

# Foundational Learning and Mental Health: Empirical Evidence from Botswana

Jennifer Opare-Kumi

## Abstract

A considerable proportion of mental health problems surface in early childhood and adolescent years, with early onset mental health problems having the potential to affect the long-term development of young people. Research shows that positive teaching and learning school climates are associated with positive socio-emotional, behavioural, and academic student outcomes. The pedagogical intervention Teaching at the Right Level (TaRL) creates an enabling learning environments through fun and engaging, targeted instruction—proven to improve foundational numeracy and literacy outcomes of young people. With the current gap in policy relevant mental health and education data in low resource settings, this paper studies the effect of targeted instruction interventions such as TaRL on the mental health and educational outcomes of primary school learners in Botswana. Using a difference in difference design, the study finds that exposure to the learning pedagogy reduces the behavioural and emotional difficulties of children by .15SD when compared to children not yet exposed to the programme. This paper is able to connect the mental health and education literatures, contributing to the evidence base on improving student outcomes.

**JEL Classifications:** I20, I21, I28, I31



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### Acknowledgements:

I am grateful for instructive feedback and support from Kate Orkin, Stefan Dercon, David Johnson, Martin Williams, reviewers from Oxford Policy Management, RISE programme and participants of research seminars from the Blavatnik School of Government. My sincere appreciation to Director Labane Mokgosi, David Ananius and Rapelang Bogatsu for supporting the research and granting permissions, making this research possible in Botswana. I am indebted to all the students, teachers, and schools for their support and participation. I thank Katlego Sengadi, Otsile Mphusu, Boamogeleng Motlhobogwa, Thato Letsomo Israel, and Lorato Gaolebe for their invaluable support on translating the tools, training, coordination, data collection and management, and for providing excellent feedback through the process. Thank you to Gabrielle Arengé, Julia Ruiz Pozuelo, Rosemond Opare-Kumi, John Walker, Zahra Mansoor and Efua Bortsie for insightful conversations about this work. This work has been inspired by TaRL Botswana efforts led by Youth Impact (previously Young 1ove). I am deeply appreciative for previously working with Youth Impact. Thanks to Kirsty Newman for showing interest in this research and making the funding available through RISE. This work was supported by the RISE programme [project A0268]; and the Centre for the Study of African Economies (CSAE).

This is one of a series of working papers from “RISE”—the large-scale education systems research programme supported by funding from the United Kingdom’s Foreign, Commonwealth and Development Office (FCDO), the Australian Government’s Department of Foreign Affairs and Trade (DFAT), and the Bill and Melinda Gates Foundation. The Programme is managed and implemented through a partnership between Oxford Policy Management and the Blavatnik School of Government at the University of Oxford.

Please cite this paper as:

Opare-Kumi, J. 2023. Foundational Learning and Mental Health: Empirical Evidence from Botswana. RISE Working Paper Series. 23/133. [https://doi.org/10.35489/BSG-RISE-WP\\_2023/133](https://doi.org/10.35489/BSG-RISE-WP_2023/133)

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## 1. Introduction

About 10-20% of all children and adolescents have mental health<sup>1</sup> challenges (WHO, 2001; Kieling et al., 2011; O'Reilly et al., 2018). With 90% of the global population of children and adolescents living in low-income and middle-income countries (LMICs), this presents a considerable public health challenge particularly in low resource settings (Kieling et al., 2011). In addition, a significant proportion of mental health problems surface in early childhood and adolescent years (Kessler et al., 2007; Kieling et al., 2011) and early onset mental health problems have the potential to affect the long-term development and wellbeing (Gleason et al., 2016).

Mental health is fundamental to good health and wellbeing (WHO, 2014). We learn from Sen's capability approach the importance of the freedom of people to be or to do the things they have reason to value (Sen, 1992). Thus, having good mental health can allow one to participate in the things that they value (i.e., education) and do things one values (i.e., learn). This allows one to be in good health. We also know that externalising mental health problems such as disruptive and behavioural difficulties affect academic outcomes, and academic outcomes affect mental health, particularly internalising problems such as anxiety and depression (Suldo et al., 2014).

In sub-Saharan Africa (SSA), a systematic review on SSA countries (Ethiopia, Nigeria, Kenya, South Africa, Uganda, and the Democratic Republic of Congo) showed that 1 in 7 (14.5%) children and adolescents up to 16 years of age have significant psychological difficulties. These include emotional problems, depression, anxiety disorders, conduct, disruptive and reactive behaviour disorders, and post-traumatic stress disorder (Cortina et al., 2012). However, in policy prioritisation only 29% of African countries have a child and/or adolescent mental health policy compared to 65% in European countries and 100% of countries in South East Asia Region (World Health Organization, 2020). This is evident of the disparity in prioritisation within the public health agenda, particularly within African countries. In addition, the economic cost of poor mental disorders is potentially substantial as

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<sup>1</sup> "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community" (WHO, 2001a)

the research looking at the rates of investments made at different life stages, showed that early prevention was often most cost-effective (Carneiro & Heckmann, 2003; Kieling et al., 2011).

Young people spend considerable amounts of time in schools. As such, when thinking about the ideal settings for universally rolling out early preventative interventions, schools can be leveraged to support the health and overall wellbeing of children (Becker et al., 2014; Zerner et al., 2014; Garcia-Escalera et al., 2020). Additionally, studies have found associations between positive school climates<sup>2</sup> and mental health (Aldridge & McChesney, 2018). In LMICs in particular, where high levels of bullying, poor disciplinary strategies, problems with student behaviour, and lower test performance are often prevalent, evidence shows that a positive school climate is linked with positive socio-emotional, behavioural, and academic student outcomes (Larson et al., 2020). Positive outcomes are found because of mediating factors such as, teacher support, sense of belonging and school connectedness and students' experiences of bullying behaviour (Aldridge & McChesney, 2018).

It is against this backdrop that this research study evaluates the impact of a foundational learning intervention on the mental health and learning outcomes of young people in Botswana. Teaching at the Right Level (TaRL) is a basic numeracy and literacy intervention, that disrupts the traditional rote learning, teacher-centered pedagogy for a student-centered, targeted activity and play-based pedagogy. This research explores the extent to which TaRL impacts the externalising and internalising mental health of children exposed to the learning pedagogy. The underlying hypothesis is that by positively influencing the school climate children are in (i.e., through TaRL), will improve the extent to which children feel emotionally and socially safe, subsequently reflecting in their improved mental health.

A Difference in Difference (DD) specification is used to causally identify the impact of the foundational learning intervention TaRL on learning and mental health. Findings show that students engaged in the TaRL implementation experience significantly lower levels (.15 SD)

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<sup>2</sup> School climate can be defined as the norms, expectations and beliefs that create the psychosocial environment determining the level at which people feel physically, emotionally, and socially safe. The quality of teaching and learning also contribute to this environment (Cohen et al., 2009; Aldridge & McChesney, 2018).

of emotional and behavioural difficulties when compared with children not in the programme. This indicates that the foundational learning intervention designed to improve the basic numeracy and literacy outcomes of young people also improves some of their mental health outcomes. No significant effects are found on the education outcomes: student test results and attendance records. This rules out improved education outcomes as a mediator for improved mental health in this study.

These results are particularly important for the education and mental health literature particularly in low resource settings. There is a large body of work on positive school climates from high income countries including the well-established linkages between improving social and emotional outcomes and improving the educational outcomes of young people (Valdez et al., 2011; Suldo et al., 2014; Becker et al., 2014). There is, however, less evidence in low resource settings from LMICs (Larson et al., 2020). This paper brings together the education and mental health literature, contributing to the education literature on the associated mental health effects of targeted instruction and student-centered interventions whilst also contributing to the mental health literature on young people. As such, this study will fill an important research gap in LMICs adding to the evidence base on mental health and education. Additionally, to the best of my knowledge, this is the first empirical study on targeted interventions such as TaRL and the mental health outcomes of young people.

The rest of the paper is organised as follows. Section 2 provides a background for the study context, and research questions. Section 3, shares details on the data included in the study, including descriptive statistics of the study. Section 4 provides the empirical framework including the estimation strategy. Section 5 presents the results and section 6 provides a discussion and concluding remarks.

## **2. Background: Botswana**

Botswana is a landlocked democratic country located in Southern Africa with a population of approximately 2.3 million (Statistics Botswana, 2022). Over the years, the proportion of the population living on less than \$1.90 has steadily decreased from 29.8% to 18.2% (World Bank, 2020) but there are still substantial portions of the population living in poverty. Botswana's GDP per capita rose from USD 80 in 1966 (at independence) to USD 6,924 in

2016, with services as the fastest growing sector contributing to the national GDP (Honde, 2018). Additionally, the World Bank's Human Capital Index (HCI) scores Botswana at 0.42 suggesting that a child born in Botswana today would be 42% as productive as they could be if they had received the "best"/most attainable education and health by the age of 18 years old (World Bank, 2020).

In Botswana, the first mental health policy was developed in 2003 to align mental health care with the general healthcare system (Opondo et al., 2020). Botswana has one of the highest national HIV prevalence rates with 18.3% of the general population living with HIV. It is then not surprising that most mental health research studies in Botswana find links between people living with HIV (PLWHIV) and mental health disorders such as depression and anxiety (Opondo et al., 2020). Nonetheless, a semi-systematic scoping review of mental health research in Botswana found that there was insufficient mental health data in Botswana to inform policy (Opondo et al., 2020).

With regards to education policy in Botswana, basic education (the first ten years) is available to all children in the country and students enter into primary education at age 6 (Government Paper No.2, 1994). Parents are charged a "co-payment" for education, but families from low-income groups receive free education and, school meals are provided to all learners (ETSSP 2015-2020). Furthermore, at the primary education level, there are two standardised national assessments; the first is the Standard 4 attainment test, and the second is the Primary School Leaving Examination (PSLE) taken at Standard 7 (SACMEQ, 2017). The net enrolment ratio for primary school learners aged 6-12 years was at 93% in 2012, an increase from 86% in 2009. (ETSSP 2015-2020). According to Statistics Botswana (2017), the net enrolment ratio of students aged 9, 10 and 11 was at 98% and over. In addition, 98% of primary school educators teachers are qualified with a Diploma in Education (ETSSP 2015-2020) and the student teacher ratio is approximately 23 students to each teacher (Statistics Botswana, 2014).

**Figure 1:** Map of Botswana



Source: (Mokibelo, 2015)

Botswana is divided into 9 districts with 10 education regions: Central, North-West/, Ngamiland, Ghanzi, Kgalagadi, Kweneng, Southern, Kgatleng, North-East, South-East and Chobe (see figure 3). The education system is organized into four levels: (1) pre-primary, (2) primary education, (3) junior and senior secondary education and (4) tertiary education.

This research study focuses on the Teaching at the Right Level (TaRL) intervention in primary schools in the North-East education region of Botswana.

### 2.1. Teaching at the Right Level – a foundational learning intervention

Teaching at the Right Level (TaRL<sup>3</sup>), a targeted foundational numeracy and literacy intervention is backed by multiple evaluations and has proven to improve learning outcomes across multiple contexts and delivery models<sup>4</sup> (Banerjee et al., 2007; Duflo et al., 2011; Banerjee, Banerji, Duflo et al., 2016). TaRL is a basic numeracy and literacy remedial

<sup>3</sup> Within Pratham, the approach is called CAMaL (Combined Activities for Maximized Learning); which in Hindi also means “magic” or “wonder” (Banerji & Chavan, 2016)

<sup>4</sup> A low-tech variation of the programme was also found to reduce learning loss and encourage parental engagement during the height of the pandemic (Angrist, Bergman, & Matsheng, 2022).

education intervention designed to ensure all students are fully numerate and literate. The intervention was developed by Pratham Education Foundation approximately 15 years ago in India initially as a community-based intervention to improve children's learning.

The innovation is to teach children guided by their level of knowledge and not by their assigned grade level. As such, children are assessed and grouped by their learning level and receive intensive bursts of engaging, targeted instruction over a period of time (Banerji & Chavan, 2016). TaRL has now been tested through multiple randomised control trials by the Jameel Poverty Action Lab (J-PAL) and affiliated researchers. In India, the programme was found to improve student learning outcomes by 0.28 standard deviations (Banerjee, Banerji, Berry, Duflo, et al. 2016). Evaluations from Kenya and Ghana also found that grouping children by their learning levels, helped in supporting instructors to target instruction and for children to learn (Duflo, Dupas & Kremer, 2011; IPA, 2018). In addition, the TaRL literature also showed that learning gains persisted even when multiple delivery models<sup>5</sup> were used (Banerjee et al., 2007; Duflo et al., 2011; IPA 2018).

In Botswana, a situational analysis of basic literacy and numeracy report found that only 1 in 10 standard 5 students could do division and only 20% of students could read a paragraph (Pansiri & Tsayang, 2017). In response, the Ministry of Basic Education, supported by the evidence-driven NGO – Youth Impact, have committed to adapting and scaling TaRL in all primary schools in Botswana.

In Botswana the programme is typically delivered in 30-day bursts, over a 9-week period, with three TaRL assessments points. The baseline assessment is used to form the initial teaching groups for targeted instruction. Students are then are taught foundational numeracy and literacy skills in their learning groups for 1 hour a day in weeks 2-4 as shown in figure 3. At the midline, students are re-assessed and re-grouped as needed. Targeted instruction continues in weeks 6, 7 and 8. Finally at the end of the intervention, there is an endline assessment. TaRL numeracy assessments cover number recognition, basic addition,

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subtraction, multiplication, and long division. TaRL literacy assessments cover, letter recognition, reading a word, reading a sentence, and reading a paragraph/short story.

**Figure 2:** TaRL assessment and intervention calendar

BASELINE: TaRL Assessment Week 1
Week 2
Week 3
Week 4
MIDLINE: TaRL Assessment Week 5
Week 6
Week 7
Week 8
ENDLINE: TaRL Assessment Week 9

In view of this study context, the following research questions are posed.

1. What is the impact of TaRL on the behavioural and emotional (externalising and internalising) difficulties of children?
2. What is the impact of TaRL on the anxiety and depressive (internalising) symptoms of children?
3. What is the impact of TaRL on the educational outcomes (i.e., test scores, attendance) of children?
4. Does TaRL differentially affect learners pre-disposed to mental health difficulties?

### **3. Data and Descriptive Statistics**

Primary schools from the city of Francistown in the North-East region were selected for this study. Francistown was selected because at the initiation of this research study, it was the only location in the region where TaRL was actively being implemented by the Ministry of Basic Education. There are 63 public schools in the North-East region (Statistics Botswana, 2017) and 20 schools in Francistown. All the TaRL implementing schools (15) during the data collection period were included in the study sample.

The North-East region was assessed as presenting the best case scenario for finding possible effect sizes, if any. The following was considered: (1) how many implementation days were completed in the 30-day implementation cycle; (2) how many implementation cycles had been successfully completed and; (3) the willingness to participate – regional education officers’

willingness to be involved in the research process. The schools selected in Francistown all met these criteria. Prior to sample selection, TaRL implementing schools in the region had consistently implemented 30 days of the TaRL programme multiple times.

### 3.1. Ethics

The Botswana Ministry of Basic Education approved the study through the issuance of a research permit and the North-East Regional Director assigned a Principal Education Officer (PEO) to the research study who actively participated in trainings throughout the data collection period and routinely checked in on the progress of the research study. Furthermore, signed parental consent and informed student assent was obtained for all students in the study sample. Parents and students were assured of the confidentiality of their personally identifiable information.

This study was also approved by the institutional research ethics committee at the University of Oxford (UK, Ref No SSH/BSG\_C1A-22-01, February 7<sup>th</sup>, 2022).

### 3.2. Treatment assignment

The Botswana school system spans approximately 3 months each academic term and the study data was collected over two academic terms between January and July 2022. The classes receiving the TaRL programme were in the “treated group” and the classes yet to receive the TaRL programme were in a waitlist “comparison group”. TaRL in the study sample was implemented at the class level. This means that all students within the targeted classes were exposed to TaRL when selected. The comparison group was comprised of students who had not been exposed to TaRL in any of the data collection rounds. Students in the comparison group were engaged in a “business-as-usual” study hour where they sat quietly at their desks completing homework activities and or copying notes off the blackboard.

All schools in the study sample identified TaRL as remedial support for learners to catch up on foundational numeracy and literacy. As such, TaRL was being rolled out in phases with some classes enrolled in the programme, while other classes were waitlisted to receive the programme over the course of the academic year. Implementation in these schools was led by

Tirelo Sechaba Participants – youth volunteers placed in schools by the Ministry of Youth, Gender, Sports, and Culture, to support teachers. These youth volunteers had been trained by Youth Impact<sup>6</sup>.

Treatment assignment was not random. Classes within schools selected to start TaRL implementation were selected by school leaders (Principals and Heads of Departments), who made the decision based on need and willingness of class teachers to enroll their students into the programme. However, students were not tracked into classes in each grade<sup>7</sup>. This means that students were not systematically assigned to classes based on academic grades and or other performance metrics.

A total of 1,297 students from 52 classes in standards 4 and 5 were included in the study.

**Table 1:** Sample size by data collection round (i.e., number of students in each round of data collection)

	Term 1	Term 2	Total
Treated (TaRL)	244	459	594
Comparison Group (No TaRL)	530	64	703
Total Students	774	523	1,297

### 3.3. Data collection

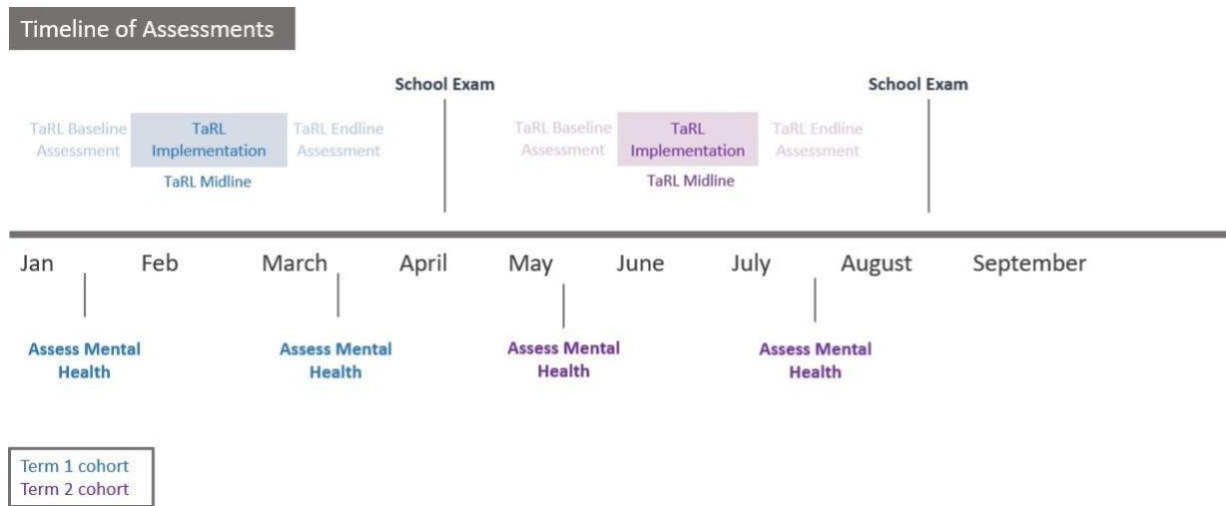
Students in TaRL classes (treated) and non-TaRL classes (comparison group) were surveyed using a mental health instrument (see Table 2) prior to the 30-day TaRL implementation cycle and again after the implementation was completed. Two cohorts of students were surveyed during the data collection period; cohort 1 was surveyed in the first academic term and cohort 2 was surveyed in the second academic term as shown in Figure 3. Each cohort was comprised of treated (TaRL) and comparison group classes and each round of data collection had a baseline and endline measure for the mental health outcomes of interest.

<sup>6</sup> The youth-led, evidence-based NGO supporting the Ministry of Basic Education to scale TaRL in Botswana. <https://www.youth-impact.org/>

<sup>7</sup> Education Policy in Botswana randomly assigns students in standard 1, students who remain in the same schools, typically progress in the same stream through school. This means a student assigned to standard 1B, moves to standard 2B, 3C etc.

Any student that was transferred into the school after baseline data collection was not included in the data collection at the endline. The assessment timeline as described is shown below. The final study sample pools together students from cohort 1 and 2 of the data collection rounds.

**Figure 3:** Timeline of assessments.



### 3.4. Outcome measures

Mental health outcomes were captured through psychometrically validated tools: the Strengths and Difficulties Questionnaire (SDQ) and the Revised Child Anxiety and Depression Scale (RCADS). The SDQ (Goodman, 2001) is a behavioural and emotional questionnaire screening for internalising problems (emotional and peer symptoms), externalising problems (conduct and hyperactivity symptoms) and the prosocial scale. The RCADS (Chorpita et al., 2000) screens for internalising anxiety and depressive problems through six subscales: separation anxiety disorder, social phobia, generalised anxiety disorder, panic disorder, obsessive compulsive disorder and major depressive disorder.

For this study, the screening questions were back-translated using principles on cross-cultural back-translation (Brislin, 1970). Two bilingual translators familiar with the TaRL programme and study context individually translated the tools from English into the local vernacular Setswana. Once the two translators had agreed on the translation. A third translator back-translated the tool into English to ensure consistency in the translation. All three translators agreed on the final translation.

It is important to note that the use of the SDQ and RCADS tools in this research are to capture general symptoms of externalising and internalising mental health challenges in the study sample while when utilised collaboratively with clinicians, the same tools can also be used as diagnostic tools (Cortina et al, 2012).

**Table 2:** Outcome measures

Instrument	Items	Details	Timing	Target	Link
Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001)	25 items	5 subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour	Baseline & Endline	TaRL & Non-TaRL Classes	Internalising & externalising MH
Revised Child Anxiety and Depression Scale (RCADS) (Sandin, Chorot, Valiente, & Chorpita, 2010)	25 items	6 subscales: major depression, generalised anxiety, social phobia, separation anxiety, obsessive compulsive disorder, panic disorder	Baseline & Endline	TaRL & Non-TaRL Classes	Internalising MH
SDQ- short	3 items	Teacher reported on student emotional and behavioural difficulty	Endline only	TaRL & Non-TaRL Classes	Externalising MH
Administrative Data		School exam results (multiple periods)	Term 1 & 2 (2022); Term 1, 2, & 3 (2021)	TaRL & Non-TaRL Classes	Educational outcome
Administrative Data		Student Attendance	Term 1 & 2 (2022)	TaRL & Non-TaRL Classes	Educational outcome

All students in the TaRL programme and the waitlisted comparison group students were screened using the mental health instrument (SDQ + RCADS). In addition, class teachers reported on observed emotional and behavioural difficulty, using a shortened SDQ instrument for each student in the study sample at endline.

To capture education outcomes, school administrative data on test scores and attendance records were collected for academic terms 1 and 2. School exam data and attendance records are routinely used to inform school level decisions (i.e., student progression) and wider

regional and national education policy decisions, these were also selected as the education outcome measures. The TaRL assessment data, while valuable in showing learning on foundational concepts, is narrow in scope when compared to range of concepts assessed in standards 4 and 5 (see appendix J for a sample of a school exam).

All the variables used in this paper with a description of what they measure is captured in Table 3.

**Table 3:** Data Description for variables included in analysis

Variable	Description
<b>Outcome variables</b>	
Depression and Anxiety (RCADS raw t score)	Total RCADS raw score for 25 item scale (6 subscales)
Depression and Anxiety (RCADS z score)	Standardised RCADS score
Total Difficulties- Emotional and Behavioural (SDQ raw score)	Total SDQ raw score for 25 item scale (5 subscales)
Total Difficulties- Emotional and Behavioural (z score)	Standardised SDQ score for 25 item scale
Learning Outcome (raw)	Reported test scores by school term (%)
Learning score (z score)	Standardised student test scores
<b>Treatment Status</b>	
TaRL Class	Students grouped by TaRL Implementation classes (1=TaRL class) (0= No TaRL)
<b>Student related Variables</b>	
Standard	Student Grade
Age	Reported student age
Reported gender	Reported student gender
Attendance	Teacher recorded student attendance
<b>Teacher related Variables</b>	
Student prosocial behaviour (raw)	Question on how readily student shares with other children
Student conduct problems (raw)	Question on how often student fights with other children
Student hyperactivity (raw)	Question on how easily distracted/wandering concentration
Emotional and behavioural indicator (z score)	Standardised composite score of 3 questions on student behaviour

### 3.5. Descriptive statistics

This study sampled 1297 students, from 52 classes, in standards 4 and 5. At baseline, there were no significant differences between students in TaRL classes and students in non-TaRL classes on students' characteristics such as gender, age, or grade and on mental health

outcomes (emotional and behavioural difficulties; anxiety and depression). In addition, looking at term 1 test scores and attendance for the sub-sample of students exposed to the TaRL implementation in term 2 (400+ students), there were no significant differences between treated students and students in the comparison group.

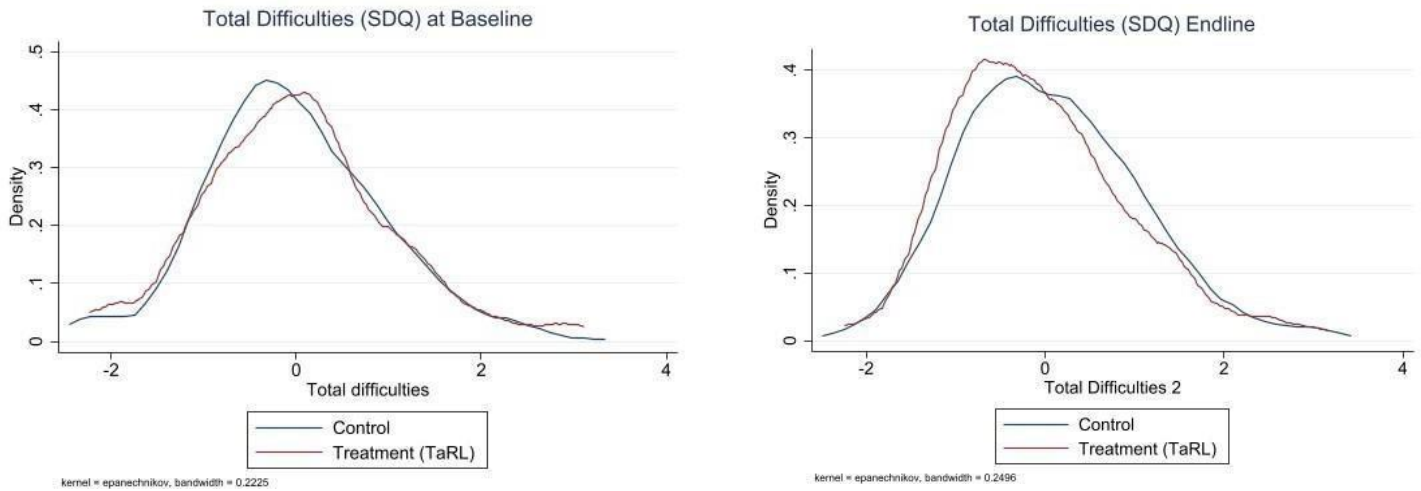
**Table 4:** Baseline comparison between TaRL students (treated) and non-TaRL students (control)

<b>Panel A</b> Student Characteristics	(1) Baseline mean/proportion controls	(2) T-C difference at baseline	(3) N
Girl (1=Girl)	0.49	-0.012 (0.031)	1,296
Age	9.44	0.078 (0.135)	1,287
Standard (year)	4.19	-0.110 (0.095)	1,297
<b>Panel B: Mental Health Outcomes</b>			
Total difficulties (SDQ) – raw score	16.870	0.263 (0.562)	1,282
Total difficulties (SDQ) – z score	-0.021	0.039 (0.083)	1,282
Total Anxiety and Depression (RCADS) – raw score	48.075	0.568 (1.276)	1,296
Total Anxiety and Depression (RCADS) – z score	-0.026	0.049 (0.110)	1,286
Total Anxiety (RCADS) – raw score	49.411	0.809 (1.192)	1,296
Total Anxiety (RCADS) – z score	-0.037	0.072 (0.106)	1,296
Total Depression (RCADS) – raw score	46.297	0.184 (1.252)	1,296
Total Depression (RCADS) – z score	-0.009	0.015 (0.105)	1,296
<b>Panel C: Education outcomes (sub-sample of term 2 cohort)</b>			
Test score (term 1) – percentage score	53.641	-7.107 (8.950)	414
Test score (term 1) – z score	0.232	-0.381 (0.479)	414
Attendance (term 1) – raw percentage	99.172	-0.585 (0.801)	405
Attendance (term 1) – z score	0.130	0.161 (0.220)	405
Note: Robust standard errors in parentheses are clustered at the class level. The T-C difference is the baseline “treatment effect” using a minimal specification, including a treatment dummy. Mental health and education outcomes are standardised with mean 0, standard deviation 1; *p<0.01 **p<0.05 ***p<0.01.			

The kernel density plots in figures 4 and 5 show the distribution of students’ mental health outcome scores at baseline (before the TaRL implementation) and at endline. On the total difficulties outcome, treated (TaRL) students at endline appear to have fewer behavioural

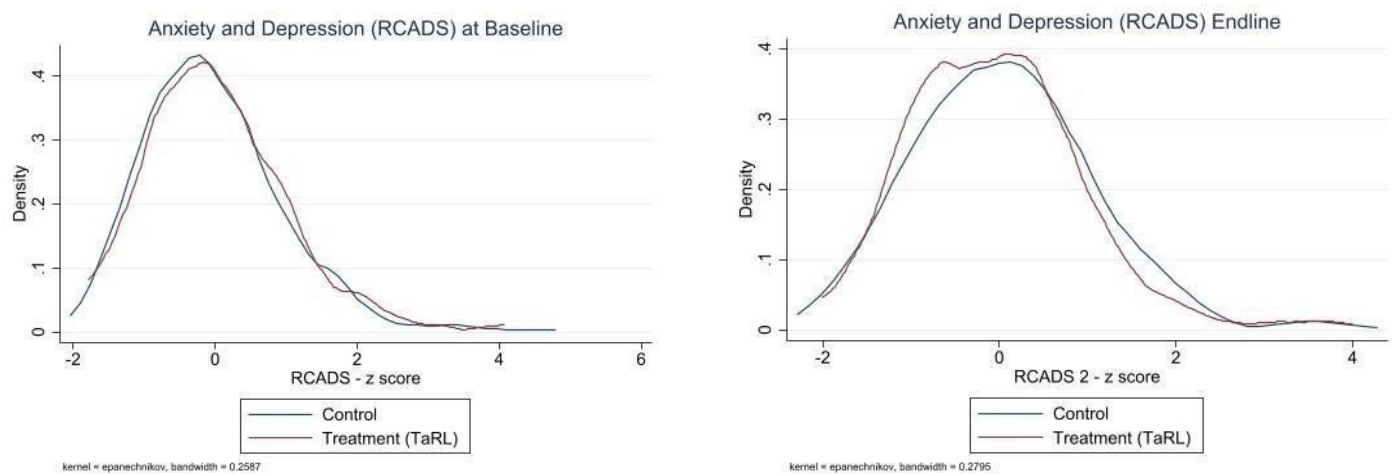
and emotional difficulties (i.e., lower SDQ score) after the implementation of TaRL as compared to the comparison group. However, at baseline the differences are less discernible.

**Figure 4:** Kdensity plots on Total Difficulties (standardised SDQ score)



Similarly, on the anxiety and depression outcome, once again students at endline appear to be better off (i.e., lower anxiety and depression) however these differences are difficult to understand without a more precise estimation strategy.

**Figure 5:** Kdensity plots on Anxiety and Depression (standardised RCADS score)





#### 4. Empirical Framework

A Difference in Difference (DD) design is used to estimate the effects of TaRL on mental health and learning outcomes. The standard DD framework requires two groups (treatment and comparison), two time periods (before and after) and a change in treatment status (i.e., the treatment group receives a treatment in the second period, while the comparison group does not receive the treatment in either of the periods). This design can account for biases introduced by time-invariant differences between the groups<sup>8</sup>.

In this study, we find that TaRL receiving classes and the waitlisted comparison classes are balanced on key baseline characteristics. Additionally, the comparison group is composed of students from the same school (TaRL implementation schools) waitlisted to receive the programme. This would suggest that both groups are exposed to the same school quality variables and similar socioeconomic variables.

##### 4.1. Estimation Strategy and Hypotheses

The unit analysis for each dependent variable is for student  $i$  in class  $c$  at time  $t$ . The following specifications are estimated:

$$y_{ict} = \beta_0 + \beta_1 A_{ic} + \beta_2 T_t + \beta_3 (A_i * T_t) + \epsilon_{it} \quad (1)$$

The dependent variable  $y_{ict}$  is the outcome variable of interest (i.e., student-reported, or teacher-reported mental health outcome; or education outcome) for student  $i$  in class  $c$  at time  $t$ .  $\beta_1$  captures the treatment status, where  $A_{ic}$  is a dummy variable taking 1 for treated classes.  $\beta_2$  captures the time trend with  $T_t$  as the dummy variable for the second time period (i.e., when students receive the TaRL programme).  $\beta_0$  is the constant term. The treatment effect is estimated through  $\beta_3$ .

$$y_{ict} = \beta_0 + \beta_1 A_{ic} + \beta_2 T_t + \beta_3 (A_i * T_t) + \beta_4 X_{ic} + \epsilon_{it} \quad (2)$$

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<sup>8</sup> Parallel trend analysis yet to be included.

$$y_{ict} = \beta_0 + \beta_1 A_{ic} + \beta_2 T_t + \beta_3 (A_i * T_t) + \beta_4 X_{ic} + \delta_{ic} + \epsilon_{it} \quad (3)$$

$$y_{ict} = \beta_0 + \beta_1 A_{ic} + \beta_2 T_t + \beta_3 (A_i * T_t) + \beta_4 (A_i * yHmh_{ict}) + \beta_5 (T_t * yHmh_{ict}) + \beta_6 (A_i * T_t * yHmh_{ict}) + \beta_7 X_{ic} + \delta_{ic} + \epsilon_{it} \quad (4)$$

Specification 2 includes student level controls (gender, age, standard) making the outcomes of interest marginally more precise than the first specification. However, as TaRL implementation happens over a school term (i.e., over 3 months), it is unlikely that during this time, there are changes that cause the treatment and control groups of students within the same schools to be significantly different from one another. Specification 3 adds school fixed effects ( $\delta_{ic}$ ). This is possible as there are treatment and control classes within each school. It increases power by controlling for time-invariant school-specific variation. The main results reported in this study utilise the preferred specification 3.

Specification 4 explores treatment heterogeneity for students predisposed to mental health difficulties (i.e., high SDQ and RCADS scores).  $yHmh_{ict}$  is for students with SDQ/RCADS scores at “high/very high” and “high severity” thresholds in class c at time t.

## 4.2. Hypotheses

### *Mental Health Outcomes*

**H1:** TaRL reduces the emotional and behavioural difficulties of students enrolled in the programme as compared with non-TaRL students (measured through SDQ).

**H2:** TaRL reduces the depressive and anxiety symptoms of students enrolled in the programme as compared with non-TaRL students (measured through RCADS)

**H3:** TaRL reduces teacher reported emotional and behavioural difficulties of students enrolled in the programme as compared with non-TaRL students (measured through selected SDQ).

### *Educational Outcomes (alternative mechanisms)*

**H4:** TaRL improves mental health outcomes through improved test scores of students enrolled in the programme as compared with non-TaRL students.

**H5:** TaRL improves mental health outcomes through improved attendance of students enrolled in the programme as compared with non-TaRL students.

## **5. Results**

On the mental health outcomes, a higher score reflects a higher degree of difficulty/severity. The explanatory variable of interest is the interaction term (Treat\*Period). Coefficients in columns 2 and 4 capture the effects of TaRL on the emotional and behavioural difficulties (SDQ) and the anxiety and depressive disorders (RCADS) of students respectively. The results show that Teaching at the Right Level (TaRL) has a significant impact on reducing the total emotional and behavioural difficulties experienced by students. Students in TaRL implementation classes experience .15 SD less externalising and internalising difficulties (SDQ measure) compared with students not in TaRL classes. On the Anxiety and depression outcome, the results show a similar direction of effect, but the effect estimated is nonsignificant.

**Table 5:** Impact of TaRL on Mental Health Outcomes

VARIABLES	SDQ	SDQ	RCADS	RCADS
Treatment status	0.048 (0.080)	0.022 (0.106)	0.115 (0.083)	0.053 (0.100)
Period	0.086 (0.070)	0.086 (0.070)	0.047 (0.068)	0.047 (0.068)
Interaction (Treat*Period)	-0.155* (0.088)	-0.153* (0.088)	-0.100 (0.095)	-0.100 (0.096)
Controls	Yes	Yes	Yes	Yes
School FE		Yes		Yes
Control mean	0	0	0	0
Students	1,281	1,281	1,296	1,296

Notes: regression estimates on mental health outcomes (standardised), the coefficients of interest are reported with robust standard errors in parentheses, clustered at class level; \*, \*\*, and \*\*\* denote significance at the 10; 5; and 1 percent levels respectively.

In addition, at endline, teachers were asked 3 questions on the observed emotional and behavioural difficulty of the students in their classes. Their responses were combined into a composite score and the raw and standardised scores are reported. These results are not significantly different from 0, showing that teacher-observed behaviour has no real effects on student mental health.

**Table 6:** Impact of TaRL on Teacher-observed behaviour

VARIABLES	SDQ (raw)	SDQ (z score)
TaRL	0.090 (0.167)	0.082 (0.153)
Controls	Yes	Yes
School FE	Yes	Yes
Control mean	2.68	0
Students	636	636
Observations	1,272	1,272

Cluster-robust standard errors in parentheses, \*\*\* p<0.01,  
\*\* p<0.05, \* p<0.1

Looking at a sub-sample of students surveyed in term 2, the results show that TaRL does not significantly improve student test scores or attendance records when compared with students yet to receive the programme. Due to the growing literature linking children’s emotional and behavioural health to their educational outcomes such as test scores, and school attendance (Valdez et al., 2011; Suldo et al., 2014; Becker et al., 2014), it was plausible that mental health outcomes improved as a result of improved educational outcomes. However, this study finds no evidence of the intervention improving any of the educational outcomes (test scores and attendance).

Evidence from a synthesis of targeted instruction programmes found that the model of delivery (i.e., use of volunteers or teachers) and implementation take-up explained the variation in reported effects (Angrist & Meager, 2022). This may be a possible explanation for the results found on education outcomes as it is possible that the model of delivery (i.e., governmental youth volunteers) affected the effects observed in this study.

**Table 7:** Impact of TaRL on Educational outcomes

VARIABLES	Test score	Attendance
Treatment status	-0.483 (0.365)	-0.129 (0.148)
Period	-0.263 (0.323)	-0.133 (0.107)
Interaction (Treat*Period)	0.297 (0.340)	-0.047 (0.242)
Controls	Yes	Yes
School FE	Yes	Yes
Control mean	0	0
Students	414	386

Notes: robust standard errors in parentheses, clustered at class level; \*, \*\*, and \*\*\* denote significance at the 10; 5; and 1 percent levels respectively.

Finally, this research study also looked at treatment heterogeneity for students predisposed to mental health difficulties (i.e., high SDQ and RCADS scores). The study looked to understand the extent to which students with high levels of emotional and behavioural difficulty (SDQ) and high levels of anxiety and depression (RCADS) were affected by the TaRL pedagogy, relative to students in the comparison group. The results are significant. Students with “high/very high” levels of emotional and behavioural difficulty experience even less mental health difficulties as a result of the program (see coefficients on Treat\*Period\*high SDQ).

**Table 8:** Impact of TaRL on students pre-disposed to emotional and behavioural difficulties

VARIABLES	SDQ	SDQ
Treatment status	-0.132*** (0.014)	-0.135*** (0.019)
Period	-0.367*** (0.037)	-0.365*** (0.037)
Treat*high SDQ	0.332*** (0.023)	0.331*** (0.022)
Period*high SDQ	0.565*** (0.009)	0.565*** (0.009)
Treat*Period*high SDQ	-0.329*** (0.026)	-0.330*** (0.025)
Controls	Yes	Yes
School FE		Yes
Control mean	0	0
Students	408	408

Notes: robust standard errors in parentheses, clustered at class level; \*, \*\*, and \*\*\* denote significance at the 10; 5; and 1 percent levels respectively.

For students above the “high severity” threshold for the anxiety and depression measure (RCADS), the results show a similar direction of effect, however the effect estimated is nonsignificant.

**Table 9:** Impact of TaRL on students pre-disposed to anxiety and depression

VARIABLES	RCADS	RCADS
Treatment status	-0.380 (0.314)	-0.410 (0.300)
Period	-1.624*** (0.115)	-1.629*** (0.121)
Treat* highRCADS	0.151 (0.103)	0.170 (0.120)
Period*highRCADS	0.567*** (0.025)	0.570*** (0.027)
Treat*Period*RCADS	-0.034 (0.049)	-0.044 (0.051)
Controls	Yes	Yes
School FE		Yes
Control mean	0	0
Students	37	37

Notes: robust standard errors in parentheses, clustered at class level; \*, \*\*, and \*\*\* denote significance at the 10; 5; and 1 percent levels respectively.

## 6. Discussion and Concluding Remarks

Overall, this study confirms the main hypothesis that the student-centered pedagogy significantly improves the mental health outcomes of children exposed to intervention. Student centered pedagogies that are activity based, include peer learning, and no corporal punishment have been shown to improve student psychological outcomes (Erwin et al., 2012; Hanson et al., 2016; Larson et al., 2020). For TaRL, the ease with which students are able to openly ask questions, the inclusion of structured play activities such as energizers/icebreakers, the use of small group activities to reinforce concepts, the enthusiastic vocal support of instructors, and the behavioral management techniques that are utilised without corporal punishment, may all play a role in improving the school climate in for students.

The quality of school climate is also often likened to positive parenting models/relationships (Larson et al., 2020). Studies guided by Bronfenbrenner’s (1979) ecological theory illuminated the importance of the interactions within and between different ecological systems (i.e., individual, process, and context) as a means of guiding public mental health policy and

practice (Eriksson & Ghazinour, 2018). This showed the vital role parents play in the wellbeing of their children. A positive parent-child relationship leads to reduced parental stress levels and by association, improved outcomes for their children (Massarwi, Cluver, et al., 2022). Similarly, it is intuitive to see how positive school environments would be associated with positive socio-emotional, behavioural, and academic outcomes.

The main results reveal that the Teaching at the Right Level (TaRL) pedagogy improves the internalising and externalising mental health difficulties of children (observed through the SDQ) compared with students not yet exposed to the programme. No effects were found on the internalising anxiety and depression (RCADS) measure. In addition, when looking at treatment heterogeneity by predisposition to high mental health symptoms, the results show that the intervention also significantly reduces overall mental health problems for those displaying high levels of emotional and behavioural difficulties, relative to the comparison group. No significant effects are found among students with high levels of anxiety and depression at baseline. However, the number of students in the sample is much smaller and must be interpreted conservatively.

Regarding educational outcomes, this study was interested in whether the learning intervention would impact student mental health through improved educational outcomes (test scores and attendance). There is evidence linking mental health to children's educational outcomes where difficulties in one area also uncovers difficulties in the other (Valdez et al., 2011; Becker et al., 2014). Externalising problems such as disruptive and behavioural difficulties affect academic outcomes and academic outcomes affect mental health, particularly internalising problems such as anxiety and depression (Suldo et al., 2014). However, this study finds no significant effects on test scores and attendance records.

The results in this research study indicates that improved mental health is not realised through improved education outcomes but is rather driven by a mechanism within the TaRL pedagogy. These results lay the ground for further research to uncover which of the possible mechanisms discussed above could be driving the effects observed. Nonetheless, the findings show that targeted instruction interventions such as Teaching at the Right Level have a

positive impact on reducing some externalising and internalising difficulties experienced by learners.

This paper is able to connect the education and mental health literatures, contributing to the evidence base on improving mental health and educational outcomes particularly in low resource settings in Africa. With the dearth of policy relevant mental health data in SSA, this study fills an important research gap.

Moreover, this research presents the first study linking Teaching at the Right Level with improved mental health outcomes.

#### **Acknowledgement of funding**

This work was supported by the RISE programme [A0268]; and the Centre for the Study of African Economies (CSAE).



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## Appendix A: Mental health related terms

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	<b>Working Definitions</b>
<b>Mental health</b>	<p>“a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community” (WHO, 2001a)</p> <p>“an asset or resource that enables positive states of wellbeing and provides the capability for people to achieve their full potential” (Patel et al., 2018)</p>
<b>Mental disorder</b>	<p>Disturbances of thought, emotion, behaviour, and relationships with others that lead to substantial suffering and functional impairment in one or more major life activities (WHO, 2004); identified by the WHO International Classification of Diseases and the Diagnostic and Statistical Manual of Mental Disorders (Patel et al., 2018)</p>
<b>Externalising mental health problems</b>	<p>Disruptive behaviours, inattention/hyperactivity, other behavioural and emotional difficulties (Becker et al., 2014; Garcia-Escalera et al., 2020)</p>
<b>Internalising mental health problems</b>	<p>Anxiety, depression, trauma (Becker et al., 2014; Garcia-Escalera et al., 2020)</p>

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## Appendix B: Number of Primary Schools by Ownership and Region

Table 2. 1: Number of Primary Schools by Ownership and Region – 2017

Region	Public		Government Aided		Private		Total	%
	Public	%	Government Aided	%	Private	%		
South East	44	6	4	40	24	37	72	9
North East	61	8	2	20	5	8	68	8
South	122	16	1	10	6	9	129	16
Kweneng	92	12	-	-	9	14	101	12
Kgatleng	37	5	-	-	1	2	38	5
North West	68	9	-	-	5	8	73	9
Chobe	10	1	-	-	1	2	11	1
Gantsi	22	3	-	-	1	2	23	3
Kgalagadi	42	6	-	-	-	-	42	5
Central	248	33	3	30	13	20	264	32
<b>Total</b>	<b>746</b>	<b>100</b>	<b>10</b>	<b>100</b>	<b>65</b>	<b>100</b>	<b>821</b>	<b>100</b>

Source: Statistics Botswana, May 2021. *Primary School Stats Brief, 2017*.

## Appendix C: Pupils reaching acceptable mathematics levels.

Region	Pupils reaching acceptable mathematics levels (%)					
	Boys	Girls	Rural schools	Urban schools	Low SES	High SES
Central	62.9	73.4	57.7	78.9	63.3	79.4
Chobe	57	61.6	60.7	58.1	55.2	72.5
Gaborone	78.1	83.6	x	80.1	77.4	82.6
Gantsi	40.2	28.6	20.1	58.1	28.1	51.3
Kgalagadi	41.3	43.8	40.2	62.5	39.5	50.3
Kgatleng	47.1	58.3	48	53.1	48.7	55.4
Kweneng	59	64.1	58.5	63.1	53.9	73.1
North East	70.1	74.3	66.9	73.4	68.7	76.9
North West	46.3	56.6	40.8	70.9	49.5	62.4
South East	73.6	83.7	77.7	78.8	70.5	80.8
South	47.6	59.2	48.4	65.7	48	66.1
<b>Botswana</b>	<b>60.7</b>	<b>69</b>	<b>52.8</b>	<b>73.4</b>	<b>57.7</b>	<b>75</b>

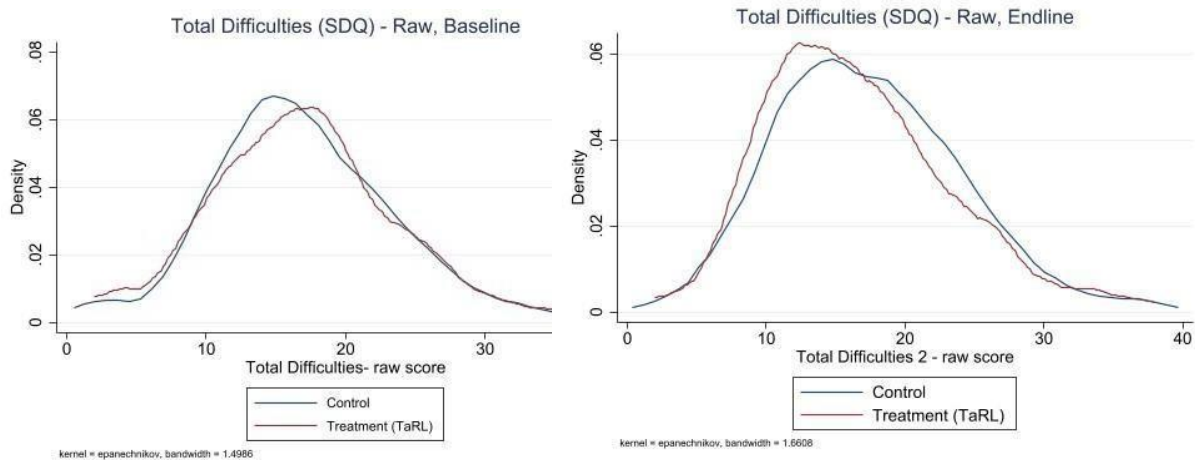
Source: SACMEQ IV, 2017

## Appendix D: Categorization of educational outcomes

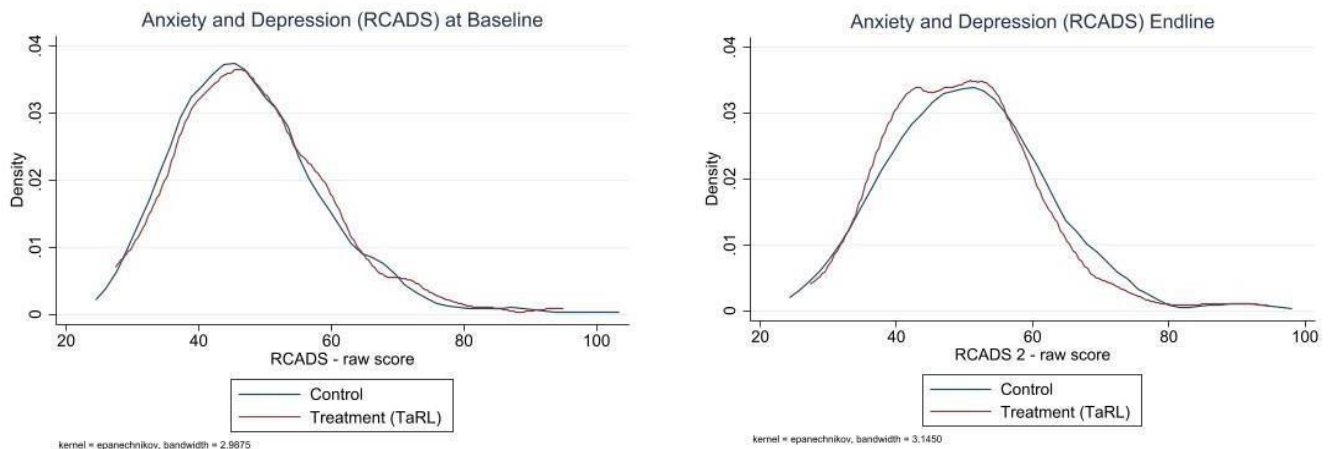
Educational outcomes	Description
Academic achievement	Classroom test scores, exam results, grade level performance, standardised test scores
Academic and behavioural skills	Classroom behaviour, teacher-student interactions, peer relationships
Attendance	School attendance as measured by school records and or caregiver report
Quality of learning environment	School or home ecology in terms of promoting educational skills
Academic self-efficacy	Self-reported perceptions of academic skills

Source: adapted from Baskin et al, 2010 & Becker et al, 2014

## Appendix E: Kdensity plots – Total Difficulties (SDQ) - raw scores



## Appendix F: Kdensity plots- Anxiety and Depression score (RCADS) – raw scores





**Appendix G: Impact of TaRL on Mental Health Outcomes (raw scores)**

VARIABLES	(1) SDQ	(2) SDQ	(3) SDQ	(4) RCADS	(5) RCADS	(6) RCADS
Period	0.456 (0.461)	0.498 (0.456)	0.496 (0.456)	2.050** (0.821)	2.094** (0.814)	2.094** (0.816)
Treatment status	1.265 (0.959)	1.338 (0.912)	1.125 (1.017)	1.674 (2.053)	2.585 (1.747)	1.879 (1.782)
Interaction	-1.024* (0.589)	-1.041* (0.583)	-1.026* (0.586)	-1.089 (1.123)	-1.162 (1.117)	-1.162 (1.120)
Controls	No	Yes	Yes	No	Yes	Yes
School FE	No	No	Yes	No	No	Yes
Control mean	17.109	17.109	17.109	49.090	49.090	49.090
Clusters	52	52	52	52	52	52
Students	1282	1273	1273	1296	1287	1287
Observations	2,564	2,545	2,545	2,592	2,574	2,574

Notes: regression estimates mental health outcomes (raw scores), the coefficients of interest are reported with heteroskedasticity-robust standard errors in parentheses, clustered at class level; \*, \*\*, and \*\*\* denote significance at the 10; 5; and 1 percent levels respectively.

## Appendix H: Student Tool<sup>9</sup>

STUDENT QUESTIONNAIRE				
North East Francistown	School Name:	Are you a girl or a boy		Girl
Full name:		Boy		
Are you a TaRL student?	<input type="checkbox"/> YES <input type="checkbox"/> NO	Age:	Baseline	Endline
<b>Instruction:</b> Please select the answers that are true for you. It would help us if you answered all the items as best as you can even if you are not absolutely certain, or the question seems silly. Please answer based on how you have been feeling over the past three months (over the last school term). If you do not want to answer any of the questions, no one will be upset with you. Thank you for your time. Are you ready to start?				
1	I try to be nice to other people. I care about their feelings	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
2	I am restless, I cannot stay still for long	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
3	I get a lot of headaches, stomach-aches, or sickness	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
4	I usually share with others (food, games, pens/pencils, etc.)	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
5	I get very angry and often lose my temper	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
6	I am usually on my own. I generally play alone or keep to myself	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
7	I usually do as I am told	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
8	I worry a lot	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
9	I am helpful if someone is hurt, upset, or feeling ill	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
10	I am constantly fidgeting or squirming	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
11	I have one good friend or more	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
12	I fight a lot. I can make other people do what I want	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
13	I am often unhappy, down-hearted, or tearful	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
14	Other people my age generally like me	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
15	I am easily distracted; I find it difficult to concentrate	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
16	I am nervous in new situations. I easily lose confidence	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
17	I am kind to younger children	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
18	I am often accused of lying or cheating	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
19	Other children or young people pick on me or bully me	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
20	I often volunteer to help others (parents, teachers, children)	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
21	I think before I do things	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True

<sup>9</sup> Translated Setswana tools not included

22	I take things that are not mine from home, school or elsewhere	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True	
23	I get on better with adults than with people my own age	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True	
24	I have many fears, I am easily scared	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True	
25	I finish the work I'm doing. My attention is good	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True	
26	I feel sad or empty	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
27	I worry when I think I have done poorly at something	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
28	I would feel afraid of being on my own at home	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
29	Nothing is much fun anymore	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
30	I worry that something awful will happen to someone in my family	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
31	I am afraid of being in crowded places (like shopping centers, the movies, buses, busy playgrounds)	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
32	I worry what other people think of me	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
33	I have trouble sleeping	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
34	I feel scared if I have to sleep on my own	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
35	I have problems with my appetite	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
36	I suddenly become dizzy or faint when there is no reason for this	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
37	I have to do some things over and over again (like washing my hands, cleaning, or putting things in a certain order)	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
38	I have no energy for things	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
39	I suddenly start to tremble or shake when there is no reason for this	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
40	I cannot think clearly	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
41	I feel worthless	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
42	I have to think of special thoughts (like numbers or words) to stop bad things from happening	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
43	I think about death	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
44	I feel like I don't want to move	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
45	I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
46	I am tired a lot	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
47	I feel afraid that I will make a fool of myself in front of people	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
48	I have to do some things in just the right way to stop bad things from happening	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
49	I feel restless	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always

50	I worry that something bad will happen to me	<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Often	<input type="checkbox"/> Always
Facilitator Name:			Date of completion:		

### Appendix I: Teacher Tool

TEACHER QUESTIONNAIRE				
Student Name:		Teacher Name:		Date:
Std. and class:	Baseline / Endline	Is your student a TaRL student?		Yes / No
For each question, select Not True, Somewhat True or Certainly True. Please give your answers on the basis of how things have been this year (2022) <b>for the student</b> . The student...				
Questions				
1	Shares readily with other children (treats, toys, pencils etc.)  <i>O kgaogana sentle le ba bangwe(dinekere, diToy, dipensele etc)</i>	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
2	Often fights with other children or bullies them  <i>Gantsi o lwa le bana ba bangwe kana o a ba tshwenya</i>	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True
3	Is easily distracted, concentration wanders  <i>O iteega tsebe motlhofo, o eta mogopolo</i>	<input type="checkbox"/> Not True	<input type="checkbox"/> Somewhat True	<input type="checkbox"/> Certainly True

Appendix J: Sample of student exam

4E

Work out question 1 and 2.

1.6.1.1 1 PULA = 100 thebes

1. What is 375 thebe in Pula?

working

$$375 \times 100 = P37.5$$

Answer: P37.5 ..... (2) ✓

2. Write P5.50 in thebe

working

$$P5.50 \times 100 = 550$$

Answer: 550 ..... (2) ✓

1.6.1.3

Complete the following

3.  $P97.35 = P50 + P20 + P20 + P5 + P2 + 25 \text{ thebe} + 10 \text{ thebe}$  (1)

1.6.1.4

Work out

4.  $P63.45$   
 $+ P15.20$

$$\begin{array}{r} P63.45 \\ + P15.20 \\ \hline P78.65 \end{array}$$

(1) ✓

5. P100.00

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2

8. Ms Neo gave  $\frac{5}{8}$  of a cake to Shawn, she gave  $\frac{3}{8}$  of the cake to her son, what fraction of the cake did Ms Neo give to her children altogether?

Working

$$\frac{5}{8} + \frac{3}{8} = \frac{8}{8}$$

Answer  $\frac{8}{8}$  ..... (2)

1.4.1.5

Work out the following

9.  $350 \div 10 = \boxed{35}$

(1) 
$$\begin{array}{r} 30 \\ 10 \overline{) 350} \\ \underline{-30} \phantom{0} \\ 50 \\ \underline{-50} \\ 0 \end{array}$$

1.4.14

10.  $428 \div 5 =$

Working

$$\begin{array}{r} 85 \\ 5 \overline{) 428} \\ \underline{-40} \phantom{0} \\ 28 \\ \underline{-25} \\ 30 \\ \underline{-30} \\ 0 \end{array}$$

Answer  $85.6$  ..... (2)

$$11. \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

(1) ✓

The table below shows a bill. Use it to answer question 12

1.6.1.6

ITEM	COST PER ITEM	NUMBER OF ITEMS	TOTAL COST
Shirt	P21.50	2	P21.50
Pair of trousers	P36.75	1	P36.75
		TOTAL	P58.25

12. What is the total cost of all the items?

working

$$\begin{array}{r} P21.50 \\ + P36.75 \\ \hline P58.25 \end{array}$$

Answer: P58.25 (2)

Use the information given below to answer question 13.

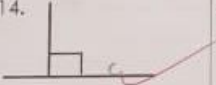


10mm = 1cm

3.1.1.6

13. Convert 140 mm to cm

140 mm = ~~140~~ 14 cm (1)

Match the angles with their correct names

ANGLES	NAMES
14. 	A. Obtuse angle
15. 	B. Acute angle
16. 	C. Right angle

3.1.1.4



17. Find the perimeter of the following shape



Answer 24mm ✓ (1) |

1.2.1.6

Use the list of numbers below to answer question 18 and 19.

8, 9, 10, 11, 12

18. Which of the numbers are odd numbers?

9, 11 ✓ (2)

02

19. Which of the numbers are multiples of 4?

8, 12 ✓ (2)

2

1.2.1.3

20. Write **704** in words

Answer Seven hundred and four ✓ (1)

1

21. Write **one hundred and forty five** in numerals.

Answer: 145 ..... ✓ (1) /

**3.2.1.2**

22. Calculate the area of the rectangle below



Working  
L x W ✓  
 $11\text{ cm} \times 6\text{ cm} = 2\text{ km}$

Answer: 2 km ..... ✗ (2) /

23. Find the area of the square below

25. From the given containers, which one has more capacity?



Answer: B, C ..... (1) 0

3.4.1.3

26. Neo bought 9 kg of sugar and gave her neighbour 3 kg. What is the mass of sugar left for Neo?

Working

$$9\text{kg} - 3\text{kg} = 6\text{kg}$$

Answer: 6 kg ..... (2) 2

27. Gaba has 10 kg of potatoes, Reba has 5 kg of potatoes and Chedu has 7 kg of potatoes. What is the total mass of all the bags of potatoes?

Working

$$\begin{array}{r} 10\text{kg} \\ 5\text{kg} \\ + 7\text{kg} \\ \hline 22\text{kg} \end{array}$$

Answer: 22 kg ..... (2) 2

MARKING KEY MATHEMATICS STD4

4