Response from MultiLit to the MiniLit Learning Impact Fund Evaluation Report

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August 2019

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Executive summary

MiniLit is a small group reading program for Year 1 children who are having difficulty learning to read. It is an explicit and systematic early intervention developed by MultiLit.

In 2017, MultiLit collaborated with Evidence for Learning and the New South Wales Department of Education to undertake a trial of the MiniLit program. MultiLit provided training, resources and limited coaching to schools implementing the program. The trial was evaluated by an independent team of researchers.

Reading outcomes for children who had attended MiniLit were compared to children who had not attended MiniLit. The primary outcome measure chosen for the trial was the York Assessment of Reading for Comprehension - Passage Reading (YARC-PR) assessment. This was later deemed not to be an appropriate measure for the young struggling readers in the trial because only a very small proportion of students were able to complete the required tasks at the baseline assessment. The results were therefore considered unreliable by the independent evaluators and assigned low security ratings by Evidence for Learning. Any findings reported using this measure do not provide good evidence for or against the efficacy of the MiniLit intervention.

Reading comprehension is difficult to measure among beginning readers, which this trial has confirmed. The YARC Early Reading assessment is the companion test created for children who cannot complete the YARC-PR. The YARC-ER and the Castles and Coltheart 2 (CC-2) test were also used in the trial. These assessments, which were designated as secondary outcome measures in the trial protocol, provide more reliable findings. These tests showed strong statistically significant results for Letter Sound Knowledge, Phoneme Awareness, Regular Word Reading and Nonword Reading for children who attended at least 80% of MiniLit lessons.

Due to the strict adherence to the evaluation protocols for this study, the YARC-PR was retained as the primary outcome measure despite its serious limitations. Likewise, the main statistical analysis used was an Intention to Treat analysis, whereas a Complier Average Causal Effect (CACE) analysis (which takes attendance into account) is arguably more suitable. Other attenuating factors were that MiniLit tutors were new to the program, and classroom literacy teaching was not always consistent with the intervention's evidence-based approach.

Nonetheless, when using valid measures, outcomes in key foundational reading skills were significantly higher among children who participated in MiniLit, especially for children who attended the minimum recommended number of lessons, and when the program was administered with fidelity.

Introduction

We appreciate the opportunity to respond to the evaluation report and the findings of the Learning Impact Fund trial of the MiniLit intervention. We have previously expressed serious concerns about aspects of the trial. Some of these concerns were shared by the evaluation team, who have placed clear caveats around the findings of the primary outcome measure, and by Evidence for Learning, who have allocated low and very low security ratings.

Our two most significant concerns relate to the York Assessment of Reading for Comprehension Passage Reading (YARC-PR) as the primary outcome measure and the Intention to Treat analysis. In this response to the Final Report, we reiterate the reasoning behind our concerns.

It is important to state that we are committed to the principle of rigorous, independent evaluation of educational programs. Studies that adhere as closely as possible to scientific research practices are central to accumulating an evidence-base that will allow teachers to make sound decisions about effective teaching and interventions.

We are therefore grateful to Evidence for Learning and the NSW Department of Education for managing and participating in this trial of the MiniLit program, and thank the schools and teachers who took part. We also appreciate the extensive work done by the researchers in the independent evaluation team.

Nonetheless, it is also important to point out the serious shortcomings in the report that unfortunately risk overshadowing the valuable findings showing significant improvement in foundational reading outcomes for students who participated in the MiniLit intervention program.

It was apparent early in the trial that the YARC-PR test was not an appropriate primary outcome measure, with many students unable to complete the required tasks. This is consistent with a growing body of research showing it is very difficult to measure comprehension among young readers, especially young struggling readers. This finding will inform future research.

Fortunately, the YARC Early Reading (YARC-ER), which is a companion test to the YARC-PR, and the Castles & Coltheart-2 (CC2) tests have provided a good set of data that do not suffer from the same statistical unreliability of the YARC-PR and are more closely aligned with the reading skills targeted in the MiniLit intervention.

The evaluation found strong evidence that MiniLit students who attended at least 80% of lessons scored significantly higher on tests of Letter-Sound Knowledge, Phoneme Awareness, Regular Word Reading and Nonword Reading at both six and 12 months after the intervention began.

Six month outcomes (CACE analysis)

	Intervention N = 107	Control N = 107		CACE Analysis			
	Mean (SD)	**Mean (SD)**	**Mean difference (I – C)**	**95% CI**	**p-value**	**Effect size**	**Effect size 95% CI**
YARC – Early Reading							
Letter Sound Knowledge	109.47 (15.16)	95.93 (14.24)	23.27	18.52 to 28.01	0.00	1.44	1.15 to 1.73
Early Word Recognition	84.94 (11.85)	84.4 (13.23)	1.00	-1.46 to 3.46	0.43	0.08	-0.12 to 0.28
Phoneme Awareness	96.23 (12.47)	91.59 (12.58)	8.20	2.41 to 13.99	0.01	0.65	0.19 to 1.10
Castles & Coltheart – 2							
Regular Word Reading	-0.36 (0.97)	-0.7 (0.84)	0.54	0.30 to 0.79	0.00	0.59	0.33 to 0.85
Irregular Word Reading	-0.77 (0.8)	-0.71 (0.9)	-0.14	-0.45 to 0.17	0.39	-0.16	-0.52 to 0.20
Nonword Reading	0.01 (0.94)	-0.52 (0.76)	0.84	0.66 to 1.02	0.00	0.93	0.73 to 1.13

Intention to Treat is the default protocol for studies using the Education Endowment Fund evaluation model, as is the case with Evidence for Learning (E4L) research projects. However In this response we explain why the primary outcome measure (YARC-PR) should not have been used in the trial, and why the data it yielded do not provide information about the effectiveness of MiniLit. We also explain why the Intention to Treat analysis, which compares outcomes for all students irrespective of their attendance at MiniLit lessons, is not the most useful measure of the impact of the MiniLit intervention. We also discuss some of the other important factors that must be considered when interpreting the results of the trial.

Main responses

1. The YARC – Passage Reading test was not an appropriate primary outcome measure

The results of the primary outcome measure, the YARC-PR, should be disregarded for statistical and psychometric reasons that are acknowledged on multiple occasions in the independent evaluators' report.

The YARC-PR results should not have been used as the basis for further analysis and should not be used to draw conclusions about the effectiveness of the intervention.

Unfortunately, the decision to persevere with the YARC-PR, and to use it as the basis of detailed analysis and interpretation despite the data being unsafe, serves to give a false impression of the reliability of the results.

The reasons that the YARC-PR results should be disregarded are unambiguous.

- Only six students (2.5%) of the study cohort were able to complete the necessary two passages of the YARC-PR at the baseline assessment. Therefore, for 97.5% of the study cohort, the results are unreliable.

  According to the YARC-PR administration protocol, "In order to ensure a reliable estimate of a student's reading ability, it is necessary for a student to complete two passages" (YARC-PR manual, p. 26).

- The majority of children achieved at the 'floor' in the baseline assessment, which means that they did not achieve a raw score high enough to be able to be converted to a Standard Score for statistical analysis.

  This floor effect prevents a reliable estimate of improvement at post-test being calculated because very low scores on this assessment have high rates of measurement error.

  The independent evaluators' report states that the distribution of raw scores below the floor "justified using these variables as covariates in the regression models to calculate mean difference between the intervention and control groups at six months and 12 months" (p. 39).

  This decision is not supported by the YARC-PR manual, which states,

  "Very low and very high standard scores are printed as <70 or >130. This reflects the fact that extreme scores will tend to have high errors of measurement" (YARC-PR manual, p. 36).

This means that the analyses using YARC-PR data are not reliable as they clearly breach the protocols for statistical analysis.

- The administration protocol for the YARC-PR advises that children who struggle with the assessment, who cannot complete two passages, and whose error rate is higher than the threshold, should be assessed using the YARC Early Reading (YARC-ER) test.

  It says, "[F]or children who exceed the maximum number of reading errors on the passage; discontinue Passage Reading with these children and administer YARC Early Reading instead" (YARC-PR manual, p. 26).

  The YARC-PR manual acknowledges that the reliability of the assessment for measuring comprehension using one passage, even for cohorts of students for whom the test is appropriate, is "lower than is desirable" (p.100).

  The YARC Early Reading test was also used in the study. Although it was designated as a secondary outcome measure, it should be considered the primary outcome measure. Almost all of the children in the study fit the criteria for YARC-ER stated in the administration protocol at the baseline assessment and therefore the YARC-ER is a more appropriate and more valid measure for this cohort of students.

  A decision to switch to the YARC-ER as the primary outcome measure should have been made as soon as it became apparent that the YARC-PR was not appropriate for the students in the study, given the extensive floor effects and high error rate. As a companion test to the YARC-PR, the YARC-ER could justifiably have been adopted as the primary outcome measure.

- The independent evaluators share the view that the YARC-PR is not the appropriate primary outcome measure for this cohort of poor readers, due to the young age of the cohort and the level of difficulty of the task, and have noted the statistical caveats and limitations of the analyses that use the YARC-PR data.

  The YARC-PR is "a test of prose reading and comprehension for young readers *who have already made a good start in developing decoding skills*" (YARC-ER manual, p.vii, our emphasis). That was not the case for the cohort of children in this study.

  It was apparent early in the study that the young readers being assessed were not the intended population for the YARC-PR assessment, given that so many

achieved scores too low for reliable statistical analysis and almost all were unable to complete the two passages required.

The independent evaluators acknowledge this problem explicitly and note the statistical caveats and limitations of the analyses that use the YARC-PR data throughout the report:

> "However, a large number of intervention and control students performed at the floor for the [YARC-PR] measure at the outcome time point, with nearly all not being able to complete the measure at baseline. Therefore, the findings should be considered with caution" (p. 6).

> "However, it is important to note that the majority of children were not able to complete the primary outcome measure at baseline and at the follow-up time points, despite the measure being validated for this age group. Therefore, it may not be sensitive enough to detect differences among children with very low reading skills, which is the target population for the intervention" (p. 9).

> "In hindsight, it seems the YARC Passage Reading measure was not an appropriate measure for the cohort of poor readers at baseline, due to the young age of the cohort and the level of difficulty of the task" (p. 39).

> "These flooring effects [in YARC-PR at 12 months] raise similar concerns as those present at baseline, and therefore reinforces the caveats around the reliability of the findings" (p. 39) .

> "It is important to note again here the significant limitations in the interpretation of the YARC-PR measure in this study" (p. 48).

> "However, the trial also revealed that this measure is not appropriate for this cohort of students and therefore these results must be considered with caution" (p. 54).

> "This finding [about implementation fidelity] has the aforementioned caveats about the security of the YARC-PR data in this study" (p. 63).

> "However, a large proportion of students were not able to complete the measure at baseline and there were a large number of students who performed at the floor at the follow-up time points. Therefore, these findings [for the YARC-PR] should be treated with caution" (p. 75).

> "The main limitation of the study is the psychometric properties of the primary outcome measure, the YARC – Passage Reading. Overall, a large proportion of students were unable to complete the primary outcome at baseline or at follow-up. This may reflect the psychometric properties of the measure, which may not be suitable for students who are struggling to read as demonstrated by the high number of students achieving at the measure's floor" (p. 76).

- Evidence for Learning shares the view that the YARC-PR was not a reliable outcome measure for this study.

  Evidence for Learning has assigned low security ratings for the findings on the YARC-PR Accuracy and YARC-PR Rate (two out of a possible five padlocks) and a very low security rating for YARC-PR Comprehension (one out of a possible five padlocks). This reflects the strong caveats placed around the findings in the evaluation report. It confirms that the evidence from the YARC-PR results are inconclusive.

2. The Intention to Treat analysis does not provide the most useful findings

We argue that the Intention to Treat (ITT) analysis is more suitable for an effectiveness trial rather than an efficacy trial as it is now described on the E4L website and in the evaluation team's published research protocol.

There are some common understanding of these two terms: effectiveness and efficacy.

> "Intervention studies can be placed on a continuum, with a progression from **efficacy** trials to **effectiveness** trials. **Efficacy** can be defined as the performance of an intervention under ideal and controlled circumstances, whereas **effectiveness** refers to its performance under 'real-world' conditions. However, the distinction between the two types of trial is a continuum rather than a dichotomy, as it is likely impossible to perform a pure efficacy study or pure effectiveness study." (Singal, Higgins & Waljee, 2014, p. 1)

We take seriously the caveat about the distinction between the two being on a continuum rather than being seen as a dichotomy. Nevertheless, we argue that an efficacy trial must be reflective to a large degree to intervention being under controlled, if not always ideal circumstances, as was the case here. The most important way in which the intervention did not meet controlled conditions was the low level of compliance in terms of attendance.

This study started out as an effectiveness trial but circumstances forced it to become an efficacy trial. In our opinion, therefore, the Complier Average Causal Effect (CACE) analysis is more appropriate than the ITT analysis to estimate the impact of the intervention.

Intention to Treat is the default protocol for studies using the Education Endowment Foundation evaluation model, as is the case with Evidence for Learning (E4L) research projects. It includes all children who were randomly allocated into a treatment group and for whom follow-up data could be obtained, irrespective of whether they remained in the trial, and irrespective of the extent of their participation in the intervention.

For example, in this trial, one of the students allocated into the MiniLit group left the trial and did not actually do MiniLit. That student's reading results were included in the MiniLit group data. While it is unlikely that one student would have had a large effect on the results, this example is illustrative of the logical problems with the ITT approach.

The Complier Average Causal Effect (CACE) analysis, on the other hand, includes only those students who actually participated in the intervention to a reasonable degree. Reading interventions are, by definition, developed for children who are struggling with reading and require intensive support to catch up. Their effectiveness is dependent on children participating fully in the program. MiniLit lessons are systematic, sequential and explicit and therefore a high level of attendance is required to achieve good progress. We determined that the threshold level of attendance to achieve a measurable benefit should be 80% of lessons (four out of five daily lessons, on average). This is not an unreasonable expectation. In the Evidence for Learning evaluation of the QuickSmart program, compliance was set at 90%.

In the MiniLit study, only 55% of students met the attendance threshold (described in the report as 'compliance'). This means that the ITT analysis included a large proportion of students who had attended, in some cases, far fewer than the recommended number of lessons.

The CACE analysis yielded very strong results for MiniLit. Children who had met the attendance threshold had higher scores in Letter Sound Knowledge, Phoneme Awareness, Regular Word Reading and Nonword Reading at both six and 12 months after the intervention began. That is, the recommended level of participation in MiniLit significantly improved reading outcomes in the skills targeted in the program.

Additional comments

1. The 'months of learning metric' is widely contested among educational researchers

We have argued consistently that the 'months of learning' metric should not be employed for this study. The research team also had reservations about calculating 'months of learning'. The fact that the Education Endowment Foundation usually uses this metric is not a good reason for continuing to use it for this study, not least because the 'months' are based on the effect size of the mean group differences on the YARC-PR which, as we have discussed (and the independent evaluators acknowledge) is not an appropriate or credible measure.

2. The reported program costs overstate the cost for most schools

The total cost provided in the report is accurate, but it is the first-time set up cost and represents the *maximum* potential initial investment for schools to introduce the MiniLit program. It assumes that the school does not already have any of the supporting book resources. This is not the case in most schools.

The total cost in the report includes training costs (both the MultiLit training fee and staff time), the MinIiLit lesson kit and student booklets, class sets of MultiLit decodable books, additional sets of non-MultiLit decodable books, several dozen children's story books, and staff time to deliver the intervention.

For most schools, not all of these outlays will be necessary. Many schools already have sets of decodable books as well as a large number of the children's storybooks. Staff training and delivery time will not necessarily be an additional budget cost if existing permanent staff deliver the program – if, for example, learning support teachers are deployed to teaching MiniLit rather than another intervention. This dramatically reduces the amount that needs to be specifically allocated to MiniLit, by as much as several thousand dollars.

The per student cost presented in the report is based on a one-time delivery of the program to one group of four students over two terms. If a teacher delivered MiniLit to two groups of four students each day for four terms, the per student cost is approximately $1240 per year, again assuming that *all* book resources needed to be purchased.

Other important factors

1. Measuring reading comprehension in young struggling readers is problematic

It is widely agreed among experts that it is very difficult to reliably measure passage reading comprehension below about a Year 2 level, especially for struggling readers with poor decoding and word reading. In retrospect, we were ill-advised to agree to the measurement of reading comprehension as the outcome measure. It was included because a representative from the NSW Department of Education involved in the framing of the study requested that a measure of reading comprehension be the primary outcome measure.

"While it is possible to classify children as RD and RD+LI at 7 years, this is a young age to be measuring reading comprehension, especially in children with manifestly poor reading at the word level."…"For research, there is a pressing need to look beyond standardised scores on an off-the-shelf test of reading comprehension to consider the nature of reading comprehension in children with poor decoding" (Nation, 2019, p. 60).

MiniLit is designed to address the prerequisite skills for the development of reading comprehension. The Simple View of Reading model states that reading comprehension is the product of word identification and language comprehension (Hoover & Tunmer, 2018). MiniLit focusses on teaching children to use the phonological decoding skills (composed of letter sound knowledge and blending) that are necessary to read words accurately and fluently. This ability is a strong predictor of later reading comprehension (Hjetand et al., 2019; Schatschneider et al., 2004). The essential sub-skills of letter sound knowledge and phonological awareness are sometimes described as 'distal' factors to reading comprehension, as they are enacted predominantly via more 'proximal' word reading abilities (Kim, 2011). This trial demonstrated a significant effect of MiniLit on both distal factors and proximal factors.

Sounds and Words Activities and Text Reading comprise the major component of each lesson. The Storybook Reading part of the lesson is not sufficient on its own to develop the linguistic comprehension side of the Simple View of Reading equation. The expectation is that children will also be participating in classroom literacy lessons where they are learning vocabulary and other elements of reading comprehension. Unfortunately, according to the classroom observations conducted as part of the process evaluation in this study, this was not uniformly the case.

It would arguably be unrealistic to expect 20 weeks of MiniLit to have had a measurable impact on passage reading. Its primary objective is to improve word reading accuracy and fluency among children who are having difficulty with reading. For these children,

it is an achievement to be independently reading full sentences. Passage reading comprehension is a more advanced skill. It could therefore have been anticipated that the YARC-PR would be beyond the ability of most.

2. MiniLit tutors were novices

It is also important to emphasise that all of the MiniLit tutors in the study were new to the program and were teaching it for the first time in this trial. Previous research by Buckingham, Wheldall and Beaman-Wheldall (2012) has shown that MiniLit tutors are more effective when they have had prior experience teaching the program.

The process evaluation looked at the extent to which the tutors delivering the MiniLit intervention were doing so with fidelity; that is, whether they were teaching the program as intended. It found strong statistical evidence that implementation fidelity was associated with higher scores on Letter Sound Knowledge (YARC-ER), Phoneme Awareness (YARC-ER), Regular Word Reading (CC-2) and Non-word Reading (CC-2) at 6 months, which were in turn associated with higher scores on these measures at 12 months.

“Overall, these path analyses highlight that better implementation of the MiniLit program is associated with better scores on domains related to the intervention’s theory of change over time.” (p. 64)

These findings have obvious implications in terms of both the ITT and CACE analysis results, given that all of the MiniLit tutors in the study were new to the program. MiniLit is an explicit instruction program that requires a fast pace and familiarity with the resources to deliver all components of the program with fidelity. A school adopting MiniLit would be able to expect the effectiveness of the program to improve as the MiniLit tutors became more experienced and implementation fidelity increased.

The evaluation report notes the importance of coaching for the MiniLit tutors in the trial, saying that “ongoing coaching should be part of the training provided to new tutors implementing the intervention for the first time within their schools” (p. 72).

Nonetheless, it should be noted that the trial found highly significant improvement in foundational reading skills among students in the MiniLit intervention, even with novice tutors.

3. The length of the intervention was shorter than optimal

MiniLit needs three terms to achieve maximum benefits for students. For this trial, it was decided to limit the intervention to two terms. The evaluation report says this was for "pragmatic and funding purposes" (p. 19). This decision arguably affected the effectiveness of the program.

The MiniLit program consists of 80 lessons. It is designed to be delivered in daily one hour lessons that have three components which together incorporate the 'five big ideas' of reading instruction – Sounds and Words Activities (phonemic awareness, phonics and fluency), Text Reading (fluency, vocabulary and comprehension), and Storybook Reading (vocabulary and comprehension). The majority of time in each lesson is spent on Sounds and Words Activities because young struggling readers are most likely to have difficulties with decoding.

All 80 MiniLit lessons follow a phonics-based scope and sequence intended to equip children with sufficient decoding accuracy and fluency for them to subsequently thrive in their usual classroom literacy program. The deliberate sequencing of the lessons, and their cumulative nature, means that if students miss a large number of lessons, they will not have as much time learning this content. Struggling readers are often struggling because they need more intensive exposure to letter sound correspondences in order to learn them. Missing lessons means missing new content, as well as missing the daily opportunity to practise and consolidate their learning, which will impede their progress.

In previous experimental trials of MiniLit in schools it was apparent that it is difficult to cover all 80 lessons in two school terms or 20 weeks. While in theory this would be four lessons a week over 20 weeks, in reality, some students need to do some lessons more than once. This aspect, combined with the various occasions throughout a typical school term that MiniLit lessons would be missed, make a two term intervention impractical in many schools. Three terms allows the entire program to be delivered with fidelity and maximises its effectiveness.

4. Quality of classroom instruction was variable, both during and after MiniLit intervention

The evaluation assessed reading outcomes at the end of the intervention (six months post-randomisation) and six months after the end of the intervention (12 months post-randomisation, that is, six months after students had returned to their usual classrooms for literacy).

As noted above, the trial found significant improvement for the MiniLit group in the foundational reading skills that are the focus of the program and which are precursors to subsequent reading comprehension – Letter Sound Knowledge, Phoneme Awareness, Regular Word Reading and Non-word Reading. The effects were highly significant at six months and still highly significant but somewhat less so at 12 months.

This attenuation is not surprising given the report's observations of the differences between MiniLit and the instruction provided in students' regular classrooms. If children are returning to classrooms either during or after the intervention where the skills they have learned in MiniLit are not supported, reinforced, encouraged and developed, they will not continue to grow at the same rate.

As noted in the report (p. 56), "Alignment between the MiniLit and usual classroom literacy practice is a critical factor for optimising successful intervention. Classroom literacy practice that uses a different pedagogical approach may detract from MiniLit's outcomes". The evaluation report found that for most of the students in the trial, there was a low level of alignment between MiniLit's evidence-based explicit instruction and their usual classroom literacy teaching.

In around two thirds of the classrooms observed, teachers instructed children in whole word recognition. Only just over half (56%) of teachers were observed focussing on letter-sound knowledge. Only one third of teachers were observed explicitly teaching vocabulary and word meanings. The report concluded that "their practices did not consistently provide enough attention to the critical foundation skills needed to ensure successful reading fluency and reading comprehension" (p. 70). This may explain why eight of the nine participating schools had more than 30% of their students in the lowest quartile according to the WARL baseline measure norms. Three schools had close to 50% of students in the bottom achievement quartile.

MiniLit gave students a much-needed boost in critical foundation reading skills but the effect would have been even stronger if all children were also receiving evidence-based instruction in their classrooms.

Conclusion

Any experimental study will raise and answer more questions for research and researchers than those it was designed to investigate. One of the additional findings of this study was to confirm that, when conducting research with young struggling readers, the selection of reading measures is of paramount importance. The YARC-PR was a poor choice for the primary outcome measure, which might have been anticipated with more careful scrutiny of the administration instructions before the trial began, but certainly became apparent when it was implemented as a baseline measure at the beginning of the trial. Feedback from the testers to the evaluation team, especially that so few children could complete the assessment, should have raised an alarm. At that point, the companion assessment, the YARC-ER, could and should have replaced the YARC-PR as the primary outcome, with complete justification.

Our aim is to provide an accurate and educationally useful account of the evaluation's findings. There are some very positive results for MiniLit from the YARC-ER and the CC-2, as well as some constructive lessons for improvement, but they are not easily apparent to the general reader in the final, lengthy version of the document. Despite numerous caveats about the limitations of the primary outcome measure, the report gives the impression that those results are informative and does not sufficiently support the positive findings for MiniLit in this trial. In our view, it understates the effectiveness of the MiniLit program – with which many schools are achieving excellent results. It might thereby undermine the research and education community's view of systematic and explicit reading interventions generally. A null result would of course be accepted in the interest of research integrity if that was the true finding, but that is simply not the case here.

When using valid measures, the true headline finding is that key early reading outcomes were significantly higher among children who participated in MiniLit, especially for children who attended the minimum recommended number of lessons, and when the program was administered with fidelity.

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