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Building psychosocial assets and wellbeing among adolescent girls: A randomized controlled trial



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ABSTRACT

We conducted a randomized controlled trial of a 5-month resilience-based program (Girls First Resilience Curriculum or RC) among 2308 rural adolescent girls at 57 government schools in Bihar, India. Local women with at least a 10th grade education served as group facilitators. Girls receiving RC improved more (vs. controls) on emotional resilience, self-efficacy, social-emotional assets, psychological wellbeing, and social wellbeing. Effects were not detected on depression. There was a small, statistically significant negative effect on anxiety (though not likely clinically significant). Results suggest psychosocial assets and wellbeing can be improved for girls in high-poverty, rural schools through a brief school-day program. To our knowledge, this is one of the largest developing country trials of a resilience-based school-day curriculum for adolescents.

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Today, 90% of the world's children and adolescents live in Low and Middle Income Countries (LMICs),¹ where chronic adversity, such as child labor, physical or sexual abuse, teenage marriage and pregnancy, parental death, and poverty is prevalent (Benjet, 2010; Kieling et al., 2011). Such chronic adversity predicts poor mental health, with studies suggesting that childhood adversity accounts for nearly half of all childhood-onset disorders and more than a quarter of adult or later-onset disorders (Green et al., 2010). Poverty, in particular, exists in close, cyclical relationship with poor mental health in LMICs,

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¹ Abbreviations used throughout this manuscript: AIC (Akaike Information Criterion); BIC (Bayesian Information Criterion); CD-RISC 10 (Connor-Davidson Resilience Scale 10-item version); CYRM-B (Child and Youth Resilience Measure Brief version); DiD (Difference-in-Difference analysis); ES (Effect Size); GAD-7 (General Anxiety Disorder scale 7-item version); GENVP (Gramin Evam Nagar Vikas Parishad, an NGO in Patna, India); HC (Girls First Health Curriculum); HIC (High Income Country); IDF (Integrated Development Foundation, an NGO in Patna, India); KIDSCREEN-PW (KIDSCREEN-52 Psychological Wellbeing subscale); KIDSCREEN-SW (KIDSCREEN-52 Social Wellbeing subscale); LMIC (Low and Middle Income Country); MT (Master Trainer); NGO (Non-governmental organization); OLS (Ordinary Least Squares); PF (Program Facilitator); PHQ-9 (Patient Health Questionnaire 9-item version); RC (Girls First Resilience Curriculum); SC (School as usual control); SDQ (Strengths and Difficulties Questionnaire); T1 (Time 1); T2 (Time 2); WHO (World Health Organization).

where living in poverty predicts poor mental health, which in turn predicts poverty (e.g., Lund et al., 2011; Saraceno, Levav, & Kohn, 2005).

Globally, girls and women are at higher risk than boys and men for many psychological disorders, particularly internalizing disorders (e.g., depression, anxiety; Kessler, 2003; Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998; Nolen-Hoeksema, 2001; WHO, 2002). A combination of biological (e.g., hormones), psychological, and social factors (e.g., lack of control or power) are likely responsible for this difference (Nolen-Hoeksema, 2001; WHO, 2002). Adolescent girls in LMICs may be particularly at-risk as they often face much greater adversity than their male peers, including gender-based discrimination and violence, early discontinuation of their education, and child trafficking (International NGO Council on Violence Against Children, 2013; Rafferty, 2013).

Adolescence in LMICs therefore provides a critical window for psychosocial intervention with girls. One intervention approach of particular relevance is based on a resilience framework. Over the last decades, researchers have studied “resilient” individuals who achieve positive life outcomes despite adversity, challenges or risks, including poverty (e.g., Luthar, Cicchetti, & Becker, 2000; Masten, 2001). Interventions developed from this research aim to build assets or protective factors that increase the likelihood that those at-risk will achieve positive outcomes (Masten & Obradovic, 2006; Zolkoski & Bullock, 2012).

Resilience-based interventions often target psychosocial assets such as persistence, tolerance of negative affect, self-efficacy, planning, and prosocial behaviors (e.g., empathy, kindness, teamwork, and other social skills). In previous studies, aspects of resilience (e.g., persistence and tolerance of negative affect) have moderated the relationship between adversity (e.g., childhood trauma) and psychological problems (e.g., depression and anxiety; Campbell-Sills, Cohan, & Stein, 2006), and self-efficacy has predicted psychological wellbeing (lower depression; greater life satisfaction; Karademias, 2006). Prosocial behaviors have been found to predict child and adolescent social adjustment and attachment (Crick, 1996; Wentzel, 1994).

Interventions targeting these assets (often termed resilience, social-emotional learning, life skills, or positive youth development interventions) have been shown to improve children’s behavioral symptoms (e.g., aggression, school suspensions), emotional distress (e.g., depression, anxiety), attitudes towards themselves and others (e.g., self-efficacy, beliefs about helping others), social and emotional skills (e.g., problem solving, decision making), and physical and academic wellbeing (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010; Martin & Marsh, 2006; Payton et al., 2008). Though such interventions could confer large benefits for LMIC adolescents, 90% of randomized controlled trials of mental health interventions for youth have been conducted in HICs (Kieling et al., 2011).

In HICs, many such interventions have been conducted in schools (e.g., Gillham et al., 2013; Schultz & Mueller, 2007). While school-based delivery may present a low-cost, direct, and scalable point of access to LMIC youth, a recent review of mental health promotion interventions in LMICs revealed only 13 school-based interventions with studies using a comparison or control group since 2000 (Barry, Clarke, Jenkins, & Patel, 2013). Only six were life skills or resilience-based programs implemented universally (i.e., not confined to high-risk children). Results from the review were promising, however, as many programs positively affected psychosocial assets and wellbeing, including self-efficacy, coping skills, anxiety and depression (Barry et al., 2013). Unfortunately, none of the programs targeted girls specifically.

This dearth of programs (for LMIC youth in general and girls in particular) may be in part due to the many challenges of conducting school-based psychosocial programs in LMICs, such as the lack of mental health providers (e.g., Saxena, Thornicroft, Knapp, & Whiteford, 2007), the potentially different manifestations of psychosocial issues across cultures (e.g., Kleinman & Good, 1985), the multiple language barriers, and the lack of qualified and motivated teachers (e.g., Chaudhury, Hammer, Kremer, Muralidharan, & Rogers, 2006). Working with girls in LMIC schools presents specific challenges, as girls often face harassment and discrimination from peers and teachers alike, while in school and on the way to school (Global Campaign for Education, 2012). Thus, it will be necessary to develop and test programs that address these challenges from the outset.

Since 2009, CorStone, a US-based non-profit organization, has developed and piloted one of the first resilience-based curricula for middle-school girls in LMICs. The curriculum, called the Girls First Resilience Curriculum (RC), is designed to be low-cost, flexible, and scalable. RC pilots in India suggest high feasibility and acceptability, and preliminary evidence shows positive effects on psychosocial assets and wellbeing. For example, in a 2009 uncontrolled trial in Delhi among low-income Muslim girls at a non-formal school,² 81% of girls attended all program sessions, and the percentage of girls with normal mental health scores on the Strengths and Difficulties Questionnaire (Goodman, 2001) increased during the RC from 53% to 64% ($p < 0.05$). In Surat, India, in a 2011 observational pilot with matched controls among high-poverty, low caste, urban slum-dwelling girls, qualitative reports indicated girls enjoyed the RC and found it highly relevant to their lives. Program attendance predicted greater increases in self-reported optimism and prosocial behavior and decreases in conduct and peer problems, which was maintained through follow-up assessments conducted 8-months after program completion (p 's < 0.05). Despite these promising findings, the RC has not yet been evaluated with a large randomized controlled design.

² Though definitions of non-formal schools vary, in this case we refer to a school that targets children who are currently not participating in the formal government or private school system. A non-formal school often operates outside of normal school hours and often on an as-needed basis, providing specialized attention as needed, with the goal of ultimately transferring children back to the formal government or private school system when they are ready.

The RC draws methods from fields such as positive psychology (e.g., Seligman, Ernst, Gillham, Reivich, & Linkins, 2009), emotional intelligence (e.g., Goleman, 2006), and restorative practices (e.g., McCluskey et al., 2008). The program is conducted over 23 weekly facilitated peer-support sessions and is highly interactive, featuring discussions, activities, games, and projects. It is facilitated in schools, during school hours, by women facilitators drawn from local communities with a minimum of a 10th grade education.

The RC is designed for girls in marginalized, high-poverty settings, and aims to strengthen assets such as emotional resilience (including coping skills, adaptability, and persistence), self-efficacy; and social-emotional assets (including social skills and beliefs about helping others in the community). Through building these assets, the RC seeks to help girls improve their overall psychological wellbeing (greater life satisfaction and positive affect; lower levels of anxiety and depression) and social wellbeing (stronger connections with peers).

Present research

This paper presents analyses drawn from a larger study called *Girls First – Bihar*. *Girls First – Bihar* was a 4-condition randomized controlled trial of CorStone's Girls First program among over 3000 middle-school girls at 76 government schools in rural Bihar, India, which began in 2013. This larger study combined the Girls First Resilience Curriculum (RC) with an adolescent physical health curriculum (Girls First Health Curriculum or HC) in order to compare the effects of the combined program (RC + HC) vs. its components (RC; HC), and a school as usual control (SC) on psychosocial, physical, and educational wellbeing. This paper presents a segment of the analysis from that study, focusing only on the effect of RC on girls' psychosocial assets and wellbeing vs. SC.

Methods

Study design

Girls First – Bihar included four conditions: one school-as-usual control (SC) and three intervention conditions: a resilience curriculum (RC), an adolescent physical health curriculum (HC), and a combined curriculum (RC + HC). SC girls received no intervention and attended school as usual. The protocol and procedures were approved by Chesapeake IRB, US and Sangath IRB, India.

This paper focuses on RC effects on psychosocial assets and wellbeing, using data from the RC, RC + HC, and SC conditions from *Girls First – Bihar*. All participants completed assessments before intervention (Time 1 or T1). Participants in RC and RC + HC then received RC for approximately 5 months, after which they completed Time 2 assessments (T2). Following T2, participants in RC + HC received HC. This paper includes data from T1 and T2 only, as our goal was to compare those receiving RC (girls in both RC and RC + HC received RC between T1 and T2) vs. girls receiving no intervention (SC). We therefore in this paper refer to only two study conditions: RC or “intervention” (which combines RC + HC and RC from *Girls First – Bihar*) and SC or “control.”

Fig. 1 depicts the study flow. Figure A.1 (Appendix A) depicts the full study and timing of conditions and measurements.

Hypotheses

We expected RC to primarily improve psychosocial assets targeted by the intervention (emotional resilience, self-efficacy, and social-emotional assets) vs. SC. Secondly, we expected RC to begin to improve psychosocial wellbeing (positive psychological wellbeing, depression and anxiety, and social wellbeing) vs. SC. Thus, we refer to assets as “primary” and wellbeing as “secondary” outcomes.

Setting

The state of Bihar was chosen for the study as it has one of India's poorest populations. Over a third of the population lives on less than 30 rupees (about 50 cents) per day (Government of India, Planning Commission, 2013). As elsewhere in India, women and girls in particular experience poor outcomes in health, education, and livelihoods (International Institute for Population Sciences & Population Council, 2010).

The study was conducted in three rural blocks of Patna District, Phulwarisharif, Bihta, and Maner,³ in partnership with two local non-profits: IDF (Integrated Development Foundation) and GENVP (Gramin Evam Nagar Vikas Parishad).

³ A block is an administrative sub-division of a district, composed of multiple villages. It should be noted that although we selected three study blocks, GENVP and IDF advised us to consider one block (Maner) as two distinct geographies: one that was more flood-prone and higher-poverty, and another that was less flood-prone and lower-poverty. Thus we divided Maner into these two areas, referred to as Maner (less flood-prone) and Maner Diyara (more flood-prone). Throughout this paper, we therefore refer to four areas: Phulwarisharif, Bihta, Maner, and Maner Diyara.

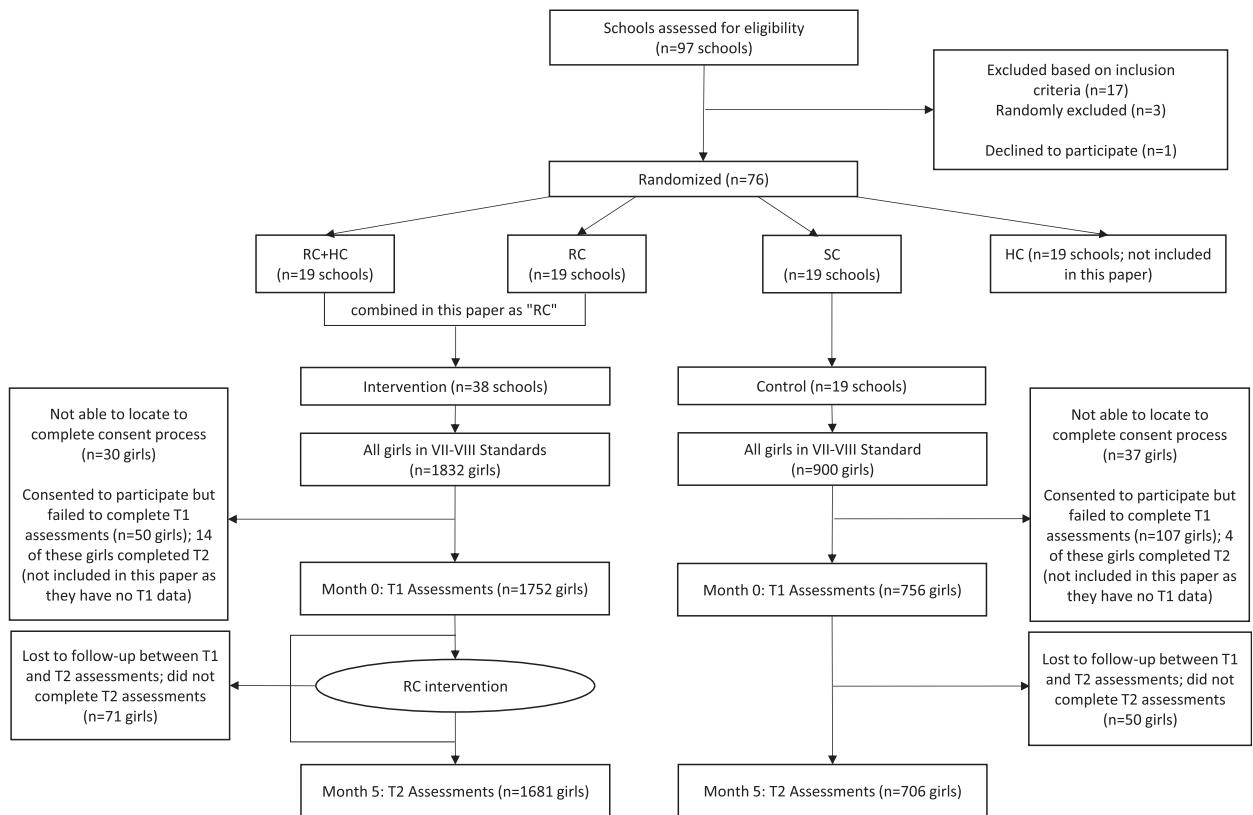


Fig. 1. Study flow diagram. T1 = Time 1, T2 = Time 2, RC = Girls First Resilience Curriculum, HC = Girls First Health Curriculum.

School selection

GENVP and IDF compiled a list of 97 schools within which they deemed it feasible to work. The 79 schools with 20–150 girls enrolled in VII–VIII Standards (Stds.; equivalent to US 7–8 grades) were considered eligible.⁴ Given funding constraints, we were only able to include 77 schools; thus, we randomly excluded two and invited the remaining 77 to participate. One principal declined to participate without giving a reason, leaving 76 schools in the sample for the full *Girls First – Bihar* trial.

Randomization

Stratified block randomization was conducted to distribute schools by location and girl enrollment across *Girls First – Bihar* conditions (19 schools/condition). No differences at $p < 0.05$ were found in girl enrollment or school location across conditions after randomization. This paper examines data from the 57 schools in RC + HC, RC, and SC. The 19 HC schools are excluded from this analysis.

Participants

All 2732 girls in VII–VIII Stds at the 57 schools in this analysis were invited to participate. 2548 girls completed the consent process; 67 girls and/or their parents completed none or part of the process (both parental consent and child assent were required). 157 girls who completed the consent process could not be located thereafter and did not complete T1. 2508 girls completed T1 (1752 intervention; 756 control), and 2387 girls completed T2 (1681 intervention; 706 control), 95.2% of the T1 sample (95.9% intervention; 93.4% control).

⁴ We set 20 girls as the minimum required at a school to create a single intervention group given potential non-response and attendance issues. The maximum was set at 150 to maintain external validity. Rural schools in India on average have only 244 students in the entire school (Jacob, Kochar, & Reddy, 2008) thus we believed schools with more than 150 girls in only two grade levels were unlikely to provide a comparable environment to other rural Indian schools.

Intervention

Intervention content

Intervention topics and example sessions are summarized in [Table 1](#). Initial sessions integrate methods from positive psychology, social-emotional learning, and life skills. Girls identify their character strengths ([Peterson & Seligman, 2004](#)) and use these to identify and plan to reach goals. Girls then learn coping skills, building on their character strengths and drawing from other positive psychology skills, such as finding benefits in difficult situations (“benefit finding”; [Tennen & Affleck, 2002](#)); and emotional intelligence skills such as identifying and managing difficult emotions ([Goleman, 2006](#)). Girls then use these assets as a foundation for problem-solving and conflict resolution, drawing from restorative practices ([McCluskey et al., 2008](#)). In the final sessions, girls work together to design and carry out projects to increase peace in their own or others’ lives. They are asked to exercise character strengths, emotional intelligence, and interpersonal skills, and to use these in a way that is meaningful to them (following [Seligman, 2012](#), that finding meaning in life is a critical aspect of wellbeing).

RC is designed to be culturally flexible. While the framework (session sequence/length, topics, pedagogy) remains constant regardless of location and culture, examples are adapted to local settings. For example, during group problem solving, girls are encouraged to and usually do bring up their own problems. If girls are hesitant, facilitators are prepared to suggest culturally-appropriate examples, such as parents forcing girls to drop out of school for early marriage.

Intervention delivery

Women from local communities were recruited to serve as program facilitators (PFs) by GENVP and IDF. Candidates were required to be women, age 18 or older, with at least a Std. X education (US 10th grade). Previous related experience (e.g.,

Table 1

Topics covered during intervention sessions.

Session #	Topics	Sample session content
Sessions 1–3	Introduction, setting group guidelines, and listening skills	<u>Session 3 – Listening Skills</u> : Open sharing about how it feels when friends listen; Brainstorming about good listening; Introducing and practicing reflective listening in pairs; Open sharing about listening in students’ daily lives
Sessions 4–5	Character strengths	<u>Session 4 – Character Strengths I</u> : Open sharing about one good thing that happened in the past week; Introducing and explaining the meaning of each of the 24 character strengths; Providing examples of character strengths use; Facilitating students to identify their three top strengths; Open sharing about students’ use of strengths in the one good thing they shared that happened in the past week
Session 6–7	Life stories, goals and planning	<u>Session 6 – Life Stories & Goals</u> : Open sharing about what students want to be/do when they grow up; Visualization exercise about their ‘life stories’; Writing or sharing about experiences during the visualization; Identifying one of the goals they have in their lives discovered during the exercise; Introducing the difference between a short-term and a long-term goal; Open sharing about how character strengths could help students reach their goals
Sessions 8–9	Identifying and awareness of emotions	<u>Session 8 – Identifying Emotions</u> : Open sharing about what students are feeling at start of session; Open discussion about expressing feelings; Colored candy game (students choose a colored candy from a bowl and are then asked to share about an emotional experience according to the color of the candy. If candy not available, colored paper is used); Open sharing about what students are feeling at end of session
Sessions 10–13	Managing strong emotions, benefit finding and assertive communication	<u>Session 12 – Worry, Stress & Fear</u> : Open sharing about a challenging emotion from past week and how students managed it; Open discussion about how we react to worry, stress & fear, helpful/healthy responses, and the use of benefit-finding in managing these emotions; Paired discussion of handout about worry & control, includes sharing worries with partner; Open discussion about experience of sharing worries with partner
Sessions 14–16	Restorative practices for conflict resolution and problem solving, and identifying and opposing violence	<u>Session 15 – Group Problem Solving</u> : Open sharing about someone students would like to fix a problem or disagreement with; Student volunteer shares a difficult problem or big emotion with group; Facilitated problem-solving technique in which students offer help and solutions in a structured, non-judgmental manner; Discussion of potential solutions to determine whether they are safe and possible
Sessions 17–19	Forgiveness, apologies, self-esteem and character strengths, and problem solving with a focus on friendships	<u>Session 17 – Forgiveness & Apologies</u> : Open sharing about the concepts of fear and self-love; Open discussion about forgiveness; Open sharing about examples of times that students forgave others and how it felt; Open discussion about apologies; Students give specific apologies to other group members; Visualization exercise for relaxation
Sessions 20–21	Peace project	<u>Session 20 – Peace Project I</u> : Open sharing about the concept of peace; In groups, students decide on a project to increase peace (in their lives/others’ lives/their communities/the world/etc.); Groups plan and get started on project using goal setting and planning, strengths and communication skills, and problem solving; Students give appreciations to one another
Sessions 22–23	Review, celebration, and gratitude	<u>Session 22 – Review & Celebrate</u> : Open sharing about times when students were at their best in group; Presentation of peace projects; Open discussion about how students can support one another to continue their peace projects after they leave group; Students provide written appreciations for one another on appreciation certificates; Open sharing about something students are grateful for

teaching, counseling, childcare, healthcare, etc.) was not required. Candidates were selected through routine hiring practices at GENVP and IDF.

Compared to other studies in which group leaders are often Master's-level or higher, the final group of 51 recruited and trained PFs was young ($M = 26.8$ years, $SD = 6.6$ years), with little education (highest level of education completed: 9.8% 10th grade; 47.1% 12th grade; 29.4% Bachelor's degree; 13.7% beyond Bachelor's), and little experience ($M = 3.1$ years of previous experience, $SD = 3.7$ years; 39.2% had no prior experience).

Four Master Trainers (MTs) were recruited at GENVP and IDF and trained over 5 days to supervise and train PFs. MTs were required to have a Master's degree and related experience (e.g., a training or management position in a related field). PFs were then trained over 5 days to facilitate RC. MTs and PFs received a 3-day follow-up training mid-way through the program. MTs provided PFs with supervision and refresher trainings approximately twice per month throughout the intervention. Both MTs and PFs received a stipend.

PFs facilitated weekly sessions in pairs with groups of approximately 12–15 girls over 5 months (1 h per week for 23 weeks) during school hours. Control condition girls attended school while receiving no intervention, thus attending one additional hour of school each week vs. intervention girls. All intervention materials and content (manuals, curricula, sessions, etc.) were delivered in Hindi, the local language.

Intervention quality, fidelity and attendance

Fidelity and quality were measured through MT ratings during session observations. Fidelity ratings consisted of whether PFs followed the RC manual's session structure and content. Ratings indicated that 85.4% of PF pairs followed session structure and 87.2% covered session content adequately or better. Quality ratings indicated that 81.3% of PF pairs presented information clearly, 95.8% managed behavior issues and discipline, 91.7% maintained girls' interest, and 70.8% used facilitative (rather than didactic) methods adequately or better. PFs were given additional training and support during refresher trainings based on these ratings.

PFs recorded attendance at each session. Four girls who completed T1 attended no sessions. Girls who attended at least one session attended an average of 78.3% of sessions ($SD = 21.3\%$).

Outcomes and measures

At T1 and T2, participants completed self-report questionnaires. Emotional resilience was measured with the Connor-Davidson Resilience Scale-10 (Connor & Davidson, 2003); self-efficacy with Schwarzer's General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995); social-emotional assets with items from the Child and Youth Resilience Measure-28 (Resilience Research Centre, 2008); depression with the Patient Health Questionnaire-9 (Kroenke, Spitzer, & Williams, 2001); anxiety with the General Anxiety Disorder-7 (Spitzer, Kroenke, Williams, & Löwe, 2006); positive psychological wellbeing with the KIDSCREEN-52 Psychological Wellbeing Subscale (Ravens-Sieberer et al., 2005); and social wellbeing with the KIDSCREEN-52 Social Support and Peers Subscale (Ravens-Sieberer et al., 2005). Measurements for outcomes and covariates are detailed in Appendix B.

Questionnaires were administered at girls' schools by PFs trained to administer assessments and provide help to girls with difficulty reading or understanding questions. In order to minimize bias at T2, PFs were shuffled such that they were not conducting assessments among any girls with whom they had worked during the intervention.

Analysis

Outcome scores were calculated only if a girl had completed at least 80% of items on a given scale. We pro-rated scores for each girl with 80%–100% of items answered, replacing missing responses with the average of her responses on other scale items.

First, we examined descriptives and differences in outcomes and covariates at T1 across conditions. We also computed T1 correlations among outcomes. We then examined 95% Confidence Intervals (CIs) of score differences from T1 to T2 within conditions (for a review of CI interpretation, see Cumming & Finch, 2005).

Finally, we examined whether RC was more beneficial than SC through a multivariate OLS Difference-in-Difference (DiD) regression analysis. DiD is a widely-used approach in impact evaluation, allowing comparison of the difference in change of outcome measures between control and intervention sites (Gertler, Martinez, & Premand, 2011; more detail on DiD provided in Appendix C). We included a dummy variable for T1 and T2 (TIME) and a dummy for control and intervention conditions (CONDITION). The interaction terms TIME and CONDITION measure the differential change in outcome measure after the intervention compared to T1.

$$Y = \beta_0 + \beta_1 \text{CONDITION} + \beta_2 \text{TIME} + \beta_3 \text{CONDITION} \times \text{TIME} + \text{covariates}$$

We ran an unadjusted model initially, then added socio-demographic and school-level covariates that might impact girls' responses to RC (see Table 2 for covariates). We then ran an adjusted model including all covariates, selecting whether the adjusted or unadjusted model was the best fit based on the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC).

Though traditionally DiD designs do not include standardized effect sizes (ES's), we present some in an exploratory fashion (Appendix D provides ES equation). Analyses were conducted in R version 3.1.0.

Results

Between-condition differences: Time 1

Table 2 details T1 girl- and school-level characteristics. No girl-level variables differed across conditions at $p < 0.05$. A number of school-level characteristics differed across conditions, including student-teacher ratio and proportion of female students at girls' schools. Intervention condition girls attended schools where a greater proportion of the student body was female, girls' attendance was higher, student-teacher ratio was higher, and use of violence in school was more prevalent than those of girls in the control condition.

Outcome measures across conditions at T1 differed for emotional resilience, self-efficacy, and depression based on 95% CIs (Table 3). Although all p 's < 0.05 , magnitudes of differences were small (d 's ≤ 0.16).

Attrition

Of the 2508 girls who completed T1, 121 did not complete T2 (71 intervention; 50 control). Girls lost to follow-up were older than girls who returned (0.23 years older, $p < 0.05$), and attended schools with higher student-room ratios (7.67 students/room higher, $p < 0.01$), with lower proportions of girls in the student body (2.3 percentage points lower, $p < 0.05$), where physical punishment/violence was used more often (0.17 greater violence; scale of 0–4; $p < 0.01$). They were more likely to be from Maner and less likely from Phulwarisharif (p 's < 0.01). No differences were found at $p < 0.05$ on outcomes for girls lost to follow-up vs. girls who returned.

Intervention girls lost to follow-up attended schools with greater student-teacher ratios (19.03 students/teacher greater, $p < 0.01$) and greater student-room ratios (14.42 students/room greater, $p < 0.01$), and were more likely to be from Phulwarisharif vs. control girls lost to follow-up. No other differences were found on demographic or outcome variables at $p < 0.05$.

Correlations among outcomes: Time 1

Correlations among T1 outcomes are shown in Table 4. All positive outcomes (emotional resilience, self-efficacy, social-emotional assets, positive psychological wellbeing and social wellbeing) were positively and significantly correlated at T1 (p 's < 0.001 , r 's ≥ 0.12). Depression and anxiety were negatively and significantly correlated with all positive outcomes (p 's < 0.03 , r 's ≤ -0.05), with the exception of emotional resilience and depression, which were not significantly correlated ($r = -0.01$, $p = 0.78$).

Within-condition changes: Time 1 to Time 2

The results from the DiD analysis are detailed in Table 5, showing adjusted means for changes between conditions over time. We report the adjusted model, controlling for covariates in Table 2. We do not include T1 outcomes as covariates in the adjusted model as relationships among outcomes are not well-established in this population. However, as a precaution, we re-ran a set of analyses including T1 outcomes as covariates (not reported here). The pattern of results was un-changed.

Table 2
Demographic characteristics and covariates at Time 1.

	Full sample		Intervention		Control		<i>t</i>	<i>df</i>	<i>p</i> value
	<i>N</i>	<i>M</i> (<i>SD</i>)	<i>n</i>	<i>M</i> (<i>SD</i>)	<i>n</i>	<i>M</i> (<i>SD</i>)			
<i>Girl-level characteristics</i>									
Age (years)	2467	12.99 (1.17)	1730	13.01 (1.16)	737	12.94 (1.18)	1.32	1372.54	0.187
Age squared	2467	170.1 (30.95)	1730	170.6 (30.83)	737	168.9 (31.21)	1.27	1374.06	0.205
Mother is high school graduate (binary)	2217	0.15 (0.35)	1552	0.14 (0.35)	665	0.16 (0.37)	1.34	1188.87	0.179
Father is a skilled laborer (binary)	2508	0.24 (0.43)	1752	0.24 (0.43)	756	0.23 (0.42)	0.57	1451.87	0.568
<i>School-level characteristics</i>									
Student-to-teacher ratio	2508	62.01 (25.06)	1752	66.68 (25.93)	756	51.17 (18.92)	16.76	1928.77	<0.001
Student-to-room ratio	2508	71.01 (31.1)	1752	71.13 (32.76)	756	70.73 (26.88)	0.33	1726.98	0.745
Proportion of females in student body	2508	0.56 (0.11)	1752	0.57 (0.12)	756	0.54 (0.07)	8.03	2362.87	<0.001
Girls at school regularly attend school (binary)	2508	0.51 (0.5)	1752	0.54 (0.5)	756	0.44 (0.5)	4.23	1436.4	<0.001
Common use of violence in school (binary)	2389	0.28 (0.45)	1752	0.3 (0.46)	637	0.22 (0.41)	4.28	1244.57	<0.001
Location 1 (Phulwarisharif) (binary)	2508	0.40 (0.49)	1752	0.41 (0.49)	756	0.4 (0.49)	0.45	1436.79	0.654
Location 2 (Maner) (binary)	2508	0.37 (0.48)	1752	0.37 (0.48)	756	0.38 (0.49)	0.5	1424.46	0.618
Location 3 (Bihta) (binary)	2508	0.15 (0.36)	1752	0.16 (0.37)	756	0.13 (0.34)	1.71	1531.88	0.087
Location 4 (Maner Diyara) (binary)	2508	0.07 (0.25)	1752	0.06 (0.24)	756	0.09 (0.28)	2.13	1253.14	0.033

Table 3
Unadjusted means and 95% CIs for intervention versus control outcomes, before and after intervention.

	Intervention			Control			Intervention–control		DiD interaction coefficient
	T1	T2	T2–T1	T1	T2	T2–T1	T1	T2	
	M	M	Δ [95% CI]	M	M	Δ [95% CI]	Δ [95% CI]	Δ [95% CI]	Intervention: Time 2
<i>Primary outcomes: Assets</i>									
Emotional Resilience (CD-RISC)	21.11	25.94	4.83 [4.36, 5.34]	22.02	22.47	0.45 [–0.29, 1.19]	–0.91 [–1.6, –0.23]	3.47 [2.83, 4.1]	4.232***
Self-Efficacy (GSES)	29.96	31.39	1.43 [1.06, 1.8]	30.67	28.26	–2.41 [–2.95, –1.8]	–0.71 [–1.24, –0.18]	3.13 [2.61, 3.65]	3.678***
Social-Emotional Assets (CYRM-B)	32.09	34.43	2.34 [1.85, 2.83]	32.51	31.66	–0.85 [–1.58, –0.12]	–0.42 [–1.14, 0.3]	2.77 [2.11, 3.45]	3.29***
<i>Secondary outcomes: Wellbeing</i>									
Depression (PHQ-9)	7.23	6.11	–1.11 [–1.41, –0.83]	8.05	6.26	–1.78 [–2.21, –1.35]	–0.82 [–1.26, –0.42]	–0.15 [–0.54, 0.24]	0.690**
Anxiety (GAD-7)	5.28	4.64	–0.64 [–0.86, –0.39]	5.59	4.63	–0.96 [–1.33, –0.58]	–0.31 [–0.66, 0.07]	0.01 [–0.31, 0.35]	0.392*
Psychological Wellbeing (KIDSCREEN-PW)	14.78	15.80	1.03 [0.68, 1.34]	15.24	15.54	0.3 [–0.17, 0.78]	–0.47 [–0.93, 0]	0.26 [–0.21, 0.68]	0.738**
Social Wellbeing (KIDSCREEN-SW)	14.97	15.06	0.08 [–0.28, 0.42]	14.85	14.17	–0.69 [–1.23, –0.11]	0.12 [–0.36, 0.64]	0.89 [0.42, 1.35]	0.943***

Note: For Differences in Differences coefficients, **p* < 0.1, ***p* < 0.05, ****p* < 0.001; Differences and CIs that differ at *p* < 0.05 are bolded.

Table 4
Correlations among outcomes at Time 1.

		Primary outcomes: assets			Secondary outcomes: Wellbeing		
		1	2	3	4	5	6
Primary outcomes: assets	1. Emotional resilience (CD-RISC 10)						
	2. Self-efficacy (GSES)		0.42***				
	3. Social-emotional assets (CYRM-B)		0.14***	0.33***			
Secondary outcomes: wellbeing	4. Depression (PHQ-9)		–0.01	–0.05**	–0.13***		
	5. Anxiety (GAD-7)		–0.05**	–0.12***	–0.22***	0.63***	
	6. Psychological wellbeing (KIDSCREEN-PW)		0.12***	0.27***	0.58***	–0.11***	–0.18***
	7. Social wellbeing (KIDSCREEN-SW)		0.12***	0.27***	0.58***	–0.08***	–0.13***

Note: **p* < 0.1; ***p* < 0.05; ****p* < 0.01.

Table 5
Adjusted means and 95% CIs for intervention versus control outcomes, before and after intervention.

	Intervention			Control			Intervention–control		DiD interaction coefficient
	T1	T2	T2–T1	T1	T2	T2–T1	T1	T2	
	M	M	Δ [95% CI]	M	M	Δ [95% CI]	Δ [95% CI]	Δ [95% CI]	Intervention × time 2
<i>Primary outcomes: Assets</i>									
Emotional Resilience (CD-RISC)	20.88	25.67	4.79 [4.26, 5.32]	22.26	23.51	1.25 [0.34, 2.08]	–1.39 [–2.21, –0.5]	2.16 [1.41, 2.96]	3.563***
Self-Efficacy (GSES)	30.75	32.10	1.34 [0.94, 1.77]	31.93	29.59	–2.34 [–2.98, –1.7]	–1.18 [–1.79, –0.55]	2.51 [1.88, 3.1]	3.696***
Social-Emotional Assets (CYRM-B)	32.72	35.05	2.33 [1.82, 2.85]	33.23	31.99	–1.24 [–2.08, –0.44]	–0.51 [–1.27, 0.31]	3.06 [2.26, 3.93]	3.596***
<i>Secondary outcomes: Wellbeing</i>									
Depression (PHQ-9)	7.68	6.61	–1.07 [–1.37, –0.77]	7.60	6.24	–1.36 [–1.85, –0.84]	0.08 [–0.41, 0.59]	0.37 [–0.09, 0.8]	0.271
Anxiety (GAD-7)	5.58	4.97	–0.61 [–0.86, –0.35]	5.52	4.32	–1.2 [–1.64, –0.74]	0.06 [–0.33, 0.47]	0.65 [0.25, 1.03]	0.592**
Psychological Wellbeing (KIDSCREEN-PW)	14.83	15.82	0.99 [0.65, 1.32]	15.75	15.80	0.05 [–0.48, 0.62]	–0.92 [–1.44, –0.36]	0.01 [–0.51, 0.57]	0.928***
Social Wellbeing (KIDSCREEN-SW)	15.42	15.57	0.14 [–0.25, 0.54]	15.60	14.72	–0.88 [–1.55, –0.26]	–0.18 [–0.82, 0.45]	0.85 [0.25, 1.39]	1.025***

Note: For Difference-in-Difference coefficients, **p* < 0.1, ***p* < 0.05, ****p* < 0.001; Differences and CIs that differ at *p* < 0.05 are bolded.

Primary outcomes: psychosocial assets

Based on 95% CIs using adjusted means, all assets (emotional resilience, self-efficacy, and social-emotional assets) improved significantly over time for intervention condition girls. In the control condition, only one outcome (emotional resilience) improved significantly, and self-efficacy and social-emotional assets decreased significantly over time.

Secondary outcomes: psychosocial wellbeing

Girls in the intervention condition significantly improved over time on three aspects of wellbeing (depression, anxiety, and social wellbeing). Girls in the control condition significantly improved in depression and anxiety, and significantly decreased in social wellbeing.

Intervention effects

AIC and BIC were minimized for the adjusted over the unadjusted model for all outcomes, indicating that the adjusted model was consistently the better fit. We therefore describe below only results from the adjusted model. Table 5 includes relevant DiD coefficients (Intervention x Time 2) and effect sizes from the adjusted model (full models included in Appendix E).

Primary outcomes: psychosocial assets

RC had a positive effect on all three assets (emotional resilience, self-efficacy, and social-emotional assets). In each case, scores increased to a greater extent in intervention than control (p 's < 0.01; ES's = 0.46, 0.58, 0.45, respectively).

Secondary outcomes: psychosocial wellbeing

RC had a positive effect on positive psychological wellbeing and social wellbeing. In both cases, scores increased to a greater extent in intervention than control (p 's < 0.01; ES's = 0.18, 0.17, respectively). Anxiety scores also increased to a greater extent in intervention than control, though the difference's magnitude was smaller and less significant than other outcome differences ($p = 0.025$; ES = 0.15). No intervention effect was found on depression at $p < 0.05$.

Discussion

We conducted one of the first large-scale randomized controlled trials of a school-based resilience curriculum for LMIC adolescent girls. We primarily assessed girls' improvements in psychosocial assets (emotional resilience, social-emotional assets, and self-efficacy), and secondarily in psychosocial wellbeing (positive psychological wellbeing, social wellbeing, anxiety, and depression). We expected that improvements would be most evident in psychosocial assets and might begin to extend to improvements in wellbeing, as wellbeing was not directly targeted by the intervention but is closely related to targeted assets (e.g., Campbell-Sills et al., 2006; Crick, 1996; Karademas, 2006; Wentzel, 1994).

Consistent with this hypothesis, we found that all psychosocial assets improved statistically significantly in the intervention condition vs. controls, as did two aspects of psychosocial wellbeing (positive psychological wellbeing and social wellbeing). These findings indicate that the Girls First Resilience Curriculum (RC) improves psychosocial assets and positive psychosocial wellbeing.

Program effects are comparable to those in a meta-analysis of 213 similar school-based programs in HICs, in which effect sizes for social-emotional learning skills (similar to our primary outcomes) were medium-to-large, and effects for social behavior and emotional distress (similar to our secondary outcomes) were small-to-medium (Durlak et al., 2011). Of particular note, RC's number of sessions and facilitator qualifications compare very favorably to programs in this review. For instance, the mean number of sessions for programs reviewed was 40.8, vs. RC's 23. In addition, programs reviewed were delivered by school teachers, researchers, or external consultants, while RC used community women with a minimum 10th grade education. RC therefore achieved similar results in a shorter period with readily available and cost-effective human resources, suggesting its feasibility and scalability within the considerable logistical and resource constraints of LMICs.

Further, preliminary qualitative reports indicate that observed benefits may also extend to other areas of girls' lives. For instance, interviews with girls suggest that improved psychosocial assets and wellbeing may be linked to their ability to advocate for themselves to stop early marriage, stay in school, and achieve goals. Thus, these improvements may be important not only for those interested in improving psychosocial assets and wellbeing, but also for those interested in improving girls' lives across multiple life domains.

While RC led to improvements on most outcomes, it did not improve anxiety or depression. In fact, RC had a small but statistically significant negative effect on anxiety. Although girls in both conditions significantly decreased anxiety and depression over time, control girls decreased slightly more in anxiety than intervention. This difference was unlikely to be clinically relevant, however. Means for both conditions at T1 and T2 remained far below the scale's threshold for clinical anxiety, and anxiety decreased only 0.59 points more for control than intervention (scale of 0–21).

Failure to find effects may also reflect limitations of this analysis. First, depression and anxiety may take longer than 5 months to impact (some studies have found intervention effects increase from post-test to around 6-month follow-up; e.g., Gillham, Reivich, Jaycox, & Seligman, 1995; Greenberg, Domitrovich, & Bumbarger, 2000). Second, there may have been little room for effects on depression and anxiety, as mean T1 scores were in the mild to moderate range. Third, depression and

anxiety behaved inconsistently in correlations at T1 with other outcomes. Though all other outcomes correlated robustly and significantly with one another, depression did not correlate significantly with emotional resilience, and depression and anxiety were only weakly correlated with self-efficacy. Thus, results for these measures should be considered exploratory only.

Study limitations

This study had several limitations. First, it is difficult to compare how measures performed in this study vs. in similar environments, as very little psychosocial research has been conducted in adolescent populations in LMICs (Kieling et al., 2011), let alone using psychometric scales. Future research should consider developing measures that may be more sensitive to cultural context. Given that depressive symptoms may differ cross-culturally (e.g., Chentsova-Dutton & Tsai, 2009; Kleinman & Good, 1985), developing culturally-relevant measures of depression could be particularly important.

Additionally, although we engaged in extensive translation, back-translation, and piloting to ensure that measurements were relevant and meaningful to participants, we were not able to perform additional psychometric analyses. Notably, this study shows initial evidence of validity, as correlations among scales were generally as expected. However, additional analyses, such as a confirmatory factor analysis, could help determine whether these scales function similarly in this population as they do in others, which is an important area for future research.

Another limitation is that only self-report scales were used. There are a number of difficulties associated with self-report, particularly among youth who have not previously encountered such scales. They may have trouble understanding questions or the importance of research, or have an inflated sense of their improvements. Though we piloted scales and explained the process and questions to participants as needed, there is still potential for error. However, logistical constraints limited our ability to diversify measures. Teacher reports, widely used elsewhere in school-based research (e.g., Durlak et al., 2011), were likely to be unreliable given student-teacher ratios in our sample (approx. 62 students per teacher), and low teacher engagement in Bihar (for instance, a World Bank study found that 38% of Bihar teachers were not present at their schools at any given time; 2003). Measures from other informants, such as parents or family members, were also unlikely to be feasible. Parents' literacy levels were very low: only 47% of mothers and 76% of fathers could read and write, making scale-based parent-report impossible. The difficulty and cost in accessing rural parents through other means was prohibitive for this study.

It will be important for future research to examine whether RC produces benefits that are noticeable to others, including teachers, parents, and peers. Thus far, anecdotal reports from teachers and parents indicate positive changes, particularly in girls' emotions and communication skills.

Future research should also examine whether effects translate into meaningful, long-term benefits. This paper measures effects over five months, but further research is needed to examine whether RC provides long-term benefit through follow-up assessments. Further, as the measures on which RC showed positive effects were not clinical, we were not able to discuss clinical significance. Ideally, future research would determine how meaningful such changes are in this and similar populations, and show how psychosocial effects are linked to other observable effects, such as school performance or avoidance of early marriage.

Additionally, though intervention condition girls attended RC during time they would otherwise have been in class (all girls thus received the same amount of classroom time in a school setting), we do not know whether non-specific factors of the RC such as facilitator rather than teacher attention, peer group meetings, or participating in a new program, are responsible for intervention effects.

Lastly, although results were consistent with the assumption that the RC benefited assets which in turn improved well-being, this paper stopped short of mediation analyses. Therefore, we do not know whether this mechanism is correct. As it is valuable to understand not only whether resilience-based psychosocial interventions work in LMICs but also to begin to understand how they work, this is an important area of future research.

Implications

This was one of the first and largest studies to show that psychosocial assets and wellbeing can be improved for girls through a brief school-day program in high poverty, rural LMIC schools. Equally compelling, this study provides some of the first indications that non-professionals receiving a modicum of training can implement such a program on a broad scale.

Given the high levels of risks encountered by girls in this and similar settings, coupled with the lack of availability of professional mental health providers, resilience-based programs in schools may hold promise as cost-effective and scalable models for improving psychosocial outcomes. Further, as psychosocial outcomes and mental health are closely linked with poverty in LMICs (Lund et al., 2011), these findings are critical not only for those interested in psychosocial wellbeing and mental health, but also for anyone interested in poverty reduction in LMICs.

This study helps to demonstrate the feasibility, importance and promise of conducting research on psychosocial assets and wellbeing with youth in LMICs, and has taken a critical step to fill some of the major evidence gaps in this area. Given that a majority of youth worldwide live in LMICs, we hope this project will inspire future LMIC research on psychosocial interventions and constructs, helping youth to make positive changes in their lives and to thrive.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.adolescence.2015.09.011>.

Competing interests

KL, GA, and SL are employees of CorStone, the organization that conceived of and conducted this study. LD, JG, and JP are consultants to CorStone on this research.

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