

ticipants with both intake and last session rating, 42% exhibited greater than 50% reduction on the GAD-7 (mean change: -4.45, SD=4.22), and 43% showed greater than 50% reduction on the PHQ-9 (mean change: -3.97, SD=4.42).

Thus, we found that a brief, in-house, telehealth-delivered, psychotherapy skills-based intervention significantly reduced symptoms of anxiety and depression among health care workers, the majority of whom were frontline workers, likely exposed to acute and chronic stress due to COVID-19. This is among the first reports of efficacy for such a brief, on-demand psychological intervention tailored to health care workers during the pandemic.

While direct comparison is difficult, the percentage of treatment responders was similar to that observed in brief evidence-based psychotherapies, and greater than reported effects in psychotherapy control conditions⁹. Limitations of the study include the lack of a control group and the brief follow-up. Nonetheless, our findings suggest that accessible, high-quality, brief interventions can reduce psychological distress among health care work-

ers and may provide a template for other health systems.

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1. Chew NWS, Lee GKH, Tan BYQ et al. *Brain Behav Immun* 2020;88:559-65.
2. Luo M, Guo L, Yu M et al. *Psychiatry Res* 2020;291:113190.
3. Li Y, Scherer N, Felix L et al. *PLoS One* 2021;16:e0246454.
4. Traverson L, Stennett J, Mathevet I et al. *medRxiv* 2021:21255908.
5. Kroenke K, Spitzer RL, Williams JBW. *J Gen Intern Med* 2001;16:606-13.
6. Spitzer RL, Kroenke K, Williams JBW et al. *Arch Intern Med* 2006;166:1092-7.
7. Posner K, Brown GK, Stanley B et al. *Am J Psychiatry* 2011;168:1266-77.
8. Stanhope J. *Occup Med* 2016;66:760-1.
9. Cuijpers P, Quero S, Noma H et al. *World Psychiatry* 2021;20:283-93.

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Sustainable Technology for Adolescents and youth to Reduce Stress (STARS): a WHO transdiagnostic chatbot for distressed youth

Up to half of mental disorders start by age 14, often with long-lasting and serious consequences for health and productivity throughout life. Among young people aged 10-24 years globally, self-harm, depression and anxiety are now respectively the third, fourth and sixth leading causes of disability-adjusted life years (DALYs) lost¹. Adolescence provides a critical opportunity to support mental health. Evidence for the effectiveness of psychological interventions for adolescents is growing, but difficulties remain in accessing them.

To expand access to evidence-based psychological interventions, the World Health Organization (WHO) is developing and testing the effectiveness of brief transdiagnostic, scalable psychological interventions for youth and other populations affected by adversity²⁻⁵. This work is including digital interventions.

Digital mental health interventions have shown promise for reducing symptoms of depression and anxiety in adolescents⁶. However, high drop-rates are reported⁷, possibly because adolescents are accustomed to digital tools with higher levels of interactivity and attractiveness than those commonly found in digital mental health interventions⁸.

Using human centered design (HCD) methods to create digital interventions may help improve user engagement⁸ by forming an understanding of user needs and the setting where the product will be used, and applying this to the product design process. HCD has been used in the development of a range of user-friendly health interventions, for example to support the implementation of evidence-based psychotherapies in low-resource communities⁹.

The WHO Sustainable Technology for Adolescents and youth

to Reduce Stress (STARS) project is aiming to develop and test an evidence-based digital psychological intervention for youth experiencing high levels of psychological distress. The development process was guided by HCD methods and thus far has focused on adolescents aged 15-18 years, incorporating feedback on prototypes from adolescents, expert input, and literature reviews. The end product was not pre-determined, but evolved through the design process, resulting in a chatbot (an online application that engages the user through a messaging conversation) that delivers transdiagnostic cognitive behavioural therapy (CBT) content.

The first step in the design process was to develop an understanding of adolescents' context and the settings where the intervention would be used. To do this, a team from WHO (two psychologists and an HCD expert) collaborated with partners in South Africa, Pakistan, Jamaica, Nepal and occupied Palestinian territories to conduct interviews and observations to understand the mental health needs, technology use and daily lives of adolescents. Concurrently, narrative literature reviews (e.g., technology use; effective psychological interventions for adolescents) and interviews with experts (e.g., community leaders, adolescent mental health researchers) were completed. The outputs of this stage included fictional characters called "personas", commonly used in HCD methods, which broadly represented the context, needs and motivations of the adolescents interviewed.

The second step focused on creating ideas for "how" and "what" psychological content would be delivered. Ideas for how to deliver content were developed through creative workshops with adolescents and experts; reviews of related products that

adolescents already used (e.g., mobile apps); and feedback from adolescents on pre-existing digital interventions. Findings from the literature reviews and expert interviews were also used. Outputs of this stage included ideas on how to deliver psychological content (e.g., through videos, radio messages, apps) and the types of evidence-based content that could be delivered (e.g., problem management techniques, mindfulness techniques).

Basic prototypes were developed based on these ideas and tested with adolescents in the five settings to understand use. Prototypes were updated based on feedback and further tested. This iterative cycle (idea creation, prototype development and feedback) continued with the intervention being progressively written and developed until a fully functioning, user friendly, version emerged.

The resulting STARS intervention uses a decision-tree logic chatbot to deliver content over ten chat sessions. Chat sessions are approximately 10 min long each and use conversational text with a friendly tone, videos, emojis and stories to communicate core psychological content. The user can respond to the chatbot through pre-defined button responses and sometimes typing. Quizzes, content reminders and options to complete shorter “re-cap” versions of previous modules are used to support learning. Elements of personalization are included to increase engagement, such as choice over notifications and content delivered by the chatbot (e.g., which emotion regulation activity to complete, which story to follow).

The psychological content delivered by the chatbot follows a CBT framework, as supported by the narrative review, prototype test results, and consultations with experts. To address the broad mental health needs reported by adolescents, a transdiagnostic approach is used. The ten sessions are: 1. Introduction (intervention overview, privacy and confidentiality); 2. Emotions (psychoeducation about emotions); 3. Relax (emotion regulation techniques, such as slow breathing); 4. and 5. What we do (behavioural activation); 6. and 7. Managing problems (problem management techniques); 8. and 9. Self-talk (thought challenging); and 10. What next (consolidating learnings and planning for the future).

STARS has been designed for adaptation across multiple set-

tings, including low- and middle-income countries. It can be delivered through existing chatbot systems using different technologies (e.g., apps, websites, messaging platforms) which require relatively low amounts of data and may support scaling of STARS once released. The conversational scripts, and the use of pictures, videos and stories have been designed to aid translation and adaptation. Human review of messages can be added to the chatbot to allow for use with or without human guidance.

STARS has been piloted in South Africa. Additional formative work is underway in other countries, and a randomized controlled trial is scheduled to begin in Jordan. If results from at least two randomized controlled trials demonstrate effectiveness, the intervention will be released open access, allowing older adolescents and young adults to access this highly scalable intervention.

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1. Vos T, Lim SS, Abbafati C et al. *Lancet* 2020;326:1204-22.
2. Epping-Jordan JAE, Harris R, Brown FL et al. *World Psychiatry* 2016;15:295-6.
3. Dawson KS, Watts S, Carswell K et al. *World Psychiatry* 2019;18:105-7.
4. Dawson KS, Bryant RA, Harper M et al. *World Psychiatry* 2015;14:354-7.
5. Carswell K, Harper-Shehadeh M, Watts S et al. *mHealth* 2018;13:34.
6. Garrido S, Millington C, Cheers D et al. *Front Psychiatry* 2019;10:759.
7. Välimäki M, Anttila K, Anttila M et al. *JMIR mHealth uHealth* 2017;5:e180.
8. Scholten H, Granic I. *J Med Internet Res* 2019;21:11528.
9. Lyon AR, Koerner K. *Clin Psychol Sci Pract* 2016;23:180-200.

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Mental health services on the roof of the world

In the past decade, mental health services have developed rapidly in China¹. The number of psychiatric hospitals increased from 583 in 2002 to 1,026 in 2016 nationwide. The numbers of licensed psychiatrists and psychiatric registrars in psychiatric hospitals increased from 1.27 per 100,000 in 2002 to 2.15 per 100,000 in 2016².

However, due to historical, sociocultural and economic reasons, mental health resources are mostly located in cities, but often less accessible or even lacking in economically underdeveloped areas, such as in Qinghai-Tibetan Plateau, the “roof of the world”.

Compared to other parts of China, very few studies examined the epidemiology of psychiatric disorders in Qinghai-Tibetan Plateau. An epidemiological survey using a multi-stage, random sampling method was conducted in Tibet Autonomous Region (part of the Qinghai-Tibetan Plateau) in 2003^{3,4}, and found that the lifetime prevalence of mood disorders, schizophrenia, and alcohol dependence was 0.56%, 0.37%, and 3.08%, respectively. The lifetime prevalence of severe psychiatric disorders was 1.14%.

There are around 10.24 million inhabitants in Qinghai-Tibetan Plateau. According to the above findings, this translates to ap-