Harnessing single-session interventions to improve adolescent mental health and well-being in India: Development, adaptation, and pilot testing of online single-session interventions in Indian secondary schools

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ABSTRACT

Background: Many evidence-based prevention and intervention approaches for youth mental health exist, but most are time-consuming and expensive to deliver. Innovative approaches are needed to develop and disseminate scalable mental health interventions, especially for youth in low- and middle-income countries. Computerized single-session interventions (SSIs) may be able to overcome many of these implementation barriers, especially if deployed in school settings.
Methods: Guided by this logic, we designed three computerized SSIs (based on behavioral activation, gratitude, and growth mindset exercises) for delivery in Indian high schools. Then, we conducted focus groups with Indian adolescents and school officials to inform adaptations of the interventions. Finally, we designed a Hybrid Type 1 effectiveness-implementation study to evaluate the interventions.
Results: In this paper, we present the rationale for selecting the interventions, the results of the focus groups, and the design of a Hybrid Type 1 effectiveness-implementation study. Our initial focus group data showed that the interventions were considered acceptable, feasible, and appropriate by both educators and students. We also describe feedback on the interventions which we incorporated to refine the interventions prior to our randomized controlled trial.
Discussion: Computerized SSIs may offer innovative, scalable ways to disseminate evidence-based interventions. By identifying which interventions are most acceptable and effective in this highly scalable format, we may understand which SSIs are best suited for continued development, testing, and, ultimately, widespread dissemination.

1. Introduction

Over the past 50 years, there have been hundreds of clinical trials testing interventions to improve youth mental health and well-being. These trials have generally tested interventions in the form of manual-guided psychotherapy administered over the course of several weeks or months (Southam-Gerow and Grinstein, 2014). These interventions yield medium to large effects for youth mental health, but their implementation often requires substantial time and funding (Weisz et al., 2017). Even in the United States, about 80 % of youth with psychiatric

disorders do not receive treatment. Among those who do, 30–60 % drop out prematurely (Harpaz-Rotem et al., 2004; Merikangas et al., 2011). The situation is often worse in low- and middle-income countries (LMICs), where the number of trained mental health providers is generally insufficient (Patel et al., 2007), mental health problems are highly stigmatized (Sartorius, 2007), and youths commonly experience a range of social and economic challenges alongside mental health problems (Atilola, 2014; Wasil et al., 2019).

There have been numerous attempts at expanding access to treatment for individuals in LMICs. These approaches include lay counselor

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interventions (Patel et al., 2017; Osborn et al., n.d.), school climate interventions (Shinde et al., 2017;Shinde et al., 2018), life skills programs (Mohammadzadeh et al., 2020), cognitive behavioral therapy programs (Selvapandiyan, 2019), guided digital self-help interventions (Michelson et al., 2019), workshops for medical professionals (Sharma and Seshadri, 2020), and mental health care legislation (Namboodiri et al., 2019). There have also been attempts to understand how parenting behaviors influence internalizing and externalizing problems (Sekaran et al., 2020) and implement parent training programs (Mejia et al., 2012). Furthermore, there have been efforts to understand resilience among youth in LMICs (e.g., Singh et al., 2019) and implement resilience-focused interventions (Barry et al., 2013). Despite the promise of many of these approaches, the majority of individuals in need are still not accessing evidence-based care, and it remains unlikely that one approach will be sufficient to fully reduce the treatment gap (Kazdin, 2017). Given these challenges, innovative approaches are needed to advance research on scalable youth mental health interventions.

One strategy for expanding access to care involves the development and testing of computerized single-session interventions (SSIs) for treatment and prevention (Bloom, 2001; Campbell, 2012; Schleider and Weisz, 2017). Meta-analytic evidence supports the efficacy of SSIs for a variety of youth mental health concerns (Schleider and Weisz, 2017). To date, most SSI trials have tested therapist-administered interventions, with only a few trials examining self-administered computer-based interventions (Schleider and Weisz, 2017). Computerized interventions have several advantages, warranting further research into this mode of delivery: they offer standardized content than can be easily accessed, they confer less stigma than traditional interventions, and they can be disseminated globally at low costs (Hall et al., 2014; Muñoz, 2010). Furthermore, a growing body of evidence suggests that computerized interventions are efficacious for a variety of mental health outcomes, including depression and anxiety (Ebert et al., 2015; Richards and Richardson, 2012).

This logic suggests that single-session, computerized interventions focused on non-stigmatizing concepts may offer a novel way to reduce the treatment gap in low- and middle- income countries (LMICs). Adolescents in low- and middle-income countries (LMICs) are at particularly high risk for developing mental health problems, and they often lack access to psychosocial treatments for their concerns (Patel et al., 2007). Consequently, developing scalable and cost-effective prevention and intervention options for youth mental health is a top priority in global mental health (Collins et al., 2011). To date, the vast majority of research on SSIs has been conducted in developed western countries (Schleider and Weisz, 2017).

This paper describes the selection, adaption, and pilot testing of three SSIs for adolescents. Each SSI focuses on a different target: developing a growth mindset, cultivating gratitude, and behavioral activation. These interventions will be tested as universal interventions designed to improve youth well-being and mental health in Pune, a city in the Indian state of Maharashtra. To our knowledge, this is the first trial to test these interventions in India to compare the effectiveness of multiple active SSIs.

In this paper, we present: (1) Our rationale for selecting the three interventions, (2) Our process of adapting these interventions for youths in India, (3) A description of a randomized controlled trial (RCT) to evaluate the acceptability and effectiveness of these interventions.

2. Methodology

Fig. 1 depicts our process of identifying and adapting interventions with input from local stakeholders. Details on each step are described below.

2.1. Rationale for selecting the interventions

As mentioned, we aimed to identify interventions which were evidence-based, brief, simple, focused on non-stigmatizing concepts, culturally appropriate, and well-suited to scale. To identify interventions that meet these criteria, we drew from multiple bodies of research (see Fig. 1). Specifically, we reviewed past work on common elements in youth psychotherapy protocols (Chorpita and Daleiden, 2009; Higa-McMillan et al., 2016), single-component "wise" interventions (Schleider et al., 2019; Walton, 2014), and brief positive psychology interventions (Seligman et al., 2005). These bodies of research were especially relevant to our objectives, as they focus on relatively brief intervention components that have been tested in empirical trials. We then consulted with local researchers and school officials in Pune to discuss the cultural appropriateness of the evidence-based interventions identified in our literature review. In the discussions with our Indian collaborators, we discussed adolescents' potential reactions to the interventions, potential unintended consequences of the interventions, the perceived efficacy of each intervention, and the perceived relevance of each intervention. Based on these discussions, we selected three brief interventions with empirical support and high potential for scalability.

We chose one intervention based on growth mindsets (drawn from social, educational, and clinical psychology), one on gratitude (drawn from positive psychology), and one on behavioral activation (drawn from reviews of youth psychotherapy protocols). Mindset interventions have demonstrated positive effects on youth depression and anxiety (Schleider and Weisz, 2016;Schleider and Weisz, 2018), and gratitude interventions have demonstrated positive effects on well-being (Emmons and Stern, 2013; Seligman et al., 2005). Behavioral activation is commonly taught in youth psychotherapies and prevention programs for depression (Chorpita and Daleiden, 2009; Higa-McMillan et al., 2016), and dismantling trials have found that behavioral activation alone has comparable effects to psychiatric medications for patients with depression (Dimidjian et al., 2006).

Ultimately, we selected these interventions because our literature review revealed that each has been shown to improve mental health or well-being, and they were deemed appropriate for delivery in secondary schools by researchers, school officials, and adolescents in India. However, it is worth noting that the empirical support largely refers to trials of youth in western countries, raising doubt about the cross-cultural appropriateness of these interventions (see Christopher and Hickinbottom, 2008; Summerfield, 2008). Thus, in addition to evaluating efficacy, one important aim of this trial was to examine the acceptability, feasibility, and appropriateness of these interventions among school leadership and students. Such research will help us understand if and how these interventions can be appropriately adapted for Indian schools.

2.2. Development of initial intervention prototypes

When developing the initial draft of the interventions, we tried to ensure that the general format of each intervention was the same (i.e., overall length, number of reading exercises and writing exercises). We standardized the format to allow for comparisons of the acceptability and effectiveness between the different interventions.

The initial format was guided by previous SSIs for adolescent mental health (Schleider and Weisz, 2017). The interventions began with a short description of the purpose of the intervention. Next, they offered brief didactic readings exercises about each concept (i.e., growth mindsets, gratitude, and behavioral activation) and summarized key research findings. Then, the interventions each provided students with intervention-specific writing exercises designed to help them reflect on the concept and apply it to their own lives. Next, the intervention included a short vignette about a hypothetical student who is experiencing a challenge and prompted students to use the lesson they learned to offer advice to this student (see Aronson, 1999 for details about
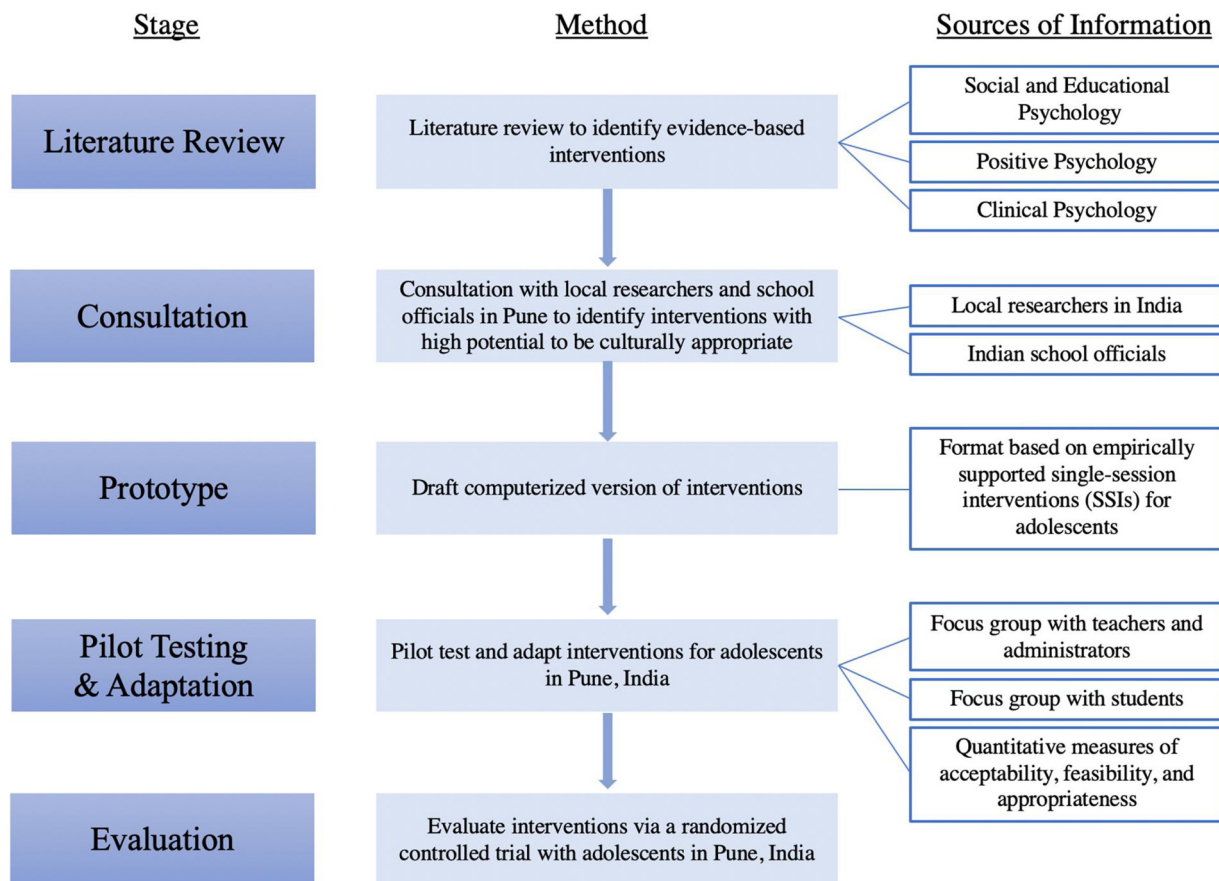
Stage	Method	Sources of Information

Fig. 1. Process of Selecting, Adapting, and Evaluating Single-Session Interventions.

"saying is believing" exercises). Finally, the initial interventions included an optional intervention-specific homework assignment and a prompt to explain where, when, and how they will complete it, as well as how they will address potential obstacles.

2.3. Focus group feedback on initial interventions

We conducted two focus groups of these initial intervention drafts. The focus groups had two main objectives. First, to collect pilot data about the perceived acceptability, feasibility, and appropriateness of the interventions. Second, to collect qualitative feedback on how to make the interventions more clear, helpful, and relevant.

2.4. Focus group with school staff

The first focus group included teachers, educators, and administrators from two high schools in Maharashtra. One was a rural government-run school and the other was an urban private school. School officials ($n = 6$) received detailed information about each of the three interventions via printed handouts. Study staff (AW and SP) discussed each component of the intervention and asked probing questions to elicit feedback about the interventions. Three areas were prioritized: 1) Questions about intervention clarity (e.g., "How is the language in this section? Will any students struggle to understand it?"), 2) Questions about intervention engagement (e.g., "How exciting or engaging is this section? What could we do to make students more interested?"), and 3) Questions about intervention appropriateness (e.g., "How does this section fit into the students' values and beliefs? Will any students object to this content?").

After the focus group, participants also filled out quantitative measures of intervention acceptability (the Acceptability of

Intervention Measure; AIM), feasibility (the Feasibility of Intervention Measure; FIM), and appropriateness (the Intervention Appropriateness Measure; IAM) of the interventions. Each scale has four items rated on a 5-point scale. Items are averaged for each scale to yield a total score, ranging from 1 to 5. Each of these measures has demonstrated strong psychometric properties (Weiner et al., 2017).

3. Results

During the focus group, the teachers and administrators reported that the interventions were acceptable, clear, feasible, and appropriate. This was reflected in the quantitative measures as well: The interventions collectively received strong ratings on acceptability (*Mean* = 4.31, *SD* = 0.43), feasibility (*Mean* = 4.06, *SD* = 0.55), and appropriateness (*Mean* = 4.38, *SD* = 0.43). They were also asked how helpful each intervention would be, on a scale from 0 (not helpful at all) to 100 (very helpful). Each of the three interventions received strong ratings on perceived helpfulness: Gratitude (*Mean* = 88.0, *SD* = 4.69), Behavioral Activation (*Mean* = 87.25, *SD* = 7.41) Growth Mindset (*Mean* = 83.75, *SD* = 11.79).

The focus group also yielded important suggestions to improve the interventions (Table 1). First, participants recommended that the interventions include specific content about neuroscience relating to each concept. The initial interventions included a short section about how each concept (e.g., growth mindsets, gratitude, and behavioral activation) was related to measurable changes in the brain and included a brief description of neuroplasticity. Focus group participants mentioned that students would be familiar with general ideas about the brain (e.g., our actions affect the brain and the brain can change) and would be more interested in specific research about how each concept related to the brain (e.g., specific brain regions that are tied to gratitude and their

3

Table 1
Summary of key themes from focus group with teachers and educators.

Intervention	Original Design	Focus Group Feedback	Adaptation
All (Growth mindset, gratitude, and behavioral activation)	Included a brief section about brain science and neuroplasticity.	Students might desire more specific information about neuroscience and its relationship to each concept.	We summarized past studies on each concept, including information about specific brain regions that are linked to each concept.
All	Homework assignment was open-ended, designed to give students freedom to choose how they wanted to reflect on each concept.	The homework assignment was too vague, and students might benefit from more specific instructions.	We replaced the open-ended homework assignment with a specific writing assignment related to each concept.
Gratitude	Included an example gratitude letter written to a teacher.	Students might react negatively to an example that includes a teacher as the recipient.	We replaced the gratitude letter example with one directed toward a parent.
Growth	The homework activity prompted students to write about a past, present, or future experience with growth.	Students might be confused by the prompt and desire clearer instructions.	We removed the ambiguity and instructed students to write about a present experience with growth.
Behavioral Activation	We defined and distinguished between pleasurable activities and mastery activities.	Students might have trouble categorizing activities that provide pleasure and mastery.	We clarified that some activities can be both pleasurable activities and mastery activities.

specific functions).

Second, when discussing the gratitude intervention, participants suggested improvements to one of the writing exercises. In one exercise, students are prompted to write a gratitude letter, expressing appreciation to someone who has positively impacted them (Seligman et al., 2005). Our initial intervention provided an example gratitude letter, in which a (hypothetical) student writes a gratitude letter thanking her 7th grade science teacher. Participants of the focus group discussion recommended that we avoid using an example involving schoolteachers. Because the intervention was school-based, they felt like students would potentially suspect that this prompt was a ploy by school administrators to foster school-specific gratitude or compliance. One participant mentioned that students would see this as "brainwashing" on the part of the school and therefore react negatively. Therefore, they suggested that we should remove this example gratitude letter and replace it with one that is directed toward someone who is unaffiliated with the school (e.g., a family member, a gardener, or a pet).

Third, when discussing the growth mindset intervention, participants encouraged us to be clearer about the homework assignment. We initially prompted participants to write about past, present, or future challenges and how they grew, or might grow, as a result of the challenge. Participants reported that this prompt would be confusing for students and recommended that we pick a specific timeframe (e.g., "write about a challenge you are currently facing.")

Finally, participants believed our open-ended homework prompt ("take time to reflect on the lessons they learned") was unclear. They encouraged us to provide specific homework assignments for each

intervention (e.g., "Please write about 3 good things that happened to you each night for two weeks.")

3.1. Focus group with high school students

The second focus group included students from an urban private school in Maharashtra. Students from grades 7 through 12 ($n = 15$; two to three from each grade level) each completed one of the interventions in a school computer lab. Study staff (AW and SP) discussed each component of the interventions and asked questions relating to the clarity, engagement, and helpfulness of each intervention component.

Each intervention received favorable scores for acceptability, feasibility, appropriateness, and perceived helpfulness. Acceptability scores varied somewhat across the growth mindset ($M = 3.95$, $SD = 0.76$), behavioral activation ($M = 4.05$, $SD = 0.78$), and gratitude ($M = 4.4$, $SD = 0.76$) conditions. Feasibility scores varied mildly across the growth mindset ($M = 4.00$, $SD = 0.64$), gratitude ($M = 4.25$, $SD = 0.77$), and behavioral activation ($M = 4.3$, $SD = 0.41$) conditions. Appropriateness scores were nearly identical across the growth mindset ($M = 4.2$, $SD = 0.57$), gratitude ($M = 4.25$, $SD = 0.77$), and behavioral activation ($M = 4.25$, $SD = 0.40$) conditions. A similar pattern was shown for perceived helpfulness across the growth mindset ($M = 4.2$, $SD = 1.30$), gratitude ($M = 4.25$, $SD = 1.30$), and behavioral activation ($M = 4.25$, $SD = 0.84$) conditions.

Students also offered useful suggestions to improve the interventions (Table 2). First, to make the interventions more engaging, students requested short testimonials or quotes to see how the concept

Table 2
Summary of key themes from focus group with students.

Intervention	Original Design	Focus Group Feedback	Adaptation
All (Growth mindset, gratitude, and behavioral activation)	The interventions did not include testimonials or quotes from previous students.	Students desired quotes to see how each concept has affected other students.	For each intervention, we added quotes from the focus group participants and participants from previous studies.
All	The intervention did not include breaks.	Students desired short breaks to reset their attention.	We included a 30-second stretch break, a 30-second doodle break, and a short break with a Pikachu meme.
All	The interventions briefly summarized broad research related to each topic.	Students desired more detailed information about each concept, including citations to specific studies.	We added more details about previous research on each topic and offered information about specific studies.
All	The interventions included "saying is believing" exercises with vignettes of hypothetical students.	The vignettes could be more relatable and include concerns that are more common.	We included relatable stories based on advice from students (e.g., abandoning hobbies to study for Grade 10 board exams, transitioning to high school).
All	The "saying is believing" vignettes were presented at the end of each intervention.	Students suggested that beginning each intervention with the vignette from the "saying is believing" exercise would engage and motivate participants.	We presented the vignettes toward the beginning of each intervention and returned to them at the end for the "saying is believing" exercise.
All	The interventions used spelling consistent with American English.	Students suggested using commonwealth spelling (i.e., British English).	We used commonwealth spelling (e.g., "colour" instead of "color").

helped other students. Second, students recommended including a short "stretch break" or "funny meme" in the middle of the intervention to help students reset their attention. Third, students desired more reading materials about research related to each concept. Specifically, students requested information about the benefits of each concept on physical and emotional health.

Fourth, students had several suggestions to make the vignettes in the "saying is believing" exercise more relatable. They offered several scenarios (e.g., feeling bad after a bad grade, abandoning hobbies to study for Grade 10 board exams, transitioning to high school, college applications) to strengthen the vignettes. Furthermore, originally, the vignettes were presented toward the end of the interventions, alongside the "saying is believing" exercise. Students suggested that we present the vignettes at the beginning of the interventions in order to increase engagement with the interventions. Finally, the student participants offered a few minor aesthetic and optical suggestions, such as using commonwealth spelling (rather than American English) and adding colors to emphasize certain text.

3.2. Description of final interventions

The feedback from both focus groups was used to refine the interventions (see Tables 1 and 2). In Supplement 1, we describe the final versions of each intervention.

3.3. Protocol for an effectiveness-implementation randomized controlled trial

We are conducting Hybrid Type 1 effectiveness-implementation RCT. The trial began in June 2019, and follow-up data is currently being collected. In supplement 2, we provide details about the trial methodology and rationale.

4. Discussion

We propose that computerized SSIs have the potential to reduce the treatment gap, particularly in low-resource areas of the world. Our initial focus group data offer support for this belief; school administrators and students welcomed these interventions and offered specific, actionable ways to improve them (see Tables 1 and 2). These suggestions led to us to refine our interventions, and we are now rigorously testing the effects of these interventions in a multi-arm RCT, as described by our study protocol (see Supplement 2). This trial is among the first to evaluate SSIs outside of the United States and to compare the effects of multiple active SSIs.

We have provided several examples of how we modified our interventions to respond to stakeholder needs or concerns. This approach illustrates what "designing for implementation" (see Damschroder et al., 2009) can look like when adapting interventions in non-western settings. Our approach is also consistent with the deployment-focused model of youth mental health interventions (Weisz et al., 2004). Under this model, collecting data on acceptability and feasibility is important during the early stages of intervention development and testing. By collecting these outcomes during beginning stages, barriers to implementation can be detected early, allowing researchers to make adaptations prior to large-scale implementation efforts (Weisz et al., 2004). Our approach also shares some similarities with design thinking and iterative testing models from digital health research (see Mohr et al., 2017). We believe that collecting implementation outcomes (e.g., acceptability, feasibility, appropriateness, and qualitative feedback) will equip us with useful information as we redesign and adapt these interventions for follow-up trials.

Finally, it is important to highlight that we are comparing multiple active SSIs, allowing us to determine which interventions are most acceptable and most effective. This information is especially valuable, as most previous SSI trials have compared an SSI to an inert control

group (Schleider and Weisz, 2017). Additionally, we plan to perform moderator analyses and predict which individuals respond best to which kinds of interventions (Cohen and DeRubeis, 2018). Comparisons between interventions from distinct bodies of research may be especially useful, as these interventions are likely to differ in their mechanisms of change.

5. Conclusion

Our findings suggest that self-guided, computerized mental health promotion interventions are appropriate and well-received among school officials and adolescents in India. Ultimately, we hope that our qualitative and quantitative findings and processes will advance research on scalable interventions for youths, especially those in LMICs. As the leading contributors to the global burden of disease, depression and anxiety are important public health problems in LMICs. Computerized SSIs may be useful tools in reducing the burden of youth mental health problems and improving youth well-being in LMICs. We look forward to examining if, in which contexts, and for whom these interventions can demonstrate a measurable impact.

Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ajp.2020.101980.

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