ($n = 20$). Coping skills, self-esteem, resilience, emotion regulation, as well as internalising and externalising symptoms were measured at pre-programme, post-programme, and at three-month follow-up. **Results:** Recruitment and retention rates indicate high feasibility for further evaluation of the programme. There was a significant interaction between intervention condition and time for non-productive coping [$F(2, 76) = 4.29, p = 0.017, f^2 = 0.11$]. Children who attended Clever Kids significantly reduced their use of non-productive coping strategies and this was maintained at three-month follow-up assessment. For all other outcomes, the interactions between intervention condition and time were non-significant. The programme appears acceptable to children with dyslexia and their families, but may be improved by reducing the number of activities involving reading and writing. **Conclusion:** Clever Kids improved the coping skills of children with dyslexia; however, a larger trial is needed replicate this finding and investigate if programme attendance is associated with additional improvements in children's socioemotional wellbeing.

Keywords: Reading Difficulties; Dyslexia, Mental Health, Coping, Self-esteem; RCT

Approximately 10% of children have substantial difficulties learning to read (Snowling, 2008), representing between one and three students in a typical classroom. In addition to reading difficulties, children with dyslexia are at elevated risk of mental health problems (Francis et al., 2019). However, there has been little attempt to develop and evaluate mental health interventions for children with dyslexia. In this study, we piloted the feasibility, efficacy, and acceptability of a socioemotional wellbeing programme developed specifically for children with dyslexia.

Reading impairments are associated with internalising (emotional) and externalising (behavioural) disorders (Carroll et al., 2005; Francis et al., 2019). In a large study of children and adolescents, Carroll et al. (2005) reported children with reading difficulties were significantly more likely to score in the clinical range than children without reading problems. Consistent with this, a recent meta-analysis reported robust associations between poor reading and anxiety and depression (Francis et al., 2019). Importantly, longitudinal studies demonstrate reading difficulties are prospectively associated with internalising and externalising symptoms (Arnold et al., 2005; Halonen et al., 2006), and are a risk factor for the development of mental health problems.

Although evidence for relationships between reading difficulties and poor mental health is accumulating, less research has investigated why this is the case (Boyes et al., 2016). A number of potential risk/protective factors have been identified. Specifically, a reliance on ineffective coping strategies (Alexander-Passe, 2006; Leitão et al., 2017), difficulties in emotion regulation (Boyes et al., 2020; Singer, 2005), low self-esteem (Boyes et al., 2020; Boyes et al., 2018; McArthur et al., 2020; Terras et al., 2009), as well as peer relationship problems and a lack of social support (Boyes et al., 2020; Claessen et al., 2020; Leitão et al.,

2017) are all associated with mental health among children with dyslexia. These factors are all robustly linked with mental health in the broader child psychology literature (Toumbourou et al., 2014), and are explicitly targeted in universal school-based mental health promotion programmes. However, while universal programmes are associated with improvements in mental health (Neil & Christensen, 2009), their reliance on literacy skills to access program content means whole-school programmes may not be optimal for children with reading difficulties.

Firth and Frydenberg (2011) developed a coping programme designed for upper primary school generally, but which also has a focus on children with learning difficulties (including dyslexia). Although programme-related improvements in coping skills were reported (Firth et al., 2010; Firth et al., 2013), the programme has not been tested in rigorous randomised trials. Additionally, measures of internalising/externalising symptoms were not administered, so whether participation translates into improved mental health is unknown. Furthermore, the intervention is implemented using a whole-school approach, with learning difficulties components nested within a universal coping programme. While universal programmes are cost-effective and reduce risks for later mental health problems (Neil & Christensen, 2009), they are difficult to implement, requiring a concerted effort by school administration and staff. Given these limitations, the Dyslexia-SPELD Foundation have adapted the Firth and Frydenberg (2011) programme and developed *Clever Kids*, a socioemotional wellbeing programme accessible to children with reading difficulties. *Clever Kids* targets children in their final two years of primary school, as the transition from primary to secondary school is particularly stressful for children with dyslexia due to the increased educational demands and expectations placed on children regarding quantity and quality of reading and writing.

Clever Kids consists of nine weekly sessions (~75 minutes), attended outside school hours over one term. The programme is implemented by psychologists and conducted in small groups ($n \sim 10$), giving attendees the opportunity to meet other children with dyslexia. Clever Kids focuses on assisting children accept their dyslexia diagnosis and the associated difficulties they may experience. The programme addresses a range of socioemotional skills, including the use of productive coping strategies, recognising and regulating emotions, resilience and self-esteem, problem-solving skills, and perseverance. The programme also addresses support-seeking, including the importance of relationships with family, peers, and teachers, as well as the role of assertiveness in developing and maintaining relationships and managing interpersonal conflict (Table 1). The programme includes a combination of explicit instruction, modelling, role-playing, and ongoing revision of concepts being taught. Activities have been designed for children with dyslexia, and parents are informed of content so they can support children in practicing skills through homework exercises.

(Table 1)

We piloted the feasibility, efficacy, and acceptability of Clever Kids. Specifically, we assessed feasibility of recruiting and maintaining participants in a randomised-controlled trial. We also evaluated efficacy of the programme in improving socioemotional outcomes among children with dyslexia. We hypothesized improvements in mechanisms targeted by the programme, namely coping, emotion regulation, resilience, and self-esteem (primary outcomes). We also predicted reductions in internalising and externalising symptoms (secondary outcomes). Finally, we assessed acceptability by recording enjoyment and perceived utility of each session, homework completion rates, and obtaining feedback from

programme attendees. We pre-registered the trial on the Australian New Zealand Clinical Trials Registry (ACTRN12618001935224)¹.

Method

Design

We conducted a small randomised-controlled trial, powered to identify medium intervention effects². Participants were randomised to attend Clever Kids (intervention condition) or a wait-list control condition. We assessed all outcomes before randomisation (pre-programme), at programme completion (post-programme), and three-month follow-up.

Participants

Forty children (Male = 26, Female = 14, M_{age} = 10.35 years, SD = 0.53 year) and 40 primary caregivers (Mother = 38, Father = 2) from a large Australian city took part in the study. Our sample did not include any Aboriginal or Torres Strait Islander children and the majority of children were of Australian, English, Irish, Scottish, Italian, or Dutch ancestry. In order to participate, children were required to have a diagnosis of dyslexia and be in their final two years of primary school (Year 5 = 17; Year 6 = 23). Dyslexia diagnoses had been established previously by the Dyslexia-SPELD Foundations, and were based on criteria specified in the

¹As the registry only allows three primary outcomes, self-esteem was listed as a secondary outcome in the protocol. However, the intention was to have proposed mechanisms targeted by the programme (coping, emotion regulation, resilience, and self-esteem) as primary outcomes, with child mental health (internalising and externalising symptoms) conceptualised as more distal secondary outcomes. The Frostig Success Attributes were specified as exploratory outcomes in the protocol; however, due to poor psychometrics we have not reported on these.

²The power analysis was conducted using G*Power (3.1.9.4; Faul et al., 2007) for a repeated measures design (within-between interaction) with 2 groups and 3 time points. We specified a medium effect size (partial η^2 = 0.06) and correlations among the repeated measures (r = 0.55). We also applied a non-sphericity correction, as this assumption is often violated in repeated measures designs (ϵ = 0.50). According to this a priori analysis, a total sample of 40 (20 per group) was needed to achieve 80% power with an alpha of 0.05. Given that the study was a pilot, we did not apply any alpha correction for multiple comparisons in the power analysis.

DSM-5, including failure to respond as expected to at least six months of targeted and explicit literacy intervention (American Psychiatric Association, 2013). After receiving a diagnosis, all children are strongly encouraged to continue to participate in carefully structured and targeted literacy intervention. Children were not eligible to participate if they were receiving psychological treatment or had additional complex needs (e.g. comorbid autism diagnosis, intellectual disability).

Measures

Feasibility

We assessed feasibility by monitoring *i*) response rates to emails inviting families to participate, *ii*) breadth of recruitment strategies needed to achieve the required sample, *iii*) retention rate across the trial, and *iv*) programme attendance across sessions.

Efficacy

Primary outcomes were assessed with well-validated measures. We assessed coping skills with the short-form of the Adolescent Coping Scale – 2nd Edition (Frydenberg & Lewis, 1993). This 20-item scale assesses the use of both productive (e.g. “Look for support and encouragement from others”) and non-productive (e.g. “Shut myself off from the problem so I can try and ignore it”) coping strategies. Internal consistency for the productive coping subscale ranged between $\alpha = 0.63$ (post-programme) and $\alpha = 0.81$ (pre-programme). Internal consistency for the non-productive subscale ranged between $\alpha = 0.62$ (three-month follow-up) and $\alpha = 0.74$ (pre-programme).

We assessed emotion regulation with the 10-item Emotion Regulation Questionnaire for Children and Adolescents (Gullone & Taffe, 2012). Items measure two emotion regulation

strategies, cognitive reappraisal and expressive suppression. Cognitive reappraisal refers to redefining an emotion-eliciting situation so that its emotional impact is changed, whereas expressive suppression refers to inhibiting emotionally expressive behaviour. Cognitive reappraisal is associated with better mental health and expressive suppression is associated with poorer mental health (Hu et al., 2014). Internal consistency for the cognitive reappraisal subscale ranged between $\alpha = 0.79$ (three-month follow-up) and $\alpha = 0.84$ (post-programme). Internal consistency for the expressive suppression subscale ranged between $\alpha = 0.60$ (post-programme) and $\alpha = 0.79$ (three-month follow-up).

We assessed resilience using the 10-item Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007). Items (e.g. “I can deal with whatever comes my way”) are summed to generate a total score. Internal consistency ranged between $\alpha = 0.78$ (pre-programme) and $\alpha = 0.84$ (post-programme).

We assessed self-esteem with the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1979). Items (e.g. “On the whole, I am satisfied with myself”) were scored so higher scores indicated higher self-esteem. Internal consistency ranged between $\alpha = 0.75$ (post-programme) and $\alpha = 0.81$ (three-month follow-up).

Secondary outcomes were assessed using child and parent-report versions of the 25-item Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ contains five subscales; emotional problems (e.g. unhappy, depressed tearful), conduct problems (e.g. angry and often loses temper), hyperactivity (e.g. restless, cannot stay still), peer relationship problems (e.g. picked on or bullied), and pro-social behaviour (e.g. kind to younger children). Internalising symptoms scores are calculated by summing the emotional problems and peer

problems subscales. Externalising symptoms scores are calculated by summing the conduct problems and hyperactivity subscales (Goodman, 1997). Internal consistency for internalising symptoms ranged between $\alpha = 0.63$ (pre-programme, parent report) and $\alpha = 0.74$ (post-programme, child report). Internal consistency for externalising symptoms ranged between $\alpha = 0.63$ (post-programme, parent report) and $\alpha = 0.81$ (three-month follow-up, parent report).

Acceptability

We assessed programme acceptability in three ways. First, children provided ratings of their enjoyment (1: Not at all; 5: A lot) and perceived usefulness (1: Not at all; 5: Very) of each session. Second, we monitored homework completion rates. Finally, we conducted two focus groups with programme attendees to obtain detailed feedback on experiences and impressions of the programme. Two of the authors co-facilitated both focus groups. The protocol was designed to elicit information regarding programme acceptability generally, as well as acceptability of specific activities. The first focus group included children who completed Clever Kids in the intervention condition ($n = 4$) and was conducted four months after the children had completed the programme (to not compromise collection of the three-month follow-up data). Given the time lag, this focus group was conducted to pilot the protocol. The second focus group included children from the wait-list condition ($n = 5$) who subsequently completed the programme. It was conducted two weeks after the final programme session and was audio recorded and transcribed verbatim.

Procedure

We obtained ethical approvals from Curtin University. We obtained written consent from primary caregivers and written assent from children. Children were randomised to either the intervention or wait-list condition using a random number sequence. Clever Kids was

delivered in two small groups ($n = 10$) by two psychologists employed by the Dyslexia-SPELD Foundation (both attended each group). Child enjoyment and usefulness ratings were collected at the end of each session. Primary and secondary outcomes were assessed at three time-points: pre-programme, post-programme, three-month follow-up. We administered child report measures in small groups ($n \sim 4$), with the help of research assistants. Research assistants read items out loud and assisted children if needed. Primary caregivers completed the SDQ individually and research assistants were available if required. Research assistants were blind to condition at all assessments. After the three-month follow-up assessments, children in the wait-list condition completed the programme. There was no cost to attend the programme and children who completed all data collection sessions received a \$50 gift voucher. Additionally, children who attended focus groups received a \$20 gift voucher.

Results

Feasibility

We achieved our target sample size ($n = 40$) by directly emailing the parents of children in the Dyslexia-SPELD Foundation database who were in Year 5 or Year 6, had received a diagnosis of dyslexia between 2016 and 2018, and lived in the Perth metropolitan area ($n = 195$). Forty-six parents responded to the email (Response Rate = 23.6%). Five parents did not respond to follow-up emails and one child was excluded from the study as they were currently receiving psychological services. We did not need to recruit through other service providers or advertise publicly. Retention throughout all waves of data collection was excellent (Retention Rate = 97.5%). A single participant (wait-list condition) withdrew from the trial, as they were unable to attend any of the post-programme data collection sessions due to family commitments (Figure 1).

(Figure 1)

The majority of families allocated to the wait-list condition did not express any concerns or annoyance. However, one parent did indicate completing the programme at a later date was likely to conflict with school activities and excursions. Additionally, one parent expressed concern that their child would not receive the same quality of intervention because they had been allocated to the wait-list condition. This was allayed by emphasising that the same psychologists would be implementing Clever Kids for the intervention and wait-list conditions. One participant allocated to the wait-list condition did drop out of the study; however, the remaining 19 children (95%) attended all data collection sessions and completed the Clever Kids programme once data collection was finished.

Overall, programme attendance was excellent. In the intervention condition, programme attendance ranged between seven (77.8%) and nine (100%) sessions ($M = 8.50$, $SD = 0.61$). Eleven children (55%) attended all nine sessions. In the wait-list condition, attendance ranged between six (66.7%) and nine (100%) sessions ($M = 8.33$, $SD = 0.97$). Ten children (52.6%) attended all nine sessions.

Efficacy

The first author conducted the analyses and was blind to condition until results were finalised. There was minimal missing data (3.7%) and data were missing completely at random, $\chi^2(436) = 435.15$, $p = 0.502$. Missing data were imputed using expectation maximisation. As specified in the trial registration, we conducted intention to treat analyses, with the last value carried forward for the single participant who withdrew from the study

after the pre-programme assessment. Child age and gender did not differ significantly across the intervention and wait-list conditions, and we did not adjust for these in the analyses.

Efficacy of the Clever Kids programme was tested in a series of generalised linear mixed models (GLMMs) in R 3.6.2 using the lme4 package with restricted maximum likelihood estimation, which is preferred for small samples (Bates et al., 2015). In all analyses, participant was included as a random effect. Time (pre-programme, post-programme, and three-month follow-up assessments), condition (intervention vs. wait-list), and the interaction between time and condition were included as fixed effects. We tested the fixed effects using the lmerTest package (Kuznetsova et al., 2017) and used the r2GLMM package (Jaeger et al., 2016) to estimate effect sizes³. Using the emmeans package (Lenth, 2020), we calculated estimated marginal means for all primary and secondary outcomes at pre-programme, post-programme, and three-month follow-up assessments, and report these disaggregated by intervention condition (Table 2). Finally, within each condition, planned comparisons (using a Holm adjustment for multiple comparisons) tested differences over time for all outcomes.

(Table 2)

Primary Outcomes

Coping: For productive coping, the effects of condition, time, and the interaction between time and condition, were all non-significant (Table 3). Additionally, the effect of time was not significant in either the intervention, $F(2,38) = 0.47$, $p = 0.628$, $f^2 = 0.06$, or wait-list condition, $F(2,38) = 1.13$, $p = 0.335$, $f^2 = 0.03$, and none of the planned comparisons were significant in either condition.

³We report f^2 as a measure of effect size (Small: $f^2 \sim 0.02$, Medium: $f^2 \sim 0.15$, Large: $f^2 \sim 0.35$; Cohen, 1988).

For non-productive coping, the effect of condition was non-significant. The effect of time, and the interaction between time and condition were significant. Specifically, the effect of time was significant in intervention condition, $F(2,38) = 14.19, p < 0.001, f^2 = 0.75$, but non-significant in the wait-list condition, $F(2,38) = 1.10, p = 0.343, f^2 = 0.06$. In the intervention condition there was a significant reduction in non-productive coping between pre and post-programme assessments, $t(76) = 3.79, p < 0.001, d = 1.20$, which was maintained at three-month follow-up, $t(76) = 5.16, p < 0.001, d = 1.63$. In the wait-list condition, none of the planned comparisons were significant.

Emotion regulation: For cognitive reappraisal, the effects of condition, time, and the interaction between time and condition were all non-significant. Additionally, the effect of time was non-significant in both the intervention, $F(2,38) = 0.54, p = 0.587, f^2 = 0.03$, and wait-list condition, $F(2,38) = 0.53, p = 0.593, f^2 = 0.03$, and none of the planned comparisons were significant in either condition.

For expressive suppression, the effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. The effect of time was non-significant in intervention condition, $F(2,38) = 1.96, p = 0.156, f^2 = 0.10$, but was significant in the wait-list condition, $F(2,38) = 3.37, p = 0.045, f^2 = 0.18$. However, planned comparisons demonstrated no significant changes in expressive suppression over time in either condition.

Resilience: The effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. However, the effect of time was non-

significant in both the intervention, $F(2,38) = 2.00, p = 0.150, f^2 = 0.11$, and wait-list condition, $F(2,38) = 1.84, p = 0.173, f^2 = 0.10$, and none of the planned comparisons were significant in either condition.

Self-esteem: The effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. The effect of time was significant in intervention condition, $F(2,38) = 3.32, p = 0.047, f^2 = 0.18$, but non-significant in the wait-list condition, $F(2,38) = 0.67, p = 0.512, f^2 = 0.03$. In the intervention condition there was a significant increase in self-esteem between pre and post-programme assessments, $t(76) = 2.95, p = 0.012, d = 0.96$; however this was not maintained at three-month follow-up, $t(76) = 1.94, p = 0.112, d = 0.63$. In the wait-list condition, none of the planned comparisons were significant.

Secondary Outcomes

Internalising symptoms: For parent-reported internalising symptoms, the effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. The effect of time was significant in intervention condition, $F(2,38) = 4.79, p = 0.014, f^2 = 0.25$, but was non-significant in the wait-list condition, $F(2,38) = 1.18, p = 0.319, f^2 = 0.06$. In the intervention condition there was a significant reduction in parent-reported internalising symptoms between pre and post-programme assessments, $t(76) = 3.25, p = 0.005, d = 1.03$, which was maintained at three-month follow-up, $t(76) = 2.77, p = 0.014, d = 0.88$. In the wait-list condition, none of the planned comparisons were significant.

For child-reported internalising symptoms, the effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. The effect

of time was significant in intervention condition, $F(2,38) = 4.31, p = 0.020, f^2 = 0.23$, but was non-significant in the wait-list condition, $F(2,38) = 3.10, p = 0.057, f^2 = 0.16$. In the intervention condition there was a significant reduction in child-reported internalising symptoms between pre and post-programme assessments, $t(76) = 3.16, p = 0.007, d = 1.00$; however, this was not maintained at three-month follow-up, $t(76) = 1.67, p = 0.199, d = 0.53$. In the wait-list condition, none of the planned comparisons were significant.

Externalising symptoms: For parent-reported externalising symptoms, the effect of condition and the interaction between time and condition were non-significant. The overall effect of time was significant. The effect of time was significant in both the intervention, $F(2,38) = 4.77, p = 0.014, f^2 = 0.25$, and the wait-list conditions, $F(2,38) = 4.45, p = 0.018, f^2 = 0.23$. In both conditions, there were significant reductions in parent-reported externalising symptoms between pre and post-programme assessments; Intervention: $t(76) = 2.98, p = 0.012, d = 0.93$; Wait-list: $t(76) = 2.98, p = 0.011, d = 0.94$. However, these reductions were not maintained at three-month follow-up; Intervention: $t(76) = 1.63, p = 0.216, d = 0.51$; Wait-list: $t(76) = 2.17, p = 0.067, d = 0.69$.

For child-reported externalising symptoms, the effects of condition, time, and the interaction between time and condition were all non-significant. Additionally, the effect of time was non-significant in both the intervention, $F(2,38) = 1.47, p = 0.244, f^2 = 0.08$, and wait-list condition, $F(2,38) = 0.56, p = 0.575, f^2 = 0.03$, and none of the planned comparisons were significant in either condition.

(Table 3)

Acceptability

Enjoyment and usefulness ratings, as well as homework completion rates for each session, disaggregated by intervention condition, are summarised in Table 4. Whilst there was some variability in ratings, on average across the sessions children rated Clever Kids as both enjoyable (Intervention: $M = 4.30$, $SD = 0.22$; Wait-list: $M = 3.98$, $SD = 0.21$) and useful (Intervention: $M = 4.18$, $SD = 0.13$; Wait-list: $M = 3.84$, $SD = 0.18$). Overall, the homework completion rate was 61.34%; however, rates varied across sessions and groups (Intervention: 54.17%; Wait-list: 68.5%).

(Table 4)

The verbatim transcript of the second focus group was thematically analysed following Braun and Clarke's (2006) procedures. Deductive codes were applied to feedback on Clever Kids in general, as well as specific programme activities. Codes focused on participant reported "Good things", "Less good things", and "Suggested improvements". Sub-themes (and illustrative quotes) provide further detail for each code category (Table 5). To ensure rigour, each facilitator independently coded the transcript. Following this, coders met to discuss their interpretation and coding.

The relational nature of the programme was viewed favourably, and participants enjoyed meeting other children with difficulties in reading and writing. The opportunity to develop skills to cope emotionally with dyslexia, as well as contend with experiences of bullying, were viewed positively. Participants also liked activities where they could track their development and experience a sense of achievement. Overall, children liked activities they found easy (i.e. involving minimal reading or writing). In contrast, children disliked activities

requiring reading and writing, and indicated that this limited their participation and enjoyment. Homework activities were also viewed unfavourably. Moreover, these appeared to have minimal impact, as participants often had difficulty recalling the activities if they were completed at home. Suggested programme improvements included making sessions shorter and providing more modelling of tasks and activities.

In general, participant perceptions of learning environments appeared to underpin what children liked, disliked, and proposed as improvements. Sessions sitting at a desk completing activities that may require writing and/or involve homework, appear to align with undesirable school experiences. To enhance participant engagement and enjoyment, findings suggest value in adjusting the learning environment to ensure activities are not dependent on proficiency in writing, the means of delivery and space used to run the programme avoids replication of the classroom context, and where participants have sufficient opportunity to engage and connect with their peers.

(Table 5)

Discussion

In a small randomised-controlled trial, we piloted the feasibility, efficacy, and acceptability of a socioemotional wellbeing programme specifically developed for children with dyslexia (Clever Kids). Clever Kids focuses on acceptance of dyslexia and the management of associated difficulties. The programme is implemented by psychologists and focuses on the development of helpful coping and emotion regulation strategies, resilience and self-esteem, as well as problem-solving skills, perseverance, and help-seeking behaviour.

In terms of feasibility, we had no difficulty with recruitment, and we achieved our required sample by directly emailing parents of children in the Dyslexia-SPELD Foundation database who met the inclusion criteria. The Dyslexia-SPELD Foundation have identified psychosocial support as a growing area of need, with increasing parental demand for services in this area. Consistent with this, nearly a quarter of families contacted responded to the email and expressed interest in the study. We did not need to recruit through other service providers or advertise the trial publicly. We also had little difficulty in randomly allocating children to the intervention or wait-list condition, which can be a source of contention in intervention research. Additionally, programme attendance and participant retention across the trial were excellent. However, it should be noted that as part of the trial, children did not pay to attend the programme, and they received a \$50 gift voucher for completing all assessments. This likely elevated recruitment and retention rates (Novak et al., 2019). Nonetheless, taken together these findings highlight the feasibility of conducting a larger trial of Clever Kids.

Regarding efficacy, in terms of primary outcomes, attending Clever Kids was associated with significant reductions in the use of non-productive coping strategies. More specifically, children in the intervention condition (but not the wait-list condition) reported a significant reduction in the use of unhelpful coping strategies, such as avoiding problems, not telling people about their problems, and blaming themselves for their problems (Frydenberg & Lewis, 1993). This is an important finding, as a reliance on these types of strategies is associated with the development of mental health problems in children and adolescents (Compas, 1987; Guerra et al., 2016), and future research should test whether the coping skills learned in Clever Kids can prevent the development of later mental health problems. The transition from primary to secondary school may be particularly useful for testing this

possibility. This transition coincides with early adolescence, a risk period for the onset of mental health problems generally (Essau et al., 2000; Newman et al., 1996), and is particularly stressful for children with dyslexia, due to the increased educational demands and expectations placed on children regarding reading and writing (Bailey & Baines, 2012).

There were no significant intervention effects for productive coping, emotion regulation, resilience, or self-esteem. However, although the overall intervention effect was not significant, children in the intervention condition (but not the wait-list condition) reported an increase in self-esteem at post-programme assessment. This finding should be interpreted with caution however. Specifically, the group by time interaction was not significant, and in comparison with non-productive coping (medium effect), the effect was small and we were underpowered to detect it⁴. Moreover, this improvement in self-esteem was not maintained at three-month follow-up. Nonetheless, we believe this finding is encouraging and warrants a larger, more powerful trial of Clever Kids. Future implementations of the programme should also test whether including booster sessions, as done in other mental health programmes (Clarke et al., 1999; Gearing et al., 2013), may result in improved self-esteem that is maintained over time.

In terms of secondary outcomes there were no significant intervention effects for internalising or externalising symptoms (both parent and child-reported). However, although the overall intervention effects were not significant, for children in the intervention condition there were reductions in both parent and child-reported internalising symptoms. More specifically, parents of children in the intervention condition (but not the wait-list condition) reported

⁴Based on the effect size from the current study ($f^2 = 0.03$), a sample of $n = 80$ ($n = 40$ per condition) would be needed to detect the group by time interactions for self-esteem and internalising symptoms.

reductions in child internalising symptoms, and these were maintained at three-month follow-up. Additionally, children in the intervention condition (but not the wait-list condition⁵) reported a reduction in internalising symptoms, although this was not maintained at follow-up assessment. Incorporating booster sessions may assist in maintaining this improvement. However, these findings also need to be interpreted with caution. Again, the group by time interactions were not significant and the effects were small. Nonetheless, we believe these findings are encouraging and support a larger trial of the programme. It should also be noted that while a reduction in parent-reported externalising symptoms was observed, this was the case for both conditions, highlighting the importance of randomised designs in the evaluation of programmes such as Clever Kids.

In terms of acceptability, in general children found Clever Kids enjoyable and useful, although completion rates for homework tasks could be improved. More specifically, participants appreciated meeting other children who were also struggling with reading and writing, and particularly enjoyed the activities that allowed them to move around, engage with others, and develop coping skills. While the programme is structured so that activities require minimal independent reading and writing, unsurprisingly, activities involving sitting at desks reading and writing were viewed less favourably than activities involving discussion or physical activity. Feedback from participants also highlighted that having shorter sessions that incorporated examples of completed activities (e.g. from previous attendees) would be helpful. This feedback could inform future adaptations of the programme. However, taken together the findings indicate Clever Kids is generally acceptable to children with dyslexia and their families.

⁵Although this was approaching significance ($p = 0.076$), reflected in the very small effect size for the group by time interaction ($f^2 < 0.01$)

The study had a number of limitations. As mentioned previously, free programme attendance and reimbursement for completing assessments likely elevated recruitment and retention rates. Additionally, the study was underpowered to detect the small intervention effects for self-esteem and internalising symptoms, and a larger study is clearly needed. Importantly, although we firmly believe that the socioemotional wellbeing of children with dyslexia needs to be considered in conjunction with high quality evidence-based reading instruction, Clever Kids does not include a literacy support component (and we do not have any information on whether children were receiving literacy support at the time of the trial). Some previous research has combined reading fluency and self-efficacy interventions (Aro et al., 2018), and it is possible that a combination of both literacy and socioemotional intervention is required for maintenance of improvements in emotional wellbeing. This should be investigated in future research. Finally, although problem-solving skills, perseverance, and help-seeking behaviour are also targeted in Clever Kids, due to logistical constraints we were not able to assess these in the study. We were also unable to assess the quality of implementation. These should all be assessed in future trials of the programme. Relatedly, there is evidence that perceiving dyslexia to be genetic, and believing that it does not necessarily indicate a lack of intelligence, is associated with better mental health (Boetsch et al., 1996). Clever Kids explicitly addresses beliefs about dyslexia, and future research should investigate whether changes in such beliefs are associated with improvements in socioemotional wellbeing.

Bearing these limitations in mind, to the best of our knowledge this is the first study to use a randomised-controlled design to test a socioemotional wellbeing programme specifically developed for children with dyslexia. There is clear parent demand for programmes addressing the emotional health of children with reading difficulties and our findings

demonstrate the feasibility of further evaluation of the programme in larger trials. Attending Clever Kids appears to improve the coping skills of children with dyslexia. However, a larger trial is needed to replicate this and investigate if programme attendance is associated with additional improvements in children's socioemotional wellbeing. The programme also appears acceptable to children with dyslexia and their families, although it could be improved by having shorter sessions, or including more breaks, and by reducing the number of activities that involve reading and writing. These modifications should be considered in any future adaptations of the programme.

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Table 1. Structure of the Clever Kids programme.

Week	Topic
1	<p>Introduction to the programme and identifying personal strengths. Establishes that everyone in the group has reading difficulties, and that the group provides an opportunity to talk to other children likely to have experienced similar difficulties. Emphasises that although individuals with dyslexia may face challenges, they have many strengths as well. Students reflect on personal strengths and accomplishments. [<u>Example Activity</u>: <i>Identifying challenges of reading difficulties, as well as personal strengths and achievements</i>].</p>
2	<p>What does dyslexia mean to me? Discusses what dyslexia is and provides students with opportunities to share how dyslexia impacts them. Highlights that students can be successful despite their learning difficulties. [<u>Example Activity</u>: <i>Explaining dyslexia in your own words and developing the language to explain dyslexia to others</i>].</p>
3	<p>How do you cope? Introduces concepts of coping and emotion regulation. Explores different ways of coping and managing emotions and highlights that different strategies are useful in different situations. Discuss how to make helpful choices about coping with difficulties and managing emotions. [<u>Example Activity</u>: <i>Reflecting on coping with difficult situations and assessing the usefulness of different coping strategies in different situations</i>].</p>
4	<p>What are your goals? Introduces SMART (specific, measurable, achievable, relevant, and time limited) goals and highlights how helpful coping and emotion regulation strategies are important in pursuing goals (particularly in planning and responding to problems as they arise). <u>Example Activity</u>: <i>Creating and pursuing personal goals, with at least one related to academic learning</i>].</p>

- 5 **Problem solving and managing negative emotions.** Re-emphasises information from sessions 3 and 4 and applies it specifically to stress (and bodily manifestations of stress). Outlines fight, flight, freeze responses, and teaches specific stress regulation strategies [Example Activity: Breathing exercises].
- 6 **Choosing powerful thoughts.** Introduces links between thoughts, feelings, and behaviour. Discusses how to identify and challenge unhelpful thoughts and self-beliefs. Provides an opportunity to apply positive thinking strategies to situations students' identify as difficult. [Example Activity: Role-playing reappraising negative thoughts as more helpful or positive].
- 7 **Why be assertive?** Discusses differences between being assertive, aggressive, and passive (and potential outcomes of these). Highlights how to respond to difficulties by assertively trying to improve the situation, rather than acting aggressively towards others or withdrawing from the situation. [Example Activity: Identifying situations in which children would have liked to be more assertive].
- 8 **Assertiveness Skills.** Students have the opportunity to practice assertive verbal and non-verbal behaviour, including making assertive requests and using assertive body language. [Example Activity: Role-playing being assertive in a variety of different scenarios].
- 9 **Revision and integration.** Reviews the concepts, skills, and strategies that have been covered in the programme. Provides an opportunity for students to reflect on the progress they have made over the course of the programme. Celebrates the successful completion of the programme. [Example Activity: Award ceremony].
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Table 2. Estimated marginal means for the primary and secondary outcomes disaggregated by intervention condition.

	Intervention Condition			Wait-list Control Condition		
	Pre	Post	3 month	Pre	Post	3 month
	<i>M</i> [95% CI]	<i>M</i> [95% CI]	<i>M</i> [95% CI]	<i>M</i> [95% CI]	<i>M</i> [95% CI]	<i>M</i> [95% CI]
<i>Primary Outcomes</i>						
Productive	36.15	37.25	36.25	35.90	36.80	34.90
coping	[33.18, 39.12]	[34.43, 40.37]	[33.28, 39.22]	[32.93, 38.87]	[33.83, 39.77]	[31.93, 37.87]
Non-productive	22.55	19.25	18.05	21.20	19.95	20.30
coping	[20.31, 24.79]	[17.01, 21.49]	[15.81, 20.29]	[18.96, 23.44]	[17.71, 22.19]	[18.06, 22.54]
Cognitive	20.30	20.55	21.40	19.60	20.30	19.85
Reappraisal	[18.31, 22.29]	[18.56, 22.54]	[19.41, 23.39]	[17.61, 21.59]	[18.31, 22.29]	[17.86, 21.84]
Expressive	11.80	10.60	10.25	11.20	9.90	9.60
Suppression	[10.39, 13.21]	[9.19, 12.00]	[8.84, 11.66]	[9.79, 12.61]	[8.49, 11.31]	[8.19, 11.01]
Resilience	23.55	23.70	26.05	22.60	24.10	25.25
	[20.46, 26.64]	[20.61, 26.79]	[22.96, 29.14]	[19.51, 25.69]	[21.01, 27.19]	[22.16, 28.34]
Self-esteem	36.15	37.40	36.25	35.90	36.80	34.90

[33.18, 39.12] [34.43, 40.37] [33.28, 39.22] [32.93, 38.87] [33.83, 39.77] [31.93, 37.87]

Secondary Outcomes

Internalising	4.95	3.25	3.50	4.75	4.10	4.25
[Parent]	[3.61, 6.29]	[1.91, 4.59]	[2.16, 4.84]	[3.41, 6.09]	[2.76, 5.44]	[2.91, 5.59]
Internalising	7.00	5.20	6.05	6.10	4.80	5.40
[Child]	[5.50, 8.50]	[3.70, 6.90]	[4.55, 7.55]	[4.60, 7.60]	[3.30, 6.30]	[3.90, 6.90]
Externalising	7.85	6.20	6.95	8.35	6.70	7.15
[Parent]	[6.28, 9.42]	[4.63, 7.77]	[5.38, 8.52]	[6.78, 9.92]	[5.13, 8.27]	[5.58, 8.72]
Externalising	8.90	8.10	7.85	7.40	6.90	6.90
[Child]	[7.41, 10.39]	[6.61, 9.59]	[6.36, 9.34]	[5.91, 8.89]	[5.41, 8.39]	[5.41, 8.39]

Table 3. Summary of inferential statistics and effect sizes from Generalised Linear Mixed Models for all primary and secondary outcomes.

	Condition			Time			Condition*Time		
	<i>F</i>	<i>p</i>	<i>f</i> ²	<i>F</i>	<i>p</i>	<i>f</i> ²	<i>F</i>	<i>p</i>	<i>f</i> ²
<i>Primary Outcomes</i>									
Productive coping	0.17	0.684	< 0.01	1.35	0.266	0.04	0.17	0.841	0.01
Non-productive coping	0.14	0.708	< 0.01	11.09	< 0.001	0.30	4.29	0.017	0.11
Cognitive Reappraisal	0.49	0.482	0.01	0.56	0.571	0.02	0.51	0.602	0.01
Expressive Suppression	0.67	0.418	0.02	5.01	0.009	0.14	0.01	0.995	< 0.01
Resilience	0.06	0.811	< 0.01	3.56	0.033	0.10	0.28	0.755	< 0.01
Self-esteem	0.19	0.667	< 0.01	4.04	0.021	0.18	1.14	0.325	0.03
<i>Secondary Outcomes</i>									
Internalising (Parent)	0.31	0.584	0.01	5.77	0.005	0.12	1.23	0.299	0.03
Internalising (Child)	0.47	0.498	0.01	7.41	0.001	0.14	0.19	0.825	< 0.01
Externalising (Parent)	0.16	0.695	< 0.01	9.10	< 0.001	0.23	0.10	0.907	< 0.01
Externalising (Child)	1.68	0.203	0.04	1.96	0.148	0.05	0.21	0.807	< 0.01

Note: Significant *p* values are bolded.

Table 4. Summary of enjoyment and usefulness rating, as well as homework completion rates, disaggregated by intervention condition.

	Intervention Condition			Wait-list Control Condition		
	Enjoyment – M [SD]	Useful – M [SD]	Completed Homework	Enjoyment – M [SD]	Useful – M [SD]	Completed Homework
Session 1	4.50 [0.58]	4.25 [0.50]	60%	3.65 [0.99]	3.59 [0.94]	80%
Session 2	4.13 [1.25]	4.07 [1.10]	75%	3.94 [0.99]	3.83 [0.92]	100%
Session 3	4.44 [0.70]	4.25 [0.81]	No homework	4.00 [1.03]	3.94 [0.93]	No homework
Session 4	4.05 [0.76]	4.00 [0.79]	55%	4.00 [1.10]	3.81 [1.05]	83%
Session 5	4.18 [0.77]	4.26 [0.73]	55%	3.94 [1.03]	3.88 [0.99]	67%
Session 6	4.41 [0.87]	4.35 [0.86]	45%	3.93 [0.96]	3.53 [1.06]	61%
Session 7	3.95 [1.10]	4.16 [0.96]	35%	3.82 [0.88]	3.94 [0.97]	20%
Session 8	4.47 [0.62]	4.00 [1.00]	No homework	4.12 [0.86]	4.06 [0.90]	No homework
Session 9	4.56 [1.04]	4.18 [1.24]	No homework	4.41 [0.94]	4.00 [0.87]	No homework

Note: Due to errors in data collection, in the intervention condition only four children (20%) provided enjoyment and utility ratings for Session 1 and in the wait-list condition homework completion was only recorded for 56% of children (i.e. only one of the groups) for Sessions 1 and 7.

Table 5. Thematic findings from the focus group.

Theme Name	Theme Description	Illustrative Quotes
<i>“Good things” about the programme</i>		
<i>Connection with peers</i>	Programme participation allowed opportunity to engage and have fun with similar peers.	<i>“...t was more fun for me because my group always makes jokes about the lesson and stuff and we all have a good time and stuff. So, it's like we have lots of fun.</i>
<i>Skills to cope</i>	Participants viewed the programme as well suited to kids who may benefit from learning skills to cope with their dyslexia.	<i>"I guess I'd just say it depends on how you feel about dyslexia and that kind of thing. If you're okay with it I'd say maybe go and see how it is. If you're have an idea about then definitely go, but if you're really confident then you can probably miss out on it."</i> <i>“...I would say to someone if they would want to go to Clever Kids, I would say, "You should do it because it's helpful and you get to learn how to cope with dyslexia and it would be just easier to improve your grades like that,"</i>

<i>Skills to contend with bullying</i>	Activities that develop skills to educate and stand up to those who do not have or understand dyslexia were viewed favourably.	<p><i>"Well, some people don't understand dyslexia and stuff so just showing them where you feel the stuff and where the other people that don't have dyslexia feel it. So maybe they have different places that they feel it and to someone like me they don't feel it in the same spot."</i></p> <p><i>"... And also, I already stand up for myself anyway because a lot of people in my school they're like sort of mean because they hurt people."</i></p> <p><i>"...sort of helpful because you can stand up for yourself now because if you don't know it you can just stand up for yourself now. And if someone's like bullying you or something you can just say, "When you do this certain stuff I'd like you to stop and I feel sad and angry when you do it."</i></p>
<i>Opportunity to develop</i>	Activities that allowed participants to track and reflect on their development were viewed favourable.	<p><i>"I like this activity because I put a goal down and I got the goal in four days of putting it down."</i></p> <p><i>"It's good because we did the same thing at the end of the lesson or the end of the different lessons right the way through so it kind of showed that we'd changed our strategies over the time..."</i></p>

<i>Accessible activities</i>	Activities participants found easy and did not require writing tended to be more acceptable (even if the activity was not perceived as beneficial to them).	<i>"So, it was mostly easy but not really helpful"</i> <i>"So some people drew, some people wrote, and some people asked the teacher for help so they can write it down. But they said that if you don't want to write just ask another student or teacher if they done. If the student's done they can just help you or they could just draw it."</i>
<i>"Less good things" about the programme</i>		
<i>Inaccessible activities</i>	Writing presented as a barrier to participation. Activities dependent on writing proficiency were described as hard, unenjoyable and were less acceptable.	<i>"Because I didn't really like writing."</i> <i>"No, I just don't like writing."</i> <i>"... Because I didn't like as much writing and I thought it was hard to think of some of the solutions for the problem."</i> <i>"I can't, like, can't always remember my goals so I spent a while just trying to write one and then I couldn't think of a solution. Any solutions."</i> <i>"I just thought it was a really hard activity."</i>
<i>Homework</i>	Homework activities were not preferable. Participants had difficulty recalling	<i>[Exchange between participants endeavouring to recall a homework activity]</i> <i>PI: "Yeah, we took it home for homework."</i>

homework activities and tended to rate them poorly.

P2: "Oh yeah, that's also what I did. We had to do it because didn't have time, so."

Suggested Programme Improvements

Learning through example Examples for each activity were suggested as a way to help facilitate engagement in activities. This was particularly the case for goal setting activities, which were often viewed as challenging. Example responses from previous programme participants presented as an empowering suggestion to learn from peers.

"Give an example."

"... Maybe they can just like from the people that like us they could just ... The kids that do it in the future they can listen to the people in the past so what they think about it."

Session Duration Shorter and potentially more regular sessions were posed as preferable.

"Maybe make the lessons a bit shorter?"

"Well, I would make it shorter but I would have more lessons so you could get more things done throughout the weeks. You would have more lessons, but you would have less time."

Figure 1: Participant flow diagram.

