The effect of an e-reader intervention on academic skills and non-verbal reasoning: GirlsRead! Zambia

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Background

- Financial strain of implementing free primary education in sub-Saharan Africa and accommodating higher school enrollments has compromised school quality and learning outcomes (Pritchett 2013; World Bank and UNICEF 2009)

- Between 2000 and 2010 rate of secondary enrollment in Zambia increased 75% percentage points – "historically unprecedented" expansion (World Bank 2018).

- Yet in 2013-2014 nearly ¼ of women aged 20-24 in Zambia could not read compared to 11% of men (DHS data).

- A critical factor contributing to low literacy is the absence of books in homes and schools (Read 2015)

GirlsRead! Zambia Program Objectives & Activities

Primary:

- Improve literacy among grade 7 girls attending government schools

Secondary:

- Further social connections
- Improve critical thinking skills
- Increase agency
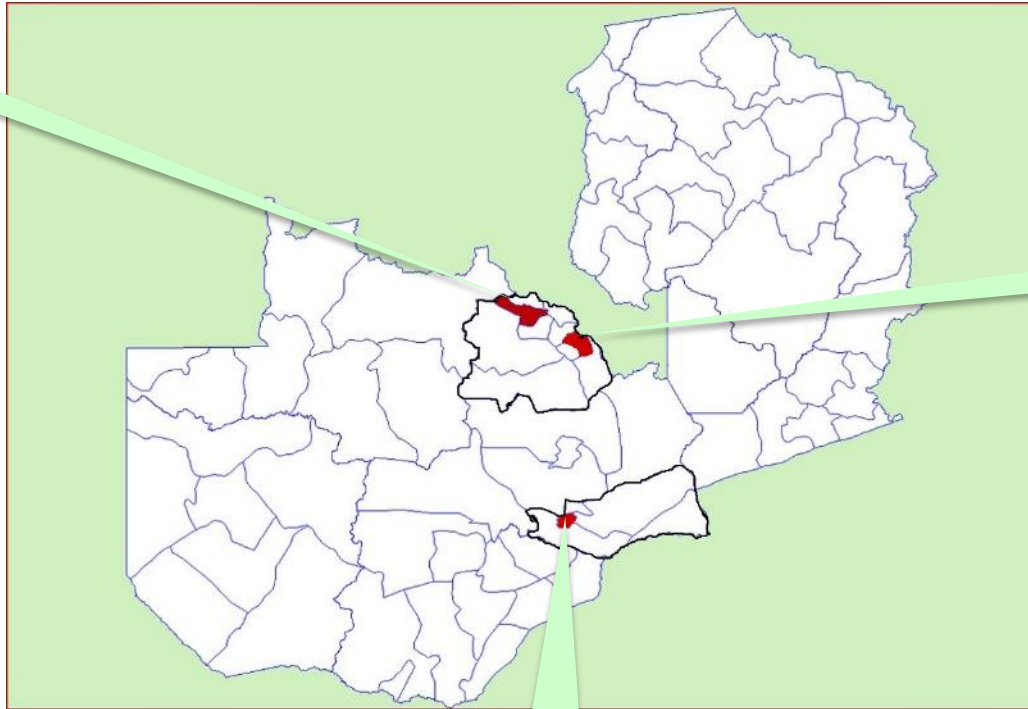- Foster more equitable gender norms

Through three key activities:

- E-readers
- Safe spaces
- Community Engagement

girlsread!

GirlsRead! Districts

Chingola

Ndola

Lusaka

Evaluation: 3-arm RCT

Arm 1

Safe Spaces

+

Community Engagement

+

E-Readers

Arm 2

Safe Spaces

+

Community Engagement

Arm 3 **Control: Activities delayed until year 2 (after evaluation)**

Baseline (Jan-Mar 2017); Endline (Jan-Apr 2018)

N=1299 girls, 36 schools; 1178 interviewed at endline, follow-up rate 90.7%

Digital Reading: E-readers

- Girls received their own e-reader (provided by Worldreader) for the duration of the program

- Girls could charge e-readers at school using locally-sourced solar units, installed at each school

- Allowed to take e-readers home and keep them over school breaks

- Encouraged to read to others – siblings, parents, friends

Digital Reading: E-books

- Each e-reader was loaded with approximately 100 books, primarily fiction by African authors from Zambia, Zimbabwe, Nigeria, Kenya, Ghana, South Africa

- Diverse content, including alternative views of gender roles and books with strong female leads
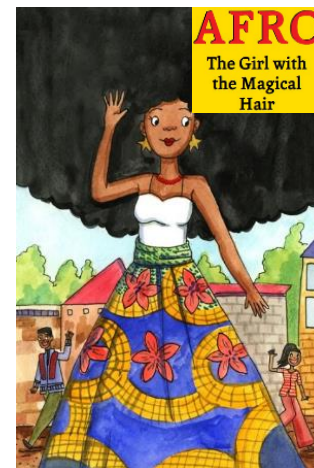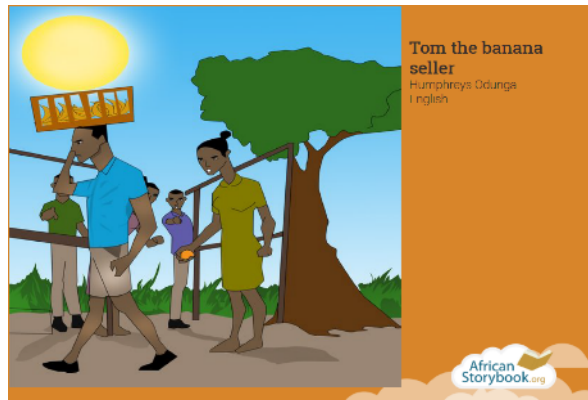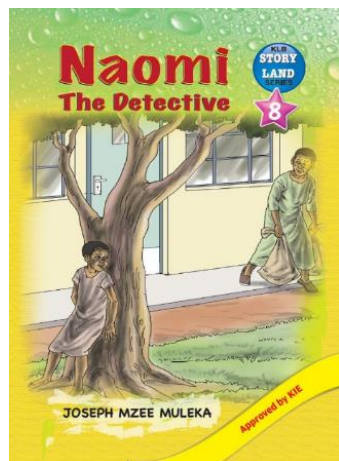
Safe Spaces

- 15 to 20 girls per group, 2 groups per school

- Led by female mentors from the school and community

- Meet once per week, after school

- 19 two-hour sessions over 6 months

Safe Spaces *continued*

- First hour: girls cover a session from the *GirlsRead!* empowerment curriculum

- Second hour: for year 1 we had – **e-reading groups or study time**, depending on study arm. For year 2 **e-reading for all groups**.

- Mentors follow-up with **home visits** if girls miss more than two consecutive meetings

- Mentors meet monthly to share lessons, get support, practice activities

Community Engagement

- Work to create an enabling environment to promote support for girls' secondary schooling, reading, and gender equality

- Conduct 4 training sessions with parents, PTA representatives, and school administrators over the course of each program year

Feasibility of using e-readers in low resource settings

- **425 e-readers** distributed in year 1 for girls to use in safe space sessions and take home; **13 (3.1%)** lost, stolen, or broken.

- **1241 e-readers** distributed in year 2 for girls to use in safe space sessions and take home; **33 (2.7%)** lost, stolen, or broken.

Literacy assessment: UWEZO & multiple choice

- UWEZO People's Action for Learning Network in East Africa – simple English diagnostic of progress in reading foundational skills – through grade two: **3 dichotomous outcomes:**

    1. **Passed paragraph:** respondent read letters, read simple words, read paragraph aloud containing 3 simple sentences and 20-22 words and make 2 or fewer mistakes.

    2. **Passed story:** respondent could do all components listed in "#1" plus could read a two paragraph 12 sentence story out loud and make 4 or fewer mistakes.

    3. **Passed story questions:** respondent could do all components listed in "#2" plus could answer 2 questions correctly about the story.

- Multiple choice – 32 questions from Grade 3 and 5 textbooks and Grade 7 Composite Exam (grammar, more complex vocabulary)

Numeracy and non-verbal reasoning assessments

Numeracy

- UWEZO– Passed all sections: counting, number recognition, addition, subtraction, multiplication, division & "ethno" math (dichotomous)

- Multiple Choice - 23 questions from Grade 3 & 5 textbooks & Grade 7 Composite Exam (3 digit addition, more complex multiplication, fractions, word problems, basic graphs and geometry)

Non-verbal reasoning

- Subset of Raven's Coloured Progressive Matrices (sets of shapes and patterns missing a piece)

Intent to treat (ITT) estimates: includes all girls regardless of exposure

$$Y_{ijt} = a_0 + a_1 S^1_{ij(t=0)} + a_2 S^2_{ij(t=0)} + a_3 Y_{ij(t=0)} + a_4 X_{ij(t=0)} + e_{ijt}$$

Y_{ijt} = outcome of interest for girl i in school j at time t (t=0 is baseline)

S^1 = girl enrolled in e-reader arm school

S^2 = girl enrolled in safe spaces only arm school

X = vector of control variables: district, age, grade repetition, English spoken at home, mother's education, father's education, mother/father alive & co-resident status, household items, books in home, cell phone use, and student-teacher ratio

a_1 and a_2 = estimates of treatment effects.

Baseline Characteristics

	Arm 1 safe spaces + e-reader (n=334)	Arm 2 safe spaces (n=374)	Arm 3 control (n=379)
English spoken at home	26%	24%	25%
Ever repeated a grade	33%	33%	36%
Count of HH items (0-15)	8.5	8.0	7.7
Passed UWEZO paragraph	58%	48%	53%
Passed UWEZO story	48%	40%	46%
Passed UWEZO story questions	41%	35%	40%
Literacy multiple choice (0-32)	13.8	13.2	14.2
Passed UWEZO numeracy	63%	60%	62%
Numeracy multiple choice (0-23)	8.9	7.8	8.7
Non-verbal reasoning (0-16)	9.1	8.6	9.0

Entropy balancing: robustness check

- Despite randomization, arms unbalanced

- Entropy balancing: generate weights so that safe spaces and control arms matched e-reader arms on specified covariates and outcomes at baseline

- Entropy balancing differs from propensity score matching; functional form not assumed (Hainmueller 2012; Hainmueller and Xu 2013)
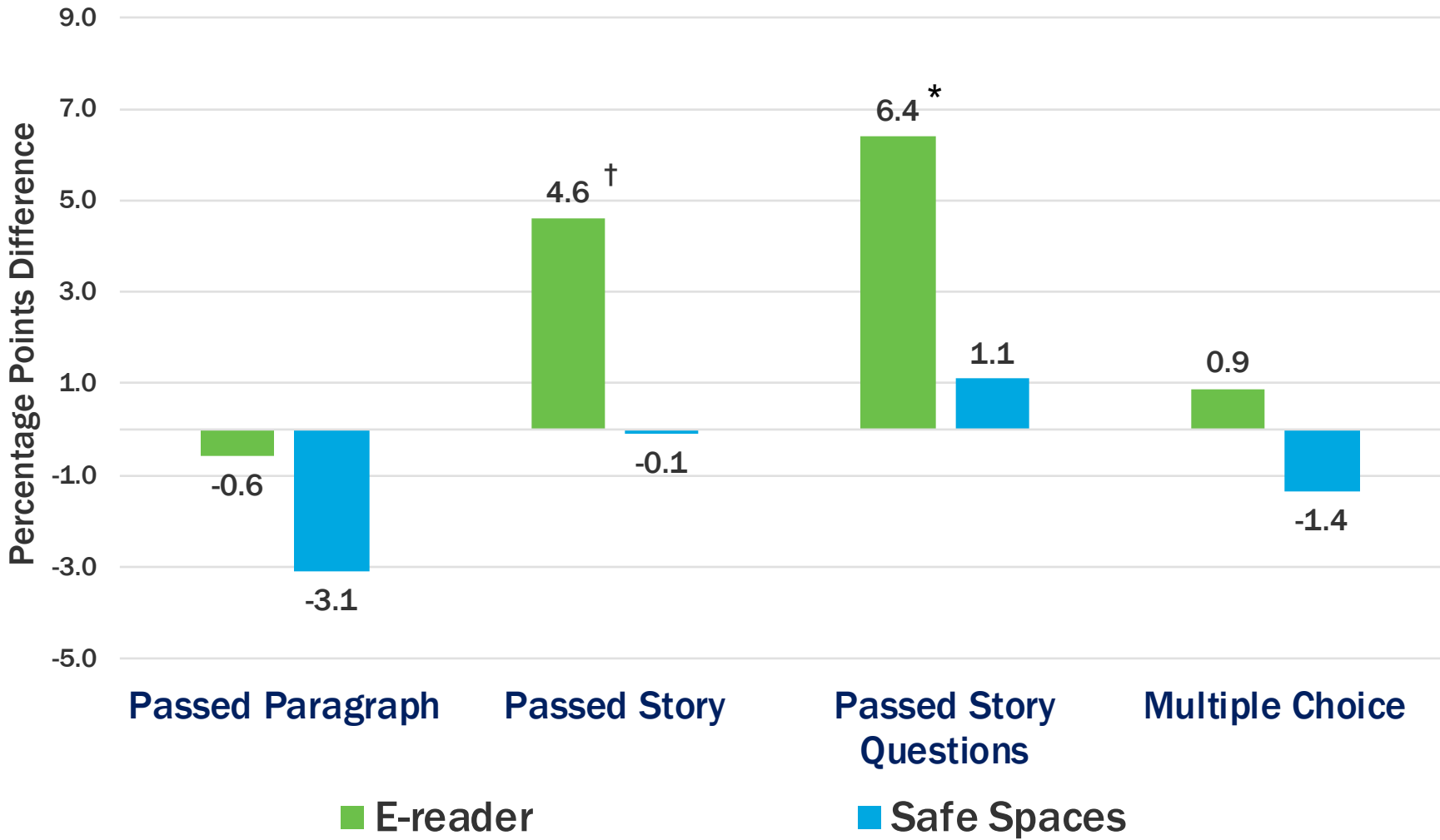
Literacy: ITT Estimates
UWEZO and Multiple Choice
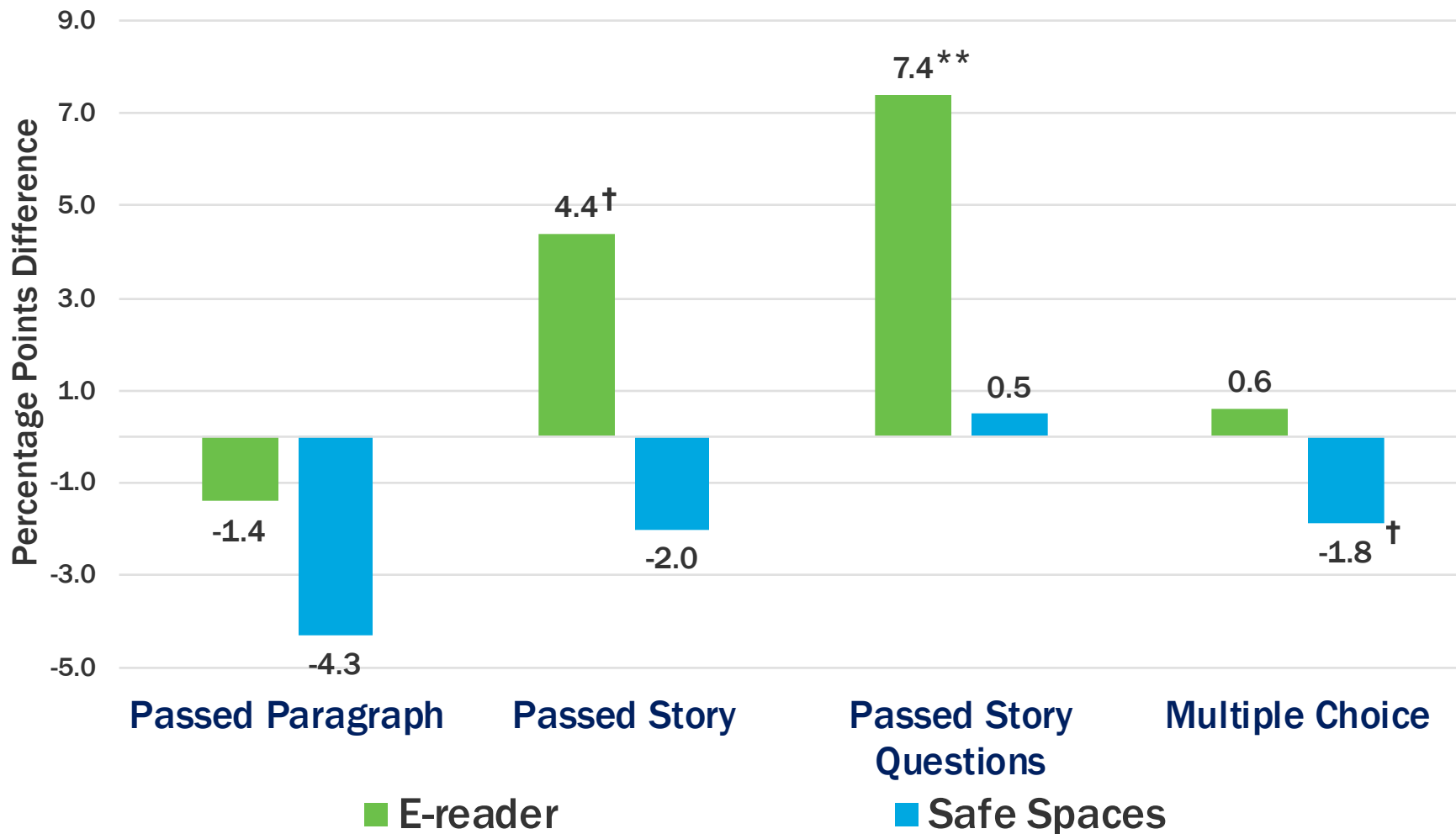
Significant compared to control arm at p<.01** , p<.05*, and p<.10†

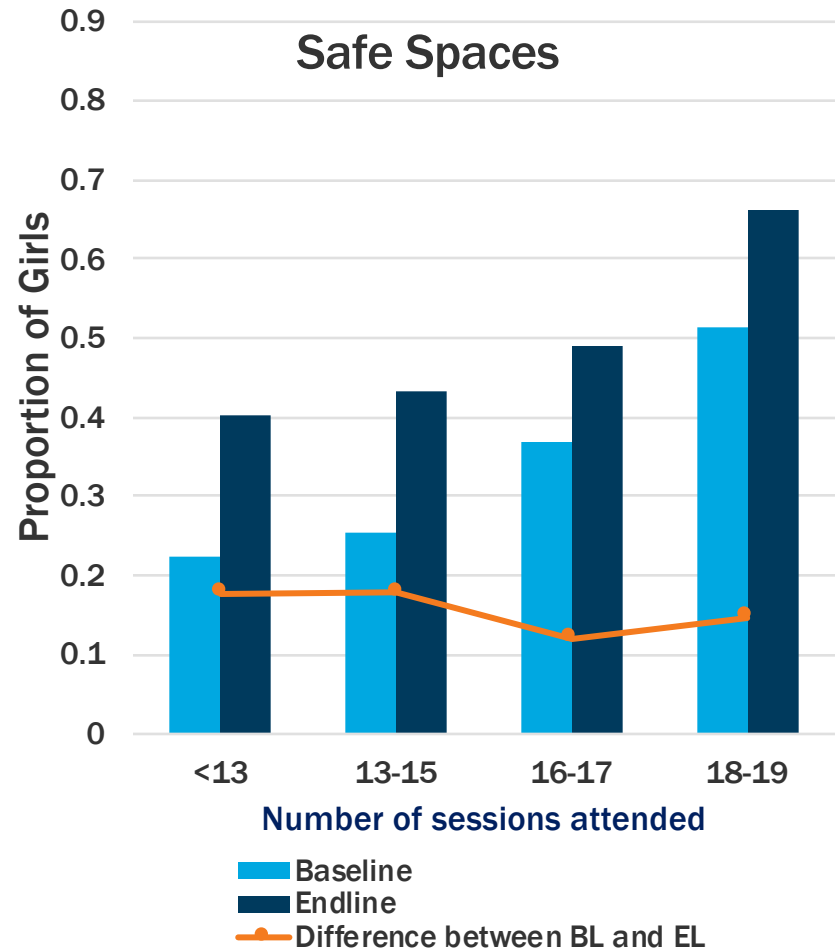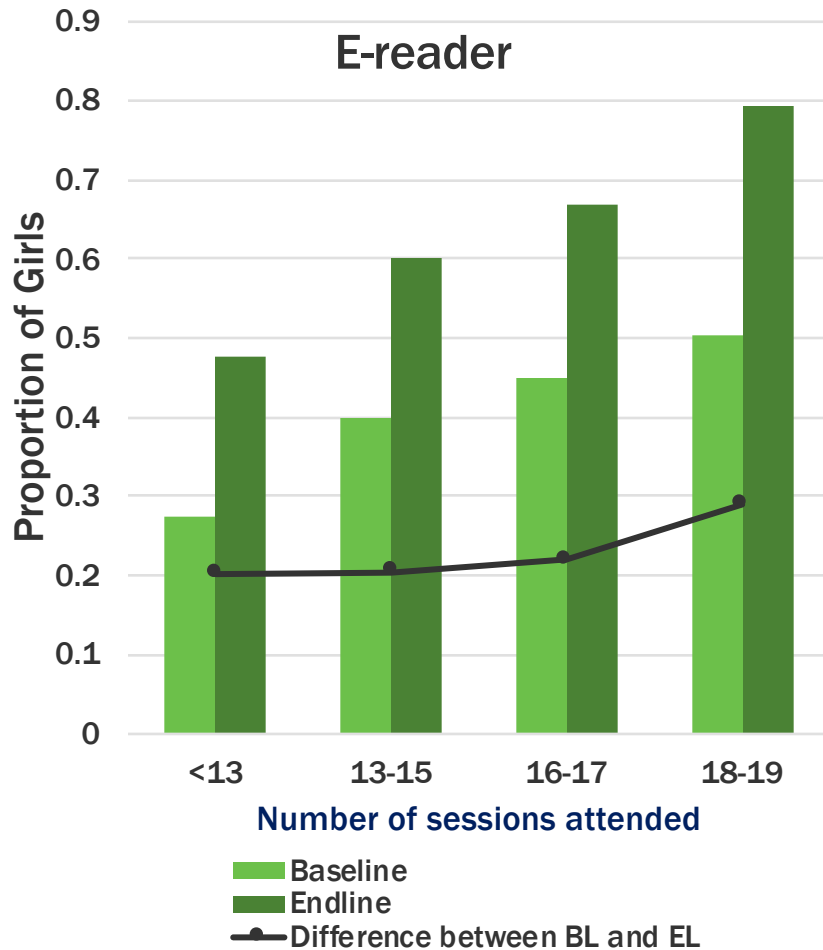[a] Baseline score imputed if multiple choice not administered

Literacy: ITT Estimates
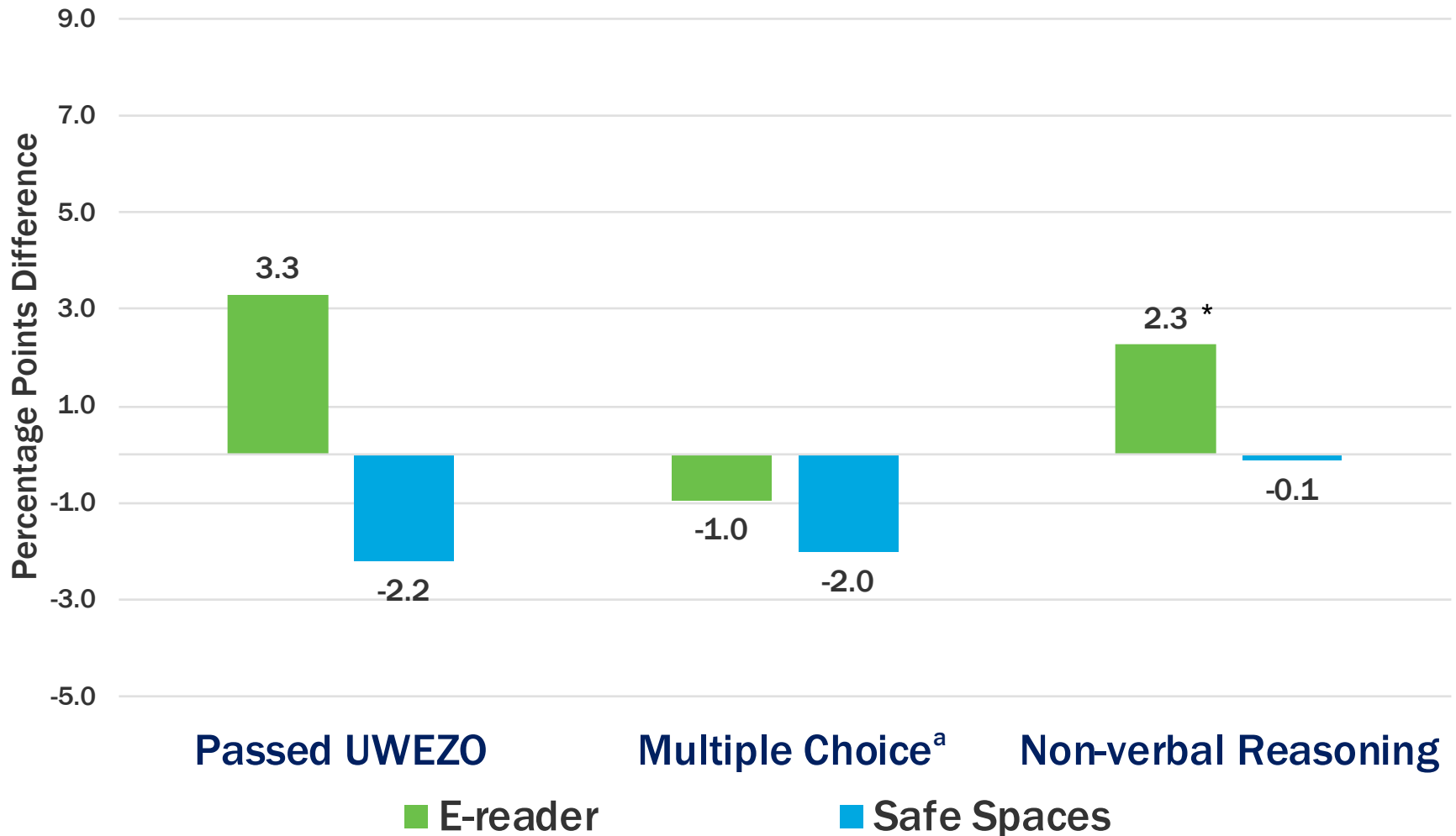## UWEZO & Multiple Choice: models with entropy weighting

Significant compared to control arm at p<.01** , p<.05*, and p<.10†

[a] Baseline score imputed if multiple choice not administered

UWEZO Literacy: Proportion passed story questions at baseline and endline by number of sessions attended

ITT Estimates: Numeracy – UWEZO & Multiple Choice - and Non-verbal reasoning

Significant compared to control at p<.01**, p<.05*, and p<.10†

a Baseline score imputed if multiple choice not administered

Summary and follow-on questions

- Evaluation of GirlsRead! demonstrates that exposure to facilitated book groups and access to books on e-readers have the potential to enhance basic literacy and non-verbal reasoning skills among adolescent girls in a low income setting.

- Is GirlsRead! ready for scale-up? Exploring opportunities to expand GirlsRead! and position for scale.

- If we followed participants for longer:

  - would we observe an effect on secondary school retention and completion?

  - would the boost in literacy be maintained?

  - would other longer term outcomes, such as timing of first pregnancy, be affected?

- Would e-readers alone produce an effect on literacy without embedding them in a safe spaces platform?

- Would more exposure produce larger effects (is 19 sessions over 6 months too short)?

- Would there be a greater effect if implemented earlier than Grade 7?

Acknowledgements

- Worldreader

- Government of Zambia

- Forum for African Women Educationalists in Zambia (FAWEZA)

- GirlsRead! Study Team

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