**Study Protocol: Transitions, a school-based intervention to promote digital citizenship in
low- and middle-income secondary school students in Perú and México**

Version 2

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Abstract

Despite the increase in digital media adoption among youth growing up in low- and middle-income countries, there is an insufficient understanding of adaptive and risky online practices within these settings. There is also a dearth of programs adapted to youth's contextualized needs that can promote adaptive use of technologies in these settings. The Transitions project aims to (1) understand how children and adolescents' access, use and appropriate digital media in Perú, and (2) use this information to adapt a culturally and developmentally appropriate digital citizenship program. The Transitions project is a researcher-practitioner collaboration between the Adolescent Research Collaborative (ARC) at UC Berkeley, Innova Schools in Latin America, and U.S.-based Common Sense Education. In this multiple wave project, we will work with up to 24, 500 children and adolescents aged 9 to 17 years, and 1,021 tutors within a large, low-cost school network that serves low to middle income urban families across Perú and up to 560 children and adolescents aged 9 to 17 years, and 10 tutors in the same network of schools across México. To date, there are 9 waves of this project (six waves in Perú and three waves in México). Each wave includes surveys on digital media use, well-being, and mental health. In several waves, participants also complete a short course on digital citizenship as part of the school advisory or homeroom period. Some waves have included qualitative data collection, gathered from focus groups and workshops. This study will shed light on how youth in Perú and México access, use and appropriate digital media. This knowledge will enhance our global conceptualization of the relationship between digital media and youth well-being by providing cultural specificity to our general understanding of the developmental science principles at play. In addition, this project will inform the ongoing development of evidence-based programs that can empower youth online.

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Keywords: adolescence, well-being, digital media use, school-based interventions,
protocol

Study Protocol: Transitions, a school-based intervention to promote digital citizenship in low- and middle-income secondary school students in Perú and México

Adolescents are often the first to adopt and the quickest to adapt to the rapid technological advances occurring globally (Banaji et al., 2018; Livingstone et al., 2017; Magis-Weinberg et al., under review). Most of the world's adolescents are growing up in low- and middle-income countries (LMICs) (The World Bank, 2019), yet research on technology use and well-being among these populations lags behind that on youth from high-income countries (HICs) (Schønning et al., 2020). Because digital media can amplify both the risks and opportunities inherent in the sensitive stage of adolescence, impacting long-term socioemotional well-being and mental health, there is a compelling need for culturally and developmentally informed, evidence-based interventions that promote healthy, educational, and prosocial use of digital technologies and minimize its harmful effects.

Youth and Digital Technologies in LMIC

Digital technologies play a crucial role in adolescents' lives as platforms for education and information, connection and entertainment, but also expose adolescents to risks and unhealthy habits (Uhls et al., 2017). Despite increasing concerns about the relationship of youth with technology, there remains a dearth of high-quality, objective, and data-driven analyses investigating the impacts of digital technologies on youth's well-being, mental health, and brain function and structure (Odgers & Jensen, 2020). Understanding these impacts is essential for developing interventions that can promote adolescents' healthy digital habits and well-being more broadly. The need for empirically driven interventions and policy is especially urgent considering the rapid pace of technological advancement and the geographical variability in device availability and usage among youth. Whereas digital media use is nearly universal in the

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high-income countries (HICs), it is still on the rise in LMIC countries like México and Perú (Livingstone et al., 2017; Pew Research Center, 2019). Further research in LMICs, where youth may be differentially exposed to technology, can provide a rare window into variations in how youth adopt and adapt to digital media, as well as offer novel insights into digital innovations as sources of resilience or vulnerability in a globalized digital age. By better characterizing digital media uptake by LMIC youth, we can tailor intervention strategies to important contextual factors such as cultural values and socioeconomic status.

Integrating Developmental Science on Adolescence

Interventions must also incorporate findings from developmental science on the particular needs and opportunities in the transition from childhood to adolescence. Early adolescence, between the ages of 10-13, is a period of dynamic maturational changes (Dahl et al., 2018). These include the onset of pubertal development, which begins a period of rapid physical growth (including extensive brain development) and sexual maturation, as well as changes in cognitive, social, emotional, psychological, and behavioral processes (Pfeifer & Allen, 2020). An emerging body of evidence supports the idea that this dynamic period of maturation is a sensitive period for social, emotional, and motivational learning—in ways that can have enduring effects on a broad range of developmental trajectories including sexual and reproductive health, mental health, gender-based violence, education retention and attainment, and social development (Dahl, et al., 2018).

During adolescence, increasing cognitive control abilities meet increasing risk for behavioral, emotional, and mental health problems due to contextual factors in the environment (Casey, 2015; Luna et al., 2015; Paus et al., 2008). New digital media—and the ways that youth use these digital technologies—can amplify these vulnerabilities if they are not optimized to

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recognize and minimize their associated risks. Indeed, most research on screen-based activities and youth development in HICs suggests opportunities but also potential vulnerabilities for well-being and socioemotional development (Magis-Weinberg et al., under review; Odgers & Jensen, 2020; Orben, 2020). Most behaviors and risks online appear to mirror offline activity (for a review see George and Odgers, 2015); however, technology introduces unique risks for adolescents (Banaji et al., 2018; George & Odgers, 2015; Livingstone et al., 2017; Odgers & Jensen, 2020).

Digital Citizenship Education

In light of the increasing role of digital media in adolescents' lives and the vulnerability and opportunity inherent in their developmental stage, educating adolescents on *smart, responsible, creative and meaningful* digital use (Czerny, 2021) is essential. Digital citizenship can be defined as “the responsible use of technology to learn, create, and participate (Common Sense, 2019), and includes both the skills and dispositions necessary. Digital citizenship education aims to prepare students to take ownership of their digital lives by teaching the risks (e.g., misinformation) and opportunities (e.g., social connection) afforded by technology, as well as concrete skills to promote responsible technology use. Despite the need, digital citizenship education is lacking in many regions of the world including Latin America—where fewer online rights for children, less stringent data policies, and parents' lagging adoption of technology may present increased risk to youth's well-being (Kleine et al., 2014; Livingstone & Byrne, 2015; Magis-Weinberg et al., under review).

Aims

The Adolescent Research Collaborative (ARC), from the Institute of Human Development (IHD) at UC Berkeley, has worked with Innova Schools and Common Sense

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Education on the Transitions Project since March 2018. As a researcher-practitioner collaboration, the Transitions Project assumes a two-pronged approach of intervention and research to better support and understand social-emotional well-being and the development of healthy digital media habits in the transition from primary to secondary school. The **practice** arm of the Transitions project seeks to promote digital citizenship among Latin American adolescents through culturally appropriate school curricula (Digital Citizenship, a free K-12 curriculum) in partnership with Common Sense Education (CSE). The **research** arm of the project investigates adolescents well-being and digital media use on this understudied population.

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Practice: intervention curriculum development, implementation, and evaluation

Overview of the Transitions intervention

The aim of the Transitions project **practice** arm is to develop, implement and evaluate a school-based intervention for adolescents in secondary school to promote digital citizenship and healthy digital media habits that foster socio-emotional well-being. A secondary aim of the project is to ensure that materials are culturally appropriate for Latin American settings and aligned with developmental principles of adolescent development. A tertiary aim of the project is to support students during the COVID-19 pandemic.

Specific aims:

1. Develop, implement, and evaluate a culturally and developmentally informed school curriculum that fosters digital citizenship knowledge and skills
2. Intervene to promote adaptive digital media use and reduce digital media risks to promote healthy adolescent development
 - a. Promote active over passive media use
 - b. Promote more positive online social experiences
3. Increase awareness of one's own digital media habits to achieve a more balanced use of digital media that is in concert with offline activities (i.e., in-person social interactions, schoolwork, sleep, physical activity)
4. Increase awareness of schools and teachers as resources for help with problems that arise in digital settings

Participants and study location

The total population consists of students enrolled in Innova Schools between 4th and 11th grade in 63 sites across Perú and 4 sites across one state in México (see **Figure 1** for map). The total number of students is approximately 30,000. Material delivery is conducted by homeroom tutors of these grades. The total number of tutors is approximately 1,031. Innova Schools is a very affordable standardized network of private schools, financially feasible for a family in the lower and middle classes of Perú and México. In our sample, 70.4% of students come from households in the middle socioeconomic status (SES) quintile, which corresponds to a monthly family income of S/ 3970 (approximately 1100 USD), and 29.2% of students come from households in the second SES quintile, which corresponds to a monthly family income of S/2480 (approximately 686 USD). Thus, we are sampling a population of lower middle-income students, with a higher income than the average Peruvian and Mexican income. For reference, tuition is on average 150 US dollars per month. Innova Schools have sites in 15 out of the 26 Peruvian territorial constituencies (24 departments and 2 constitutional provinces, see **Appendix**) and 5 sites in one state in México. According to the Instituto Nacional de Estadística e Informática (2015), in Perú, 56.5% of the population self-identifies as mestizo, 19.8% as quechua, 5.2% as white, 2.2% as aymara, 1.9% as black, 1.4% as native, 8.1% doesn't know and 4.9% as other. In México, 63% of the population identified as mestizo, 21% as predominantly Amerindian, 7% as Amerindian, and 10% identified as other, mostly European (Index Mundi, 2021). We do not collect specific race/ethnicity data at an individual level. However, our sample generally reflect the ethnic/racial breakdown of Peruvian youth, oversampling from the mestizo population. The schools have fewer indigenous or White students than the general population given the focus of

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Innova Schools on low- and middle-income students, and the fact that race/ethnicity and SES are very intertwined.

Ethics approval was granted by the university human subjects committee.

Figure 1. Map of Peruvian territorial constituencies with school sites (left). Innova Schools are currently located in 15 out of the total 26 territories in Perú (in red). Map of the Mexican state with school sites (right). Five of the Innova Schools are currently located in 1 state in México.

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Table 1

Description of the content, dates, and reach of each phase of intervention in Perú

Wave	Description	Dates and duration	Number of tutors	Number of students who received the materials	Number of students who responded the surveys	Grades	Cities in Perú
Perú 1	Pilot/Formative research	May-June 2019 (2 weeks) Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)	38	1186 All students received materials (no controls)	~ 1093	4th to 9th grade	Chiclayo and Lima
Perú 2	Pragmatic randomized trial	October - November 2019 (2 weeks) Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)	20 57% of tutors were in treatment classrooms 43% of tutors were assigned to control classrooms	1137 students in total split into two groups 57% were assigned to treatment 43% were assigned to control	~ 892	4th to 11th grade	Lima
Perú 3	Well-being under Lockdown (in response to the emerging COVID-19 crisis)	April - May 2020 (6 weeks) Delivery of two 1-hour	All tutors (~1021) 4th to 11th grade	~24 500 All students received materials (no controls)	~ 10 000	4th to 11th grade	All sites (see Appendix)

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	at the beginning of 2020)	sessions weekly for four weeks (Total of sessions: 12)					
Perú 4	Digital citizenship & relationships (in response to a continued stay of lockdown towards the end of 2020)	October - November 2020 (4 weeks) Delivery of two 1-hour sessions weekly for four weeks (Total of sessions: 8)	All tutors (~418) 6th to 8th grade	~ 11 216 All middle school students received materials (no controls)	~ 3 800	6th to 8th grade	All sites (see Appendix)
Perú 5	Digital citizenship & relationships (in response to a continued stay of lockdown towards the end of 2021)	June – July 2021 Collected 4 waves of data across 4 weeks (Total of 4 sessions).	Approximately 1021 tutors	Approximately 24,500 students from 4 th to 11 th grade.	~ 8865	4 th to 11 th grade	All sites (see Appendix)
Perú 6	Digital citizenship & relationships (in response to a continued stay of lockdown towards the end of 2021)	November 2021 Collected 3 waves of data across 3 weeks (Total of 3 sessions, only one session and one wave of data collection for 4 th	Approximately 1021 tutors	Approximately 24,500 students from 4 th to 11 th grade.	~ 5876	4 th to 11 th grade	All sites (see Appendix)

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	Piloting of the Spanish version of Social Media TestDrive (Ups and Downs of Social Media Module)	– 5 th grade). Administered a pilot of the Social Media TestDrive, a set of modules that simulate a social media platform and educate students on navigating online experiences.					
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Table 2

Description of the content, dates, and reach of each phase of intervention in México

Wave	Description	Dates and duration	Number of tutors	Number of students who received the materials	Number of students who responded the surveys	Grades	Cities in México
México 1	Teacher training Adaptation and implementation of pilot materials over the course of 2 months Outreach session with parents	January - April 2020	10	560	605	4th to 12th grade	Cuatitlán and Coacalco
México 2	Adaptation and implementation of materials as part of their own Advisory Curriculum	September 2020 – May 2021	10	560	683	4th to 12th grade	Cuatitlán and Coacalco

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	Other activities, talks with parents, workshops with students						
México 3	Adaptation and implementation of materials as part of their own Advisory Curriculum	November 2021 - Ongoing	10	560	Ongoing (current N = 113	6th to 12th grade	Cuatitlán Coacalco Tultepec Escatepec

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Intervention Components

The school-based intervention consists of the delivery of a short course (4 - 9 sessions) as part of the Advisory period and is implemented by home-room tutors on a daily or weekly basis. In each wave, these steps were adapted. See **Table 1** for details. In general, implementation entailed the following steps:

- 1) Teacher training: capacity building on the developmental science of adolescence and training on Digital Citizenship generally and on the materials and implementation
- 2) Pre-intervention questionnaires: delivered to students on the weeks before they received the Digital Citizenship materials
- 3) Implementation of materials (see **Materials** for details)
- 4) Post-intervention questionnaires and focus groups with student and teachers to get feedback on the materials

Student materials

Transitions program (Perú 1, 2, and 4, México 1 and 2):

Transitions is largely based on the [Digital Citizenship curriculum](#) developed by Common Sense Education (James, Weinstein & Mendoza, 2019). In the *Control* condition, teachers deliver “business-as-usual” materials corresponding to socio-emotional development and well-being during the *Advisory* period. In the *Treatment* condition, teachers are trained to deliver modules on: (1) media balance and well-being, (2) privacy and security, (3) digital footprint and identity, (4) relationships and communication, (5) cyberbullying, digital drama and hate speech, (6) news and media literacy. We added in-house developed modules on (7) emotional regulation online, (8) conflict resolution online, (9) sleep habits in relation to technology. Each topic is addressed in a developmentally appropriate way, tailored to each grade level.

The aim of the Digital Citizenship curriculum is to “cultivate both skills and dispositions to help young people thrive in our interconnected world” (Common Sense, 2019). The core curricular strategies emphasized in lessons scaffold students to explore the impact that their digital lives can have on their health, well-being, and relationships while learning strategies for

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balancing media in their everyday lives. Lessons feature activities that focus on the dispositions of "slowing down" and "taking action" (James, Weinstein & Mendoza, 2019). The program seeks to revise attitudes toward technology, change classroom norms around use, set intentions for balanced use and give students opportunities to practice action plans in real-life scenarios (James, Weinstein & Mendoza, 2019). Important translation and adaptation efforts were made to make the materials more suitable for children and adolescents in Latin America.

Perú 1

- Objective: pilot Spanish translation of materials and research instruments
- Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)

Perú 2

- Objective: impact assessment comparing Control and Treatment groups
- Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)

Perú 4:

- Objective: Adaptation of select modules to online instruction for Middle School. For all students, teachers delivered modules on (1) media balance and well-being, (2) relationships and communication, (3) cyberbullying, digital drama and hate speech, (4) online conflict resolution
- Delivery of two 1-hour sessions weekly for four weeks (Total of sessions: 8)

México 1

- Objective: pilot Spanish translation of materials and research instruments
- Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)

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México 2

- Objective: impact assessment comparing Control and Treatment groups
- Delivery of nine 1-hour sessions consecutively over the course of two weeks (Total of sessions: 9)

Figure 2. Diagram of the intervention design for Perú 2 which outlines the content of the control and treatment conditions as well as the pre- and post- intervention measures used to evaluate the efficacy of the intervention.

Well-being During Lockdown program (Perú 3):

In April and May 2020, we adapted materials for a special 6-week curriculum *well-being under Crisis* for grades 4 to 11 in response to COVID-19 outbreak (for details see Magis-Weinberg, 2021, JOCAM). For all students, teachers delivered modules on (1) media balance and well-being, (2) privacy and security, (3) digital footprint and identity, (4) relationships and communication, (5) cyberbullying, digital drama and hate speech, (6) news and media literacy.

Perú 3:

- Objective: provide a mental health “first-aid” materials to support student well-being during the COVID-19 pandemic
- Delivery of two 1-hour sessions weekly for four weeks (Total of sessions: 12)

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Training and Professional Development

Home-room teachers (tutors) implemented materials over the course of the Advisory period, as part of school activities. Prior to implementation, tutors received training either in-person or virtual on Digital Citizenship and the Developmental Science of Adolescence. Training was conducted in two phases. First, school staff and principals were introduced to digital citizenship and general principles of adolescent development. Second, home-room teachers were trained on Digital Citizenship materials. Training focused on core digital citizenship concepts as well as implementation logistics. Add-on sessions have been implemented throughout the school year to review the developmental science of adolescence, digital citizenship and socio-emotional well-being in adolescence. Throughout, the research team has provided technical assistance to school staff to ensure effectiveness and sustainability of programs

Well-being and COVID-19 (Perú 5, 6, and México 3):

In June and November of 2021, we administered a battery of surveys to students from grades 4 to 11 over a period of four weeks during Perú 5 and a period of three weeks during Perú 6. During Perú 5, all students received a battery of surveys via Qualtrics and during Perú 6, all students received a battery of surveys during week one, and only students in grades 6 to 11 received another battery of surveys during weeks two and three. The aim of our surveys was to collect data on the mental health, well-being, and technological habits of adolescents during the COVID-19 pandemic. Students in grades 6 to 12 in México 3 also received one Qualtrics survey in November of 2021, and a second survey in April of 2022.

In November of 2021, students in grades 6 to 11 received a pilot version of the Social Media TestDrive (SMTD), a social media education platform that provides students the opportunity to “test-drive” a social media platform, during Perú 6. The aim of this test-drive is to equip youth with strategies that will allow them to navigate tricky social situations in their own lives.

Perú 5:

- Objective: collect data on the mental health, well-being, and technological habits of adolescents during COVID-19
- Delivery of one online survey weekly for four weeks (Total of surveys: 4)

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Perú 6:

- Objective: collect data on the mental health, well-being, and technological habits of adolescents during COVID-19 and pilot the Social Media TestDrive social media education platform
- Delivery of one online survey weekly for three weeks (Total of surveys: 3)

México 3:

- Objective: collect data on the mental health, well-being, and technological habits of adolescents during COVID-19
- Delivery of one online survey over two months (Total of surveys: 2)

Group assignment

For the pilot phase for formative research, Perú 1, all students received the intervention (nine one-hour sessions over the course of two weeks) and pre and post intervention assessments. For Perú 2, classrooms were randomly assigned to either the intervention group (who received the Digital Citizenship materials during the Advisory period for two weeks) or Control group (who received regular materials during the Advisory period - “business-as-usual”). Students in both groups completed the same pre and post program assessments.

The program materials for Perú 3 were adapted in response to the Covid-19 pandemic. All students received the modified, 6-week intervention, *well-being under Crisis*, during online instruction. Given the stressful nature of the pandemic and the potential, timely benefits of the materials for students, the decision was made to provide the intervention to all students rather than assign a control group. Students completed pre and post intervention assessments.

For Perú 4, all students received the intervention (Digital Citizenship materials over 6 weeks) during online instruction due to the Covid-19 pandemic. As for Perú 3, the investigators and school leadership elected for all students to receive the intervention rather than assign a control group. Students also completed pre and post intervention assessments.

In Perú 5, all students received a battery of online surveys via Qualtrics over a period of 4 weeks in response to the ongoing COVID-19 pandemic. During Perú 6, the investigators chose to administer the online surveys to the students in grades 4 and 5 for one week only. Students in

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grades 6 to 11 were administered the surveys once a week for three weeks. Additionally, investigators chose to administer the SMTD modules to students in grade 6 to 11 only.

For México 1 and 2, classrooms were randomly assigned to either the intervention group (who received the Digital Citizenship materials during the Advisory period for two weeks) or Control group (who received regular materials during the Advisory period - “business-as-usual”). Students in both groups completed the same pre and post program assessments. During México 3, students in 6th to 12th grade received a battery of online surveys via Qualtrics over a period of response to the ongoing COVID-19 pandemic.

Study instruments

Outcome measures

Quantitative

Student surveys

Students from each wave completed a battery of surveys covering topics related to digital media use, socioemotional well-being, personality/temperament, sleep hygiene, and response to the COVID-19 pandemic. Additionally, some measures were used pre- and post-intervention during the second wave to assess effectiveness. The complete list of measures used for each wave, as well as those used for intervention evaluation purposes, can be found in **Table 2**.

Data collection schedule

For Perú 1, Perú 2, México 1, and México 2, in the days before and after implementation of the school curricula, self-report questionnaires (paper based or delivered via Qualtrics) assessed the digital media landscape and well-being of students. These measures will be used both for evaluation purposes as well as to further understand use, access and appropriation of digital media by adolescents. For Perú 3 and Perú 4, due to feasibility issues, shortened questionnaires were administered weekly *in tandem* with lessons on Well-being during Lockdown/ Digital Citizenship, and completed at the beginning of each lesson. In Perú 5, Perú 6, students only received a battery of questionnaires weekly. In México 3, students received two sets of questionnaires, one pre and one post. This data collection is still ongoing as of February 3, 2022.

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Qualitative

For adolescents, we collected session materials (workbooks, worksheets, etc.). When possible, questionnaires include open-ended questions to allow for clarification and expansion on certain topics. We ran focus groups and workshops with smaller groups of students to allow us to go more deeply into some of the concepts. For teachers, we had session debrief reflections, focus groups and training workshops to assess reception and relevance of materials. We did classroom observations during sessions.

Feasibility indices

Fidelity and treatment integrity of the trainers will be assessed to estimate the feasibility of the program when possible. Teachers will be asked to indicate to what extent the program has been followed, the goals that have been reached, and how well they were able to guide and help adolescents. Observers in classrooms will evaluate adherence to the program and classroom environment.

Research - Characterization of adolescent technology access, use and appropriation in Perú

In addition to assessing the potential impact of the evaluation, we also collected broader measures to describe the general digital media landscape in this setting, as well as well-being and mental health measures.

Our research aims are:

1. Characterize patterns of digital media use, sleep hygiene, and well-being of low-to-middle income adolescents in urban settings in Perú and México
2. Understand the risks and opportunities surrounding digital media use in these settings
3. Test the hypothesis that promoting healthy tech use in early adolescence may be an effective strategy to prevent vulnerabilities that emerge in mid-to-late adolescence

Student surveys

The *Transitions* team selected and adapted evaluation measures based on existing, validated surveys that assess well-being and technology use among adolescent samples. Over the course of the pilot and subsequent waves, the surveys were modified to best capture the experiences of youth in a middle-income setting in Latin America. The US-based researchers worked closely with Innova Schools and other collaborators in Perú and México in order to maintain relevance and cultural salience. Excluding those surveys that had already been validated in Spanish, the measures were translated and back-translated from English to Spanish and then checked again for cultural resonance by research assistants in Perú and México. Because different waves had various logistical constraints, not all measures were repeated across waves (See **Table 2**).

Some of the well-being measures that have been adapted from existing surveys include the following: Patient-Reported Outcomes Measurement Information System - Anxiety and Pediatric Depression (PROMIS, Quinn et al., 2014); Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997); UCLA Loneliness Scale Version 3—10-item Short Form (UCLA-LS3 SF-10, Russell, 1996); The Patient Health Questionnaire 2 (PHQ-2, Kroenke, Spitzer, & Williams, 2003). Technology use will be indicated by several outcomes related to quantity and

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quality of screen-based activities (Jensen et al., 2019), as well as problematic use (Domoff et al., 2017), and positive and negative experiences online (Kent de Grey et al., 2019). Sleep habits will be assessed (Falbe et al. 2015), and the Children's Report of Sleep Patterns (CRSP, Meltzer et al., 2013) will be used to measure sleep quality. Furthermore, the *Transitions* team developed a series of original questions and scales in order to capture certain behavior patterns, particularly related to technology use. See **Table 2** for a full list of questionnaires, organized by Transitions Wave.

Data analyses

Quantitative

Quantitative statistical data analysis will be conducted using R (R Core Team, 2020). One of the aims of this study is to investigate the impact of a digital citizenship intervention. In Perú 2, effectiveness of the intervention will be evaluated with an intent-to-treat model by comparing the effect of control and treatment groups on main outcomes of interest (digital media knowledge, attitudes, and behaviors). Further questions on the relationship of technology use and well-being will be explored, with particular attention to differences between school grades (as a categorical proxy for age) and longitudinal changes to answer developmental questions. Exact procedures used for processing and analysis of the data will depend on the aims and subset of data used in specific empirical papers. Analyses will be pre-registered in the Open Science Framework (current projects include: <https://osf.io/htqmy/>, <https://osf.io/rmcwv/>, <https://osf.io/aegux/>, <https://osf.io/rhfcb>, <https://osf.io/hjrab>, <https://osf.io/rhfcb>, <https://osf.io/r8eaj>).

We will test our hypotheses using a mixed effects model comparison approach, which includes participant ID as a random effect. Where relevant, session will be included as a predictor to test for either pre/post changes or longitudinal effects. Gender and school grade will be included to compare groups, as developmental and gender differences are one of the main focus of the current study. All models will be fitted with full information maximum likelihood estimation. Model fitting will be performed using R (R Core Team, 2020) and package lme4 (Bates, Mächler, Bolker, & Walker, 2020). Models will be compared based on the Akaike Information Criterion (AIC; Akaike, 1974), using log likelihood ratio tests for improvement of

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model fit for nested models. Confirmatory factor analyses will be conducted to assess for psychometric properties of validated measures to ensure whether factor structure aligns with previously reported studies. Cronbach's alpha and Spearman-Brown's parameter will be used to estimate internal consistency of scales.

Qualitative

To avoid information loss in translation, analyses will be performed in Spanish by the Spanish-speaking members of the team. Interview and focus groups transcripts will be coded and thematic analyses will be performed to identify key issues. Quotes will be provided when possible to illustrate some of these themes. The research team might also analyze other materials, including student workbooks and debrief reflections to extract key themes. The research team will collect youth artifacts (writings, drawings, class products) to exemplify the intervention.

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	Adolescents' Digital Technology Interactions and Importance (ADTI) Scale	Moreno et al., 2020			X	X			X				X
	Uses and gratifications Scale	Adapted from Dhir et al., 2016			X	X	X						X
	Online Prosocial Behavior (OPB)	Erreygers et al., 2018			X	X	X	X					X

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	Patient-Reported Outcomes Measurement Information System Pediatric Item Bank v2.0 – Depressive Symptoms Short Form8a (PROMIS-Dep8)	Quinn et al., 2014		X	X	X	X	X	X	X	X		X
	Strengths and Difficulties Questionnaire (SDQ)	Goodman, 1997	X		X (prosocial only)		X (Prosocial)	X (Prosocial)					X
	The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)	Tennant et al. 2007	X										X
	Kessler Non-Specific Psychological Distress Scale (K6)	Kessler et al., 2002)	X										X
	Student's Life Satisfaction Scale (SLSS-7)	Huebner, 1991	X	X					X				X
	Single-item Life Satisfaction (SLSS-1)	Cheung and Lucas, 2014			X	X	X	X		X	X		X
	UCLA Loneliness Scale Version 3—10-item Short Form (UCLA-LS3 (SF-10))	Russell, (1996)			X	X	X	X		X	X		X

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	The Patient Health Questionnaire 2 (PHQ-2)	Kroenke, Spitzer, & Williams (2003)			X								X
	Multidimensional Scale of Perceived Social Support (MSPSS)	Zimet (2016)			X					X			X
	Basic Psychological Need Satisfaction, and Frustration Scales (BPNSFP)	Adapted from Chen, Vansteenkiste, et al., 2015; Rodríguez-Meirinhos et al. 2020			X	X	X	X		X	X		X
	Difficulties in Emotion Regulation Scale - Short Form (DERS-SF)	Kaufman et al.(2015)			X								X
	Brief Inventory of Thriving (BIT)	Su et al. (2014)			X								X
	Child and Youth Resilience Measure-Rasch (CYRM-R)	Jefferies et al. (2019)			X								X
	Positive Risk Taking Scale	Adapted from Duell & Steinberg (2018)			X	X							X
	Perceived Stress Scale (PSS)	Cohen et al. (1983)	X		X	X	X	X			X		X

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	Mini-Social Phobia Inventory (MINI-SPIN)	Connor et al., (2001)						X			X		
Home Environment	Chaos, Hubbub, and Order Scale (CHAOS)	Matheny Jr., Wachs, Ludwig, & Phillips (1995)			X	X							X
	Family Technology Rules	Hiniker, Schoenebeck, & Kients (2016)					X			X			X
	MacArthur Scale of Subjective Social Status	Goodman et al., (2001)					X						X
Sleep	The Pittsburgh Sleep Quality Index - Short Form (PSQI-SF)	Buysse et al. (1989); Jimenez-Genchi et al. (2008)		X	X		X	X				X	
	Index of Nighttime Offline Distress (iNOD)	Scott, Biello, & Cleland Woods (2021)					X	X		X			X
Personality/Temperament	Trait Emotional Intelligence Questionnaire Adolescent Short Form (TEIQue-ASF)	Petrides et al., (2006)	X										X
	Early Adolescent Temperament Questionnaire—Revised (EATQ-R) Short Form	Ellis & Rothbart (2001)	X	X					X				X

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Values	Prosocial Youth Purpose Scale (PYPS)	Malin et al., (2014)					X			X			X
	Interpersonal Reactivity Index (IRI)	Davis (1983)					X	X					X
	Portrait Values Questionnaire (PVQ)	Schwartz et al., (2001)					X						X
	Mexican American Cultural Values Subscale (MACVS)	Knight et al., (2010)					X						X
In-house miscellaneous items													
Technology Use	Device ownership and access		X	X	X	X				X			X
	Favorite and most frequently used apps		X	X					X				X
	Screen time and frequency of device use			X	X	X	X		X	X		X	
	Perceived time on and impacts of device use		X									X	
	Efforts to reduce time on mobile devices											X	
	Consider Video Games as Social Media										X		X
	Activities on devices not for school		X	X								X	
	Whatsapp		X	X		X			X				X
	Apps			X		X			X				X
	Profiles			X					X	X			X

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	Friends/followers	X	X					X				X
	Time on mobile devices	X	X					X				X
	Family rules about devices		X	X				X	X		X	
	First profile age		X	X				X	X			X
	Where do they access internet	X						X			X	
	Device ownership by family	X	X	X				X			X	
	Device ownership personally	X	X	X				X	X		X	
	Age of first cell phone	X	X	X				X	X			X
	Hours for TV, games, computer, and mobile on weekend		X	X				X	X			X
	Hours for TV, games, computer, and mobile on weekdays		X					X	X			X
	Hours for TV, games, computer, and mobile on typical day of quarantine			X	X	X		X	X			X
	Entertainment App you use the most, and favorite							X				X
	Videogames App you use the most, and favorite	X						X				X
	Social media App you use the most, and favorite							X				X
	Favorite YouTube channel							X				X
	Own YouTube channel	X						X			X	
	Instagram specific accounts							X			X	
	Age start social media		X					X	X			X
	Hidden profiles from my parents	X	X					X			X	
	Hopelab negative activities in social media	X	X					X				X

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	Social media positive and negative	X	X					X				X
	Frequency of use no differentiation between weekday and weekend	X	X					X				X
	Content creation	X	X					X				X
	Social media apps used and most important	X	X					X				X
	Time on various online activities (hr) weird categories	X										X
	Social media displacing other activities	X										X
	Types of activities on social media mix of passive/active	X	X									X
	Impact of SM on people my age	X										X
	Homework distraction	X	X									X
	Sufficient internet			X							X	
	Device for homework	X	X	X				X				X
	Technology help								X		X	
	EU kids		X	X	X			X	X	X		X
	Mindless use (not SUQ)	X										X
	Autonomy and competence questions			X	X		X					X
Sleep	Sleep duration (i.e., typical bedtime, wake-up time)	X	X	X	X			X	X		X	
	Sleep quality (e.g., days of perceived insufficient sleep)	X	X	X	X			X	X		X	X
	Technology use near bedtime	X	X		X			X			X	X
	Sleep disruption due to series, YouTube, social media, homework, videogames	X	X		X			X				
	Naps		X	X	X			X				
COVID-19	Emotional response			X	X	X	X					X
	Social connectedness			X	X	X	X					X
	Daily schedule			X	X				X			X
	Use of technology to adapt			X	X							X

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[illegible]

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Mental Health	MEIS that are SCFS	X	X					X				X
Household	Household composition		X	X	X							X
	Household rooms			X	X							X
	Family Conflict					X	X					X
	SES		X									X
	Qualitative Measures											
Teachers	Focus groups	X	X								X	
	Session debrief reflections	X	X								X	
	Training/capacity building	X	X	X	X						X	
Adolescents	Focus groups										X	
	Session materials	X	X		X						X	
	Workshops to assess reception and relevance of materials	X	X								X	
	Vignettes		X									X
Participant and Facilitator	Observations	X	X		X						X	

Discussion

Despite the increase in digital media adoption in youth growing up in low- and middle-income countries, there is insufficient understanding of how online practices might be adaptive or risky in this context. There is also a dearth of programs specifically adapted to promote adaptive use of technologies and meet youth's needs within this setting.

By taking a two-pronged, practice and research approach to engaging with this population, we hope to both serve and illuminate patterns of digital media use among adolescents in Perú and México. Specifically, the current study will provide a comprehensive understanding of Peruvian and Mexican use, access, and appropriation of digital media in low- and middle-income urban settings across Latin America. Furthermore, the current study will shed light on the feasibility and efficacy of a culturally and developmentally appropriate, school-based intervention that cultivates digital citizenship skills in this population.

The current study has several strengths:

1. Access to a very large sample of children and adolescents aged 9 to 17 who are growing up in Perú in low- and middle-income urban settings, in 15 of the 26 territories in the country and in 5 sites in one state of México.
2. A researcher-practitioner collaboration with a school network that enables joint design of research tools, the digital citizenship program, broad implementation, and capacity to scale quickly.
3. A project that includes the voices of teachers who work directly with students and can identify the particular needs of the population.
4. Mixed methods that combine quantitative data collection for breadth, and qualitative data collection for depth and incorporation of teacher and student subjective insights.
5. Ongoing data collection during the COVID-19 pandemic to capture its effects on adolescent mental health and well-being.

Taken together, the research findings and practical applications that will emerge from Transitions will help to reveal how digital media use relates to adolescent well-being, socio-

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emotional processes, and mental health in an under-studied context. We hope to shed light on effective ways to promote the benefits of digital media use while minimizing the risks digital media may confer.

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Conflicts of interest statement

The authors declare that they have no competing interests.

Authors' contributions

LMW and RD conceptualized the study and wrote the grant funding it. LMW, CG and EB drafted the manuscript. LMW, EB and CG developed and adapted intervention and research materials. LMW trained teachers. LMW, CG and EB observed implementation. The funding body had no role in the design of the study, in collection, analysis, and interpretation of data, or in writing the manuscript.

Funding

This study has funding from an anonymous private donor and the Bezos Family Foundation.

Acknowledgements

We acknowledge the research and implementation assistants supporting this project: Camila Bossano, Elizabeth Sherwin, Karina Valdespino, Yailin Alvarez, Chun-Chi Yang, Hannah Fabian, Yi-Heng Tsai, Camila Quispe Martijena, Marcela Damonte Cayo, Stefanny Ibarra Castillo, Rebecca Ruby Avina, Yilin Liu, and Shreshth Kharbanda.

We acknowledge our research partners at Innova Schools, including the Personal Development and Well-being staff, school principals and teachers.

We would like to thank Common Sense Education for providing original materials in English and providing assistance with translation and implementation.

We would like to thank all participating adolescents for their involvement in the study.