



# Dissemination and Implementation of School-Based Health Promotion Programs: A Descriptive Comparison of Case Studies in Nicaragua and the Dominican Republic

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## Abstract

Dissemination and implementation (D&I) sciences, largely developed in clinical settings located in the Global North, have much to offer and also to learn from school settings in the Global South. In this paper, we use the RE-AIM (Reach, Effectiveness, Adaptation, Implementation, Maintenance) framework to guide a descriptive comparison of D&I research conducted with school-based health promotion programs in Nicaragua and the Dominican Republic. Experiences and reflections were gathered from and synthesized by members of our international research team, composed of interdisciplinary practitioners and researchers focused on behavioral health in the Latin America and Caribbean (LAC) region. Through transparent sharing of our challenges and successes, we provide guidance that can facilitate greater quantity and quality of implementation research conducted in these understudied settings, which is critical for the advancement of D&I sciences.

**Keywords** Latin America and Caribbean region · Implementation science · School-based intervention · RE-AIM framework

A variety of dissemination and implementation (D&I) frameworks have been developed to guide adaptation and evaluation of evidence-based interventions (EBIs) and their implementation strategies in new contexts. Yet these activities have primarily taken place through D&I research conducted in the Global North and in clinical settings. D&I research conducted in the Global South and in school-based settings is far more limited, particularly in Latin America and the Caribbean (LAC). Even more limited are detailed reflections about how D&I research has been conducted in these unique settings. Nevertheless, such reflections can facilitate greater quality and quantity of D&I research in these understudied settings by providing practical insights

about what may (or may not) work when planning, adapting, implementing, and evaluating EBIs and their implementation strategies. Through more and better-quality D&I research in LAC school settings, we can accelerate advancements in D&I sciences and towards international, regional, and country-specific priority health targets. This paper describes and compares school-based D&I research conducted in Nicaragua and the Dominican Republic (DR) aimed at responding to regional and national priorities for health promotion and disease prevention.

## Public Health Priorities in Latin America and the Caribbean

Based on patterns of disease adjusted life years among 10–24 year olds, most LAC countries have been categorized as “injury excess” or “non-communicable disease predominant” (Patton et al., 2016). For countries classified as “injury excess,” like the DR, priorities for public health are to reduce violence, unintentional injury, and adolescent pregnancy while avoiding sharp rises in mental health problems and non-communicable diseases. Indeed, the DR has the highest rate of adolescent pregnancy in LAC, and the prevalence in Nicaragua is within

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the second highest quintile (World Bank, 2020). Moreover, the DR is the only country that has seen a significant increase in physical partner violence (Bott et al., 2019). Accordingly, country-level strategies (e.g., DR 2030 National Development Strategy) include a strong focus on positive youth development, prevention of crime and violence, and promotion of psycho-social health (Ministerio de Economía & Planificación y Desarrollo de la República Dominicana, 2012). For “non-communicable disease predominant” countries, like Nicaragua, public health priorities focus on prevention of substance abuse, mental health problems, and chronic physical illness. For both country categories, identifying and implementing scalable prevention strategies are critically important (Patton et al., 2016).

### School-Based Health Promotion

While there are a variety of effective contexts for intervention, school-based preventative interventions are cost effective (Miller & Hendrie, 2008), can be scaled up and disseminated widely (Pettigrew & Hecht, 2015), and are efficacious for reducing risk behaviors like violence and substance use among high-risk youth (Atienzo et al., 2017; Fulu et al., 2014; Kerr-Wilson et al., 2020; Moestue et al., 2013). Dating and gender-based violence, for example, have been effectively prevented through school-based programs in diverse contexts throughout the Global North and South (Atienzo et al., 2017; Fulu et al., 2014; Kerr-Wilson et al., 2020; Moestue et al., 2013). Yet evidence is far more limited among low- and middle-income countries (LMICs), particularly in LAC (Canario et al., 2016; Moestue et al., 2013). In fact, according to extensive global reviews of gender-based violence program evaluations, only one was conducted in the LAC region (Arango et al., 2014; Moestue et al., 2013). The intervention was a community-based group training for male youth (*Program H*) in Brazil, and findings indicate no significant effect on reduction of partner violence (Pulerwitz et al., 2006). Importantly, researcher reflections on implementation processes indicate that many of the major barriers, like low participation rates and difficulty implementing the program in violent/dangerous community settings (Pulerwitz et al., 2006), could possibly be overcome by shifting implementation to a school-based setting. Indeed, school-based prevention programs have been found effective in LAC for other public health issues, such as obesity (Lobelo et al., 2013).

### The Imperative for D&I Research to Improve Health Research and Outcomes in LAC

To improve adolescent health promotion in LAC, scholars and funding agencies are calling for increased EBI research (Kovalenko et al., 2020; Moestue et al., 2013). Astutely,

many agencies also have identified the critical need for D&I research alongside these EBIs to inform development of innovative implementation strategies that improve efficiency, effectiveness, and reach of EBIs in diverse settings (Atienzo et al., 2017; Feinberg, 2021; Ginsburg et al., 2021; Moore et al., 2019; National Institute of Mental Health, 2022; Stevens & Tobin, 2022; World Health Organization, 2015). Emerging research indicates that traditional efficacy trials often lack generalizability, and EBIs tested under these designs often fail to reach full potential when implemented outside of highly controlled settings (Chambers & Norton, 2016). Thus, D&I scientists have mobilized a paradigm shift beyond efficacy trials to pragmatic effectiveness-implementation studies that emphasize real settings and populations, balance internal and external validity, and focus heavily on context to ensure sustainability of implementation (Battaglia & Glasgow, 2018; Leppin et al., 2020; Norton et al., 2021; Stevens & Tobin, 2020). They have also developed D&I frameworks and methods to guide planning and evaluation of D&I outcomes, contextual factors that influence D&I, and processes to adapt EBIs and their implementation strategies for new settings (Hull et al., 2019; Battaglia & Glasgow, 2018). These pragmatic D&I approaches can increase efficiency and effectiveness of EBI translation, avoid wasted funding, improve clinical care, and enhance population health (Battaglia & Glasgow, 2018; Stevens, 2013). However, conduct of D&I research and development of D&I science has lagged in LAC (Atienzo et al., 2017; Carlos et al., 2017; Kovalenko et al., 2020).

To summarize, despite the promise of school-based EBIs to address public health priorities in LAC, guidance regarding strategies for their effective and efficient D&I is limited. This limitation may partly reflect that there are few “how to” guides for conducting rigorous D&I research in LAC. Extant literature on D&I research in the Global South largely comes from African countries (Hatcher et al., 2020; Keogh et al., 2021; Keogh et al., 2018; Kerr-Wilson et al., 2020; Ramsoomar et al., 2021; Stern et al., 2021; Willan et al., 2019). Additionally, reports of this research are limited in scope and do not provide comprehensive reflections on all dimensions of their selected D&I framework. Instead, they discuss only a few select topics (e.g., implementation, building capacity for implementation, engagement of opinion leaders, research uptake, recruitment/retention), which leaves readers without guidance for other important aspects of D&I in those contexts (Bastos et al., 2020; Haberland et al., 2018; Jauregui et al., 2015; Kemp et al., 2019; Silva et al., 2019). Comprehensive reflections about the logistics of conducting D&I research in LAC and in school settings are urgently needed to produce practical knowledge and transferable lessons that can build capacity for increased quantity and quality of D&I research in these understudied settings (Bradshaw et al., 2021; Kovalenko et al., 2020; Pérez-Escamilla et al., 2021).

This will lead to advancements in D&I science throughout the region, and globally, facilitating more effective and efficient advancements towards global health equity.

## Contributions Through Case Studies

To fill gaps in D&I research conducted in LAC and school settings, our team of LAC practitioners and researchers describes and compares our experiences in Nicaragua and the DR. In this paper, we begin by providing readers with brief case overviews of the school-based D&I research that we have conducted in Nicaragua and the DR. Then, we provide more detailed reflections and comparisons of activities carried out in each setting within each dimension of the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework (Glasgow et al., 2019). RE-AIM is one of the most widely used D&I Frameworks to inform planning and evaluation of implementation outcomes and the public health impact of an EBI (Shelton et al., 2020). We integrate reflections from existing literature alongside discussions of our experiences.

By discussing these two case studies, we aim to describe transferable processes (Trickett et al., 2011), not just offer a list of best practices that may be context dependent. Thus, readers can make “naturalistic generalizations” (Stake, 1995) or find applications from our experiences that might resonate with their own contexts and implementation aims. We acknowledge that while there are some similarities across LAC, there are national differences as well as heterogeneity within countries. For example, different social systems, governmental structures and supports, cultures, and histories can limit the generalizability of our experiences. Yet, we expect that by describing our own challenges, mistakes, and successes, other researchers and practitioners will be able to learn from and apply them best to their own environments and circumstances.

## Case Comparison Procedures

At the outset of this project, the first and second authors held two brainstorming meetings. They verbally shared, debriefed, compared, and contrasted challenges and successes experienced during their D&I research in Nicaragua and the DR. Content of these discussions was based on notes, memories, and meetings which took place during the projects. They also discussed potential frameworks that could be used to organize the cases. Ultimately, RE-AIM was selected, given its widespread use in D&I research and its utility for organizing experiences related to its five dimensions of public health impact. After these initial meetings, the first two authors independently drafted case reports and

outlined experiences specific to each RE-AIM dimension. These drafts were reviewed and modified with our Nicaraguan and Dominican collaborators/co-authors. Then, the first authors read, critiqued, and edited each other’s drafts. They met via video conference to collaboratively develop summaries for each RE-AIM dimension. These reflective practices provided a structure within which our team could detail our experiences and processes, with the aim of contributing to the literature on the “how-tos” of doing D&I research within in LAC school contexts. The final paper was critically reviewed and approved by all collaborators.

## Case 1: Implementation Research with Substance and Violence Prevention EBIs in Nicaragua

In Nicaragua, Pettigrew and Castillo have worked together with many other local partners since 2013 to adapt, implement, and widely disseminate school-based drug and violence prevention programming (see Pettigrew et al., 2016). Their experiences include adapting the *keepin’ it REAL* (Hecht et al., 2006) and *Fourth R* (Wolfe et al., 2009) school-based EBIs and their implementation strategies to match the cultural context of youth and the private school system in Nicaragua. Following a process of cultural grounding (Colby et al., 2013), the team adapted the EBIs to the Nicaraguan youth culture. After obtaining ethic approval from the University of Tennessee institutional review board (IRB), formative research commenced. This included narrative interviews with youth to learn about situations where they encountered drugs and violence. The interviews also sought stories about the strategies used by teens to handle these situations. Focus groups with teachers were also employed to learn about the suitability of the program for the local school systems. Based on these findings, adaptation to the content and format were made during a week-long curriculum writing conference. The conference included Nicaraguan natives and residents along with original developers of the EBI curricula. Together, they integrated findings from the formative work into the revised curriculum. Once the revised curriculum was created, it was provided to Nicaraguan teachers for independent expert review. Ultimately, reviewers were satisfied that the curriculum mirrored the experiences of the youth they served and fit well with their school’s structures. Minor suggestions for revisions received from experts were incorporated into the final version of curricula. In addition to the written materials, the team produced six videos with Nicaraguan youth. These videos were scripted and filmed in Managua by Nicaraguan youth and with novice actors, who participated in training workshops with a professional producer. This helped create authentic content, dialect, expressions, and situations. Videos were then edited and

finalized through post-production before being distributed with teacher manuals and student workbooks.

The fully adapted program included two different curricula under the title, *Dale, se REAL* (DsR). The 7th grade program based on *keepin' it REAL* included 20, 45-min lessons and focused on drug prevention. Lessons covered critical thinking, decision making, assertive communication, and drug offer refusal strategies. Additional training on socioemotional learning (e.g., empathy, expressing feelings, understanding how feelings impact decisions, etc.) was integrated throughout the curriculum. An 8th grade program based on the *Fourth R* included 22, 45-min lessons and reinforced training on critical thinking, decision making, and communication skills. The 8th grade program focused on healthy relationships and incorporated training on handling conflict, media literacy, and sexual transmitted infections.

In 2015, after the customized DsR curriculum was fully developed, it was implemented. Castillo led a team of local staff who recruited private schools from Managua, Masaya, and Granada to deliver the program to their students and to participate in a study about program impacts. Because of a funding restriction, only private, non-public schools could be recruited to participate in the study. In total, 24 schools and youth-serving organizations agreed to implement the program and participate in a quasi-experimental effectiveness study of the adapted program. The team trained 59 teachers to deliver the seventh and eighth grade curricula and provided signed and stamped training certificates to each teacher. They then delivered DsR in their schools and reached 1300 youth while our team tracked their implementation quality (e.g., fidelity, student engagement) through observations, interviews with teachers, and post-implementation focus groups. The team tracked student outcomes through surveys.

As detailed in the final technical report (Pettigrew et al., 2016), analysis of the mixed-methods data on effectiveness and implementation showed positive effects. Overall, youth who received a program delivered with high fidelity were significantly better off than those who did not. Data indicated a positive linear relationship between youth age and drug use, but for youth in the high-fidelity implementation group, this trend flatlined. In the low-fidelity implementation group it did not. The effectiveness of the program was corroborated by teachers who reported changes in their students' behaviors. For example, two teachers from a community organization shared that their kids liked the classes overall. The teachers were very happy to see improvements in their students' behaviors. Another school teacher shared that incidents of bullying decreased after the eighth grade lessons and that students had become more assertive and less tolerant of bullying behaviors from others.

Funding for the project ended in January 2016 and Pettigrew transitioned to Arizona State University. New

funding was secured to expand the reach of the program and extend its scope. In addition, funding allowed the team to evaluate the sustainability of the program. Arizona State's IRB reviewed and approved this study protocol. In fall 2016, schools that participated in the 2015 study were re-recruited to share what they had done after the initial funding ended. New schools outside of the original cities were also recruited. Implementation began in Leon, Chinandega, Matagalpa, and Rives along with Managua, Masaya, and Granada. Like before, funding restrictions precluded partnering with any public schools, so only private schools were recruited. The project's geographical expansion followed a similar model to what was used before, with local liaisons who recruited schools in the different areas. These efforts resulted in an implementation infrastructure that grew to over 100 schools and non-governmental organizations across the country. The team trained 482 school teachers, psychologists, directors, and volunteers to deliver the seventh and eighth grade DsR program and reached an additional 14,518 youth from 2017 to 2019. In addition to widely disseminating DsR, the team also implemented a family-based intervention in partnership with schools. In 2018, in response to social crisis in Nicaragua, the team developed new curriculum content that was distributed to participating schools (Pettigrew et al., 2019).

Overall, our team gained experience adapting two EBIs to fit Nicaraguan youth and schools, developing new curriculum content, implementing the program in private schools, and widely disseminating the program. The team observed implementation quality, studied program effects, and evaluated sustainability. Pettigrew and Castillo garnered extensive experience with international collaboration, cross-cultural communication, and administration across different university, funding, and cultural systems. While these activities were taking place in Central America, colleagues in the Caribbean nation of the DR were also learning about D&I of school-based healthy relationships promotion in LAC.

## Case 2: Implementation Research on Holistic Violence Prevention in the DR

In the DR, Luft has partnered with multisectoral government and civil society organizations since 2014 to develop a robust implementation logic model for delivering the school-based healthy relationships intervention, *Fourth R* (Wolfe et al., 2009). Her D&I research in DR began with a focus on identifying needs related to healthy relationships, which was used to inform EBI selection and adaptation. After approval by the Columbia University IRB and local DR National Council of Bioethics in Health (CONABIOS), Luft conducted an initial mixed-methods study with 100 Dominican women in collaboration with Clínica de Familia La Romana.

Their team identified that gendered power in relationships, partner violence, and corresponding mental health consequences impact health behaviors and safety in relationships (Luft et al., 2020). Findings from their study and observations/experiences that emerged while living in the DR suggested a high prevalence of partner violence and substantial impact of victimization on health. To further explore this connection, Luft led a team to perform secondary analysis of national-level data from DR women ( $N=5803$ ). Findings confirmed associations between partner violence and substance misuse, sexual health concerns, and cardiometabolic conditions, in addition to highlighting the particularly deleterious impact of psychological violence (Luft et al., 2022a, 2022b, 2022c). Findings from this work and other national studies suggested that to effectively address priority public health issues faced by the DR, a holistic health promotion intervention would be needed. To identify potential strategies to increase participant engagement with a health promotion intervention, Luft also analyzed characteristics of the most popular DR YouTube videos ( $N=421$ ). She found great interest among viewers in content that including comedy/humor, games (e.g., challenges, game shows), stories/storytelling, and guest interviews. Strategic use of these strategies for packaging intervention messages could also improve DR participant engagement with the intervention material.

In 2018, Luft began a partnership with Canario and the DR Ministry of Education to understand how to best promote healthy relationships among adolescents and prevent violence and related risk behaviors (i.e., substance use, risky sexual behaviors). They elected to work with the holistic *Fourth R* school-based EBI for students in seventh grade, which includes 21 lessons over 3 modules (personal safety and prevention of injuries, prevention of substance use and addiction, human development and sexual health) and focuses on positive youth development through strengthening socioemotional capacities. Importantly, the *Fourth R* was effective at reducing peer and dating violence and delaying sexual activity among Dominican students in the Bronx (Cissner & Ayoub, 2014).

Luft and Canario's collaboration with the DR Ministry of Education has focused on adaptation of the EBI for DR adolescents and its implementation strategy for DR public schools. Their first collaborative endeavor was a mixed-method study with DR adolescents from four public schools, which was approved by the University of Wisconsin-Milwaukee IRB and DR Eikos Bioethics Committee. Analysis of adolescent survey data ( $N=233$ ) showed relationships between adverse childhood experiences—particularly physical child abuse and domestic violence—and an increased risk for depression, anxiety, and perpetration/victimization of physical and emotional dating violence (Luft et al., 2022a, 2022b, 2022c). In 2021, Luft was awarded a Fulbright US Scholar grant to build on this

work and expand knowledge about D&I of *Fourth R* in the DR. She continued partnering with Canario and the DR Ministry of Education to conduct an analysis of mixed-methods data from schools (70 students, 20 personnel) and community stakeholders (112 parents, religious leaders, and multisectoral professionals). This study was approved by the University of Texas Medical Branch IRB and DR Etikos Bioethics Committee. Overall, findings indicated adaptations to the EBI would be needed to address early unions (i.e., child marriage), particularly with older partners and tourists, and increase reporting of violence by victims and bystanders. There was also overwhelming consensus that the *Fourth R* implementation strategy in the DR would need to include education of and program planning with parents, school personnel, and religious leaders to improve effectiveness, adoption, and maintenance of *Fourth R* implementation and effectiveness outcomes.

Most recently, Luft and Canario have partnered with the DR Ministry of Education to conduct implementation mapping. This novel D&I method guided translation of findings from their formative research and needs assessments to design an evidence-informed “implementation playbook” of strategies to effectively deliver the *Fourth R* in DR public schools (Cook et al., 2019; Crooks et al., 2015; Luft et al., 2022a, 2022b, 2022c). The implementation playbook was presented, discussed, and revised with the DR Ministry of Education using a Community Engagement Studio (Meharry-Vanderbilt Alliance, 2019). As of 2023, Luft and Canario have various grant applications under review to fund adaptation and pilot testing of the implementation strategy they developed. For adaptation, they have proposed a series of community engagement studios, which entail collaborative input from community stakeholders to create draft Version 1.0 of the adapted *Fourth R*. Following these studies, theater tests (i.e., mock demonstrations) of each *Fourth R* lesson and implementation strategy will be performed. Data about the acceptability, appropriateness, and feasibility of these demonstrations is planned through brief surveys (Weiner et al., 2017) and the nominal group technique (McMillan et al., 2016) to inform the next version of the adapted program. Grants also would fund a feasibility test of *Fourth R* in four schools using a 1-arm, within-group design with a one year follow-up to evaluate *Fourth R* implementation (e.g., teacher implementation fidelity, cost, maintenance), effectiveness (e.g., bullying, dating violence), alongside contextual influences on these outcomes.

## RE-AIM: Case Comparison

Given our parallel yet distinct experiences, and our long-term investments in advancing D&I research and science in LAC, we have distilled several observations, which we

organize using the RE-AIM framework (Glasgow et al., 2019).

## Reach

“Reach” refers to the number (i.e., sample size), proportion (i.e., participation rate), and representativeness of individuals who participate in and complete the EBI (Glasgow & Estabrooks, 2018). Representativeness refers how similar or different individuals who participated and completed an EBI are to those who did not, despite their eligibility. Our experiences highlight three aspects of reach in LAC: recruitment practices, access to target populations, and study enrollment barriers.

## Recruitment Practices

Both of our projects sought to recruit participants for adaptation and evaluation of school-based programs to produce materials and protocols that would be acceptable, appropriate, and feasible (Weiner et al., 2017) among local youth populations. In Nicaragua, we recruited students from sixth through ninth grades from a diverse array of backgrounds, including rural and urban students from public and private schools who represented various socioeconomic strata. Interview data was used to inform cultural adaptation of EBI content and materials (Colby et al., 2013). When it came to producing videos for the EBI, however, the schools and students who ultimately participated were primarily from the capital city where we filmed the videos (even though we bussed some student actors from rural areas to the filming site). These biases were evident in language, because residents of the capital have a particular dialect, reflected in the student-actor’s speech. Thus, while attempting to adapt the EBI to be representative of Nicaraguan adolescents, we faced limitations around the regional diversity within the country.

This experience draws out a perennial question: how universal or local should interventions and implementation strategies be? On the one hand, a “universal” intervention or implementation strategy should work for anyone and anywhere. From that perspective, programs developed in the Global North should apply equally well in the Global South because they are premised on universal human experiences and behaviors. On the other hand, interventions need to be specific to a target population and setting. Content, materials, format, design should match local expectations, abilities, and culture. Barrera et al. (2011) provide a continuum from indigenous interventions to researcher-developed interventions that captures this tension. The

fact that even after culturally grounding the DsR program for the Nicaraguan, Spanish-speaking youth population there were regional differences points to the need for D&I researchers to clearly articulate which aspects of an EBI and implementation strategy can be tailored, how, and to what extent without altering the key mechanisms responsible for effectiveness of an EBI or implementation strategy. Accommodating heterogeneity in implementation settings may also be achieved by creating an evidence-based implementation “play book” or implementation “bundles” from which users can choose, based on their specific needs. This could be achieved through implementation mapping (Fernandez et al., 2019a, 2019b) or through type 3 hybrid effectiveness-implementation trials that focus on comparing implementation strategies rather than EBIs (Curran et al., 2012).

In the DR, modest funding for formative research also limited recruitment of schools (directors, teachers, students) to inform adaption of the EBI content and implementation strategies. Resources allowed data collection from two middle schools and two high schools in the southern region of the country, which were in either urban or semi-urban communities. Thus, schools in rural, boarder, and tourist towns were not represented. To compensate for this limited scope, we followed up with another study that included community stakeholders from multiple sectors and multiple regions. Resources were again limited, but we included participants with diverse perspectives to share about adolescent relationships or school-based implementation. We used data collection tools like in the initial study but expanded our samples to include adolescent parents/guardians, religious leaders, representatives from the Ministries of Education and Labor, lawyers, police, firefighters, health clinicians, and organizations dedicated to adolescent education, development, and violence prevention. This data substantially expanded the depth, breadth, and representativeness of knowledge about school-based implementation and adolescent health in DR.

Another consideration for reach in the DR and Nicaragua was limited representation of subpopulations. In the DR, for example, Haitian adolescents represent a growing and highly vulnerable population. They also exhibit some health needs that are distinct from other DR adolescents, and many face barriers to attending school. In Nicaragua, the program was adapted with and for the Spanish-speaking, predominantly Mestizo population in the West, which was not representative of the predominately Afro-Caribbean population in the East. Similar to barriers in the DR, challenging transportation between the East and West, language and cultural differences, and limited funding created barriers to reach. Like most projects, pragmatics influenced the research design (Maxwell, 2012) and directed what aspects of reach were privileged in our research.

## Access to Target Populations

Reach was also impacted by the different ways we accessed schools and our target youth populations. In the DR, formative research was conducted in collaboration with Ministry of Education (Luft et al., 2022a, 2022b, 2022c). The DR Ministry of Education is the governing body of all public schools throughout the country in a school system that is highly centralized and rigidly hierarchical. Thus, with adequate support and buy-in from the Ministry of Education we could achieve extensive reach for adaptation, implementation, and dissemination of school-based EBIs. Conversely, in Nicaragua funding stipulations precluded working with the central government, including its Ministry of Education and affiliates. These stipulations prevented us from recruiting, training, or delivering a program to publicly funded schools, which most of the youth in Nicaragua attend. Thus, whereas in the DR we worked through an existing educational infrastructure, in Nicaragua we developed a new implementation infrastructure. We did this by hiring local liaisons to recruit and maintain relationships with the schools in different areas. We found that having local Nicaraguans, who had grown up in the same area where the schools were located, was an important and culturally appropriate way to connect with schools in an area. We invested in training a team of skilled liaisons who then recruited broadly from their respective geographic areas. We also intentionally recruited diverse schools. For example, monthly tuition for the schools ranged in US dollars from \$1 to over \$700 (Lu et al., 2020). Our different, country-specific avenues for working with schools impacted reach.

## Study Enrollment Barriers

Another “reach” issue that our teams encountered was related to our consent and enrollment protocols. In high-income countries throughout the Global North, many people are familiar with surveys and research protocols. From store purchase receipts to classroom evaluations to direct-mailing polls, individuals often are bombarded with requests to provide data. This is not the case in the LAC settings where we worked. As one school representative in Nicaragua stated, “Parents said the program was helpful for their kids but some of them did not allow their kids to participate in the surveys, since the survey consent sheet was too full of explanation that it made parents feel uncomfortable of giving us permission to collect information” (Pettigrew et al., 2021, p. 360). Further, the sociopolitical history of both countries includes extensive political corruption and state-level violence, according to the U.S. Agency for International Development (USAID) (2021). In a ranking of the rule of law ranked from best (1st) to worst (139th) by the World Justice Project (2021) the DR ranks 94th and Nicaragua ranks 131st.

This level of corruption has bred a legacy of distrust among these societies, even of institutions that are designed to protect their wellbeing like ethics committees. To be clear, we fully support ethical research practices, especially informed consent/assent, benevolence, and respect for persons. However, the formality of the language used to describe research procedures, which was required by some of the university review committees, did not inspire the same trust or confidence that it typically does among potential participants in the Global North. It may, in fact, have fostered a perception among participants that data collection was more threatening and potentially harmful than it was. This is an area where the Global North can learn from the Global South. Developing appropriate protocols and culturally specific ethics approvals is an important future consideration for school-based projects in the LAC region where trust is personal and relational, not something that comes from signing a document.

Ethics issues surfaced particularly in terms of passive (opt-out) versus active (opt-in) parental consent. In Nicaragua, two different ethics review committees oversaw the project. One required active consent and the other passive consent. Evidence shows that using passive parental consent increases response rates compared to active parental consent protocols (Priest et al., 2012). One of the largest school-based epidemiological research projects ever conducted compared response rates for adolescent centers (e.g., schools) in 56 countries requiring either active or passive consent; they report a median decrease of 13% when centers moved from passive to active consent and in their LAC site—Buenos Aires, Argentina—this change in protocol resulted in a fall in response rate from 88 to 42% (Ellwood et al., 2010). For the Nicaraguan study, moving from active to passive consent procedures improved response rates from around 55% to over 90%, which necessarily improved reach.

Passive consent was used in the DR studies, and almost all students participated in data collection. In fact, only one participant informed us that their parent did not want them to participate. Adolescents were provided with a study information sheet to take home to their parent/guardian to review, which included information about how to opt-out their child if they did not wish for them to participate (i.e., call, text, email principal investigator). We also implemented a mechanism to protect students who were minors, as research subjects. This was a qualified social worker who was not part of the research team, but who monitored the recruitment and assent process with students. The social worker was responsible for verifying the level of understanding among students about the study purpose, requirements if they decide to participate, meaning and process of voluntary informed assent, and provision of voluntary consent on the day of data collection.

Passive consent was critical for achieving high response rates in both the DR and Nicaragua, particularly in schools that serve predominantly low-income families. It can be challenging to bring parents in before, during, or after the school day due to barriers including work schedule and cost of transportation. Thus, removing enrollment barriers, and implementing alternative procedures to protect minors, allowed for a larger and more representative sample. Further, the general community in these two settings has limited exposure to research and low level of trust that protocols will be followed to protect their identity and data, leaving some to fear that private information will be exposed to the public. For these reasons, active parent consent can be a barrier to representative participation, and ultimately lead to underestimating the severity and prevalence of public health issues.

## Effectiveness

“Effectiveness” refers to the impact of the intervention on target health or behavioral outcomes (Glasgow & Estabrooks, 2018). It also includes evaluation of unintended or negative impacts of an intervention related to the participants’ health and quality of life or financial implications. The Society for Prevention Research has set standards for defining and measuring efficacy, effectiveness, and intervention scale-up readiness (Gottfredson et al., 2015). Within the field of D&I sciences, best practices are also proposed for pragmatic evaluation of the effectiveness and cost effectiveness of EBIs (Berkel et al., 2011; Crowley et al., 2014; UNODC, 2018; Wandersman et al., 2008). In our contexts, we encountered different constituencies who approached effectiveness on their own terms using different metrics. In this section we present challenges of determining priority outcomes and evaluating effectiveness, alongside some of the strategies we used to overcome these challenges.

## Priority Outcomes

In business, leaders are encouraged to “clarify the win.” From our experience, this was different for various stakeholder groups. For example, a win for our Nicaraguan funders was generating a culturally appropriate EBI. After adapting the program, priority outcomes for funders reflected adoption (i.e., number of trained implementers) and reach (i.e., number of program participants). For our research teams in Nicaragua and the DR, these were also applicable goals. Yet we, and many of our local school stakeholders, wanted to ensure that the program positively impacted health attitudes, values, and behaviors. Thus, we found it important to clarify target outcomes and craft an evaluation plan that strategically incorporated multiple goals.

For our Nicaragua project, funders required a detailed monitoring and evaluation plan to outline objectives, indicators, data sources, timelines, and responsible parties for measuring and accomplishing these objectives. This plan was very helpful and enabled us to incorporate metrics relevant to our constituents (e.g., reach, adoption) while also identifying targets for proximal and distal effectiveness goals for health outcomes. For our DR project, we used implementation mapping. These methods facilitate stakeholder-engaged evaluation planning that is informed by theory and empirical evidence (Fernandez et al., 2019a, 2019b). Mapping also generated a logic model of change that highlights priority behavioral, environmental, and implementation outcomes and corresponding performance objectives (sub-behaviors), determinants, and actors for evaluation. Luft created a draft of the model based on formative research, behavioral theory, and insights gained through ongoing WhatsApp conversations with leaders at the DR Ministry of Education. During a three-hour Zoom meeting, she systematically discussed target effectiveness and implementation outcomes with a key informant at the Ministry of Education. Final decisions were made by balancing current strategic priorities for the DR Ministry of Education, top concerns identified in formative research, and what grant reviewers would be looking for (outcomes for which *Fourth R* has been found efficacious or for which established implementation measures exist).

## Effectiveness Evaluation

While many agree that the “gold-standard” or intervention assessment for school-based interventions is a randomized cluster trial that accounts for nested individuals within school settings, this type of assessment was difficult if not completely impossible within the Nicaraguan private school system. We faced challenges related to cultural practices. There are no “school districts”, per se. It is also common for parents to remove their students either during or after a school year for a variety of reasons (e.g., expense, disgruntled with learning outcomes, unsatisfied with peer relationships, parental migration, etc.) and enroll them in a different school. This level of volatility made tracking students difficult. It also muddied the school-level data as some students may have received part, but not all, of an EBI, which can be problematic for effectiveness evaluation (Pettigrew & Gal, 2018). Alternatively, a few students reported receiving the intervention twice, at two different schools, which can also impact effectiveness.

To mitigate these changes, it may be advisable to assess students only during a school year (i.e., long-term follow-up may be difficult) and to focus effectiveness evaluations primarily on changes in proximal health outcomes. Using unique identifying numbers to link waves of data is possible.



However, it was also helpful in Nicaragua to include self-report items in post-intervention data collection that assessed if participants completed the intervention. Obviously, this method introduces a recall bias into data, but it also helps prevent inaccurate school-level data. Another strategy is to utilize a different paradigm for assessment. Rather than aim to test proximal outcomes, program mediators, and distal outcomes at a long-term follow-up, it may be expedient and advisable to follow a more pragmatic evaluation (Pettigrew & Gal, 2018; Wandersman et al., 2016). This may capitalize on indirect data collected routinely by schools as a way to test impact while avoiding undue burden through additional surveys administered by the research team (McCord et al., 2018). In some LMICs, like Nicaragua, there may not be ready access to systematic data collection and monitoring. In the DR, however, partnership with Ministry of Education has allowed the team to explore the availability and quality of data routinely collected by schools for use in evaluation. Multiple types of data collection (i.e., mixed methods, school, and individual level) also can help provide some credibility to claims of effectiveness when randomized cluster trials are unwarranted or infeasible (Battaglia & Glasgow, 2018; Norton et al., 2021). In all contexts, there is a call for finding or developing creative, relevant, and culturally appropriate solutions for examining EBI effectiveness.

### Data Collection

Considering how data are collected is important. Who administers surveys, interviews, or observations as well as when and where these procedures take place are important considerations. Within a given culture, is it necessary to have a chaperone for youth interviews? Matched-sex interviewers? Understanding cultural norms will enable appropriate data collection as a coordination between research standards, largely based in values of the Global North, and culturally appropriate praxis.

In Nicaragua, and initially in the DR, paper and pencil surveys were used, with computerized data entry occurring later. In the DR, the team opted to have participants complete online surveys on their personal digital devices through Wi-Fi access (via mobile hotspots) provided by the research team. Yet, some students do not have or are not allowed to bring their cell phones or other digital devices to school. In situations where participants had phones and were allowed to use them, other issues emerged. They may not have had sufficient battery life to complete the survey, or their phone did not have the capacity to read the survey QR access codes. Additionally, not all students have data plans on their devices and even many schools do not have widely available Wi-Fi. Further, depending on the location of data collection, the Wi-Fi signal may be weak, causing delays due to slow servers

or intermittent internet connection, which resulted in participants restarting the survey. Consequently, we found it is necessary to provide participants tablets that have an offline survey option available, so they could access and complete the survey without the need for Internet. This data collection approach is a compromise. It is resource intensive (e.g., cost of technology, substantial involvement of research team), but it mitigates some of the issues with data quality.

### Measurement

Many instruments to measure effectiveness, and implementation, are developed with populations in the Global North, but only some have been validated among populations in LAC. Our experiences underscore the importance of selecting appropriate measures. We recommend that local experts are actively involved in this process. Additionally, given the lack of exposure to surveys by many participants in the countries where we worked, we believe formatting measures/surveys in ways that are accessible to participants is critical to quality measurement. For quantitative surveys, this is an ever-evolving calculus that considers culturally familiar technologies, translation and wording of questionnaire items, response options and ranges, as well as culturally validated measures. In other words, adapting social measures involves more than translating items for semantic equivalence. For our DR research, we have found that the TRAPD model (translation, review, adjudication, pretesting, documentation) for translation has been particularly effective for creating appropriate Spanish measures (Harkness et al., 2003). For other aspects of survey adaptation, we identified community engagement studios with local expert consultants (Meharry-Vanderbilt Alliance, 2019) and the nominal group technique (McMillan et al., 2016) to be particularly promising methods. Another promising tool is the Stakeholder Engagement Navigator webtool ([www.dicemethods.org](http://www.dicemethods.org)), which helps identify the most useful community engagement methods for research based on a group's adaptation purpose, budget, available time with stakeholders, and total number of interactions (Kwan et al., 2021).

Analysis of data should also incorporate values and standards of cultural insiders, not imposed standards from cultural outsiders. Researchers in all locations should build capacity to analyze their own data and to secure access to public databases for analysis. Outlining the “ownership” and management of data at the outset of projects is one strategy to accommodate this need. All reports produced from D&I research should also be developed in collaboration with local partners to insure accurate interpretations and useful recommendations.

## Adoption

“Adoption” refers to the number, proportion, and representativeness of settings (e.g., schools) and intervention agents (e.g., implementers) that decide to implement an EBI (Glasgow & Estabrooks, 2018). D&I research may also explore reasons why certain settings and intervention agents chose to adopt the intervention while others did not (e.g., resources, prepared staff, buy-in). Understanding why variations in adoption exist between settings provides critical insight into the current and future public health impact of an EBI. We identified five considerations for adoption of school-based programs in Nicaragua and the DR: sociopolitical context, school-based hierarchies, financial costs, limited technology, and training qualified personnel.

## Sociopolitical Context

Dynamic social, national, and political factors impacted school’s receptivity toward adopting our school-based health promotion EBIs. In some cases, adoption was facilitated and in other cases it was hampered. In the DR, stakeholders expressed concern that religious influence within the school system would pose challenges to using an EBI that included content on gender, sexuality, and sexual health. The DR’s Concordat between Catholic Church and government allows the church to influence public institutions (Tejada Yangüela, 2010). Because Catholic doctrine teaches that sex is reserved for marriage and that God created only males and females, teachings that addresses sexuality and gender in ways that disagree with this doctrine are often rejected. Similarly, some private Catholic schools in Nicaragua took issue with lessons that covered sexually transmitted infections. Some schools determined not to participate in the program whereas others agreed to teach the program by focusing on abstinence as the only 100% effective strategy for preventing infection. Working within social structures to focus content on aspects of EBIs that can be endorsed by both the Catholic Church and the public schools may be needed. For example, content addressing healthy sexuality may be removed and left to be covered in religion class or content can be adapted to focus on a variety of questions to consider about Catholic values and the Catholic faith (Crooks et al., 2015). In our DR research, we found that intentionally and intensively involving members from the church in the core planning and adaptation team was an effective way to develop trust with the researchers, create accurate understanding about the content and purpose of the EBI, and ensure content is presented in a way that is accurate and respectful to

all religious beliefs and preferences. More generally, our experiences point out that EBI adoption can be impacted by broader social forces and structures.

Another example of social forces comes from an ongoing sociopolitical crisis that started in Nicaragua in 2018. Social unrest erupted in Nicaragua when the government passed several laws that decreased social security payments and increased taxes, angering thousands of citizens and resulting in protests. Hundreds of people were killed during the crisis. This crisis shut down schools for weeks and when they re-opened, they were prevented from teaching anything beyond the most crucial subjects that year. Simultaneously, the crisis re-emphasized the importance of healthy relationships. To facilitate adoption and support schools in response to the crisis, our team developed new lessons about coping and resilience through forgiveness.

## School-Based Hierarchies

In both Nicaragua and the DR there are hierarchical structures within schools and the school system that affect adoption. Much like obtaining adequate “reach” in the DR, adoption of a new curriculum depended almost exclusively on buy-in and support from Ministry of Education. For example, in most cases we were able to speak with school principals about our intervention after presenting a physical letter of support from the Ministry along with a letter of support from the respective school regional and district directors (Luft et al., 2022a, 2022b, 2022c). One principal required the physical presence of a representative from the school district prior to holding a meeting with our research team. Our experiences also have shown that Luft’s ongoing physical presence in the DR has facilitated spontaneous in-person meetings and presentations about the project, as well as consultation on topics related to the area of research. These ongoing relationships have been instrumental for developing trust, buy-in, and commitment from leaders within the Ministry of Education. Further, maintaining consistent contact via WhatsApp chat about project topics along with bridging professional with personal relationships has also facilitated smooth relationships with many in the DR public school system.

In Nicaragua, there also was hierarchical decision making, but for private schools, the top of the hierarchy was the school director. If directors did not approve the curriculum, then it was not adopted (Pettigrew et al., 2021). Thus, our recruitment process usually included a written agreement. To add both accountability and to increase publicity of the intervention program, we obtained formal commitments during public “signing” events. These were photographed or videoed and uploaded to Facebook. When the National Youth Scouting organization signed their agreement to participate in the program, they invited the national television

station to attend, and the signing was aired on the nightly news. Together these experiences highlight the importance of relationships and working within appropriate social structures.

### Financial Costs

In Nicaragua and the DR, we licensed EBIs with permission to adapt, reproduce, and distribute the curriculum. This enabled us to offer the program to schools and ultimately deliver it to students at no cost to them. We printed teacher manuals and student workbooks for schools to facilitate implementation. Additionally, we created electronic copies of all these materials for the schools. These steps encouraged adoption because they removed the barrier of intervention cost. They also served to gauge schools' interests in continuing the program inasmuch as they invested in producing new student workbooks or innovating ways to continue the program within their own means (e.g., reusing student workbooks by having students complete materials in their own notebooks). In both countries, funding from the U.S. covered the cost of programing and evaluation. In situations where these funds are not available, particularly in low-resource settings, many turn to cost-free programs which may or may not include theory-informed and evidence-based practices. Our experiences confirm that a persistent issue for adoption of EBIs in LMICs—including those in the LAC region—is financial cost. Thus, it is essential that implementation research conducted in these contexts include pragmatic implementation cost evaluations (Cidav et al., 2020) and reporting (Pinnock et al., 2017).

### Technology

Another consideration for adoption was limited technology in schools. Because the Nicaragua DsR curriculum and DR *Fourth R* program include videos as teaching materials, schools had to find ways to show these videos to students. We provided videos on flash drives and on DVDs. Based on focus groups with teachers prior to adaptation, this was considered feasible and reasonable. However, there were some cases where technical difficulties or access issues prevented implementation (e.g., multiple teachers simultaneously scheduling use of the singular TV/DVD technology set for the school). Some schools in Nicaragua reported uploading videos to YouTube so they could be easily shown on a phone or tablet. Teachers would also provide these links to students and ask them to watch videos on their own time outside of school. While not applicable to every EBI, technology considerations were important part of adopting and implementing in both the DR and Nicaragua.

### Training Qualified Personnel

A final consideration for adoption was finding time and personnel for the curriculum. In Nicaragua and the DR, schools (public and private) are required to teach human development and/or civics. Whereas in private schools there was some flexibility around the general focus and the specific curriculum of these classes, in public schools this was dictated by the state. For example, in the DR, many schools related, “this seems like great program, but you will get nowhere unless Ministry of Education approves of it.” We found that it was critically important to gather options from school personnel during our formative research about where the *Fourth R* could fit their educational curriculum. We shared these options with leaders who often expressed resistance about this aspect of *Fourth R* implementation. In Nicaragua, the scheduled civics classes created a regular time where the DsR curriculum naturally aligned with the schools' structures and mission.

Many teachers were thankful for a “boxed set” (ready-made) curriculum that could guide their classroom time. Teachers often resorted to internet searches for lesson plans and then piecemealed various free resources into a curriculum. Thus, providing a systematic evidence-based resource with detailed lesson plans and teaching aids promoted adoption. Moreover, many teachers in Nicaragua saw the DsR training as a professional development opportunity, as they rarely had a chance to learn from peers and implement student-centered techniques.

### Implementation

“Implementation” refers to the how closely and consistently the program is followed as intended, time devoted to an intervention, and costs of implementing the intervention (Glasgow & Estabrooks, 2018). As Pettigrew and Gal (2018) point out, effective implementation is practically as important as effective content. As such, adaptations need to be made to ensure fit of EBIs and implementation strategies with each new context. Plus, planning, training, and ongoing support are keys to excellent implementation. While adoption was hierarchical in our LAC settings, determined by school principals or the Ministry of Education, implementation depended on school teachers and staff.

### Encouraging High Implementation Quality

In both Nicaragua and the DR, school system stakeholders expressed a need for extensive teacher training to prepare them for quality implementation. Behavior-change programs often rely on student-centered teaching methods (Pettigrew et al., 2013). In Nicaragua and the DR, however,

these types of student-centered, active learning program elements diverge significantly from didactic teaching practices where students write in notebooks what their teachers dictate. These traditional hierarchical classroom structures offer limited experience with horizontal, student-focused teaching methods, and teachers we met were not trained in these classroom techniques. Thus, the teacher training was modified in both contexts to include additional information and role play opportunities to build capacity for the teaching practices required for the EBIs. In the DR, we are also planning to include an implementation strategy that provides ongoing support to those involved in implementation of the *Fourth R*. To leverage existing communication structures and honor the limited time and energy of school teachers and staff, we imagine this may take form as a WhatsApp group to which all *Fourth R* teacher implementers, implementation coordinators, and champions across the DR are invited and can receive peer and professional support. In the DR, school counselors and psychologists are traditionally charged with teaching healthy relationship topics. Thus, another suggestion from the Ministry of Education was to have psychologists be present during each *Fourth R* lesson to support teacher implementers in managing classroom dynamics, facilitating dynamic activities, and responding to student questions the teachers may not feel prepared to answer.

### Monitoring Implementation

In the face of teaching strategies and curriculum content that may be novel for many teachers, monitoring implementation fidelity and providing supportive feedback on delivery was important for both settings. It helped prevent curriculum drift and negative adaptations. Yet, measuring implementation was difficult. In Nicaragua, schools were dispersed across seven cities with limited staff and infrastructure to support implementation assessment. Studies in the U.S. have used video recording equipment and a memory cards which teachers mailed to research staff after filming each lesson (Pettigrew et al., 2013). This type of infrastructure (i.e., mail system) is not available in Nicaragua, the DR, nor in many other LMICs. Further, providing relatively expensive equipment to teachers would create a safety threat (e.g., theft, pawning/resale). Thus, assessments of implementation quality and fidelity were limited to in-person evaluations. With a research staff of seven matched to 100 schools, each teaching 20–22 lessons per grade across the year, this created 4000+ lessons to potentially evaluate for implementation quality and fidelity. Further, travel to different schools, which often delivered lessons simultaneously (i.e., the same days/weeks), would require staff to be in 12 places at once! Following Global North methods was impractical and infeasible given research staff limitations.

Assessing fidelity in LAC will require novel methods or may need to focus on providing ongoing implementation coaching rather than evaluation. Nicaraguan teachers, for example, are often trained in content areas, but not offered pedagogical resources or training. For our team, implementation assessments ultimately became an opportunity for coaching toward best practices for program delivery. Using basic motivational interviewing techniques, our staff debriefed lessons with teachers and offered pointers for continued professional development. Rather than assess implementation quality, our team sought to support positive and effective implementation experiences through coaching. Another strategy employed in the DR was to gather mixed-methods data on implementation—at multiple time points and from diverse sources (i.e., teachers, students, research team observers)—to triangulate findings. This may overcome some of the limitations of self-report data related to social desirability bias as well as improve implementation monitoring.

### Maintenance

“**Maintenance**” refers to when an EBI becomes operational within the new context and how long it is sustained (Glasgow & Estabrooks, 2018). Otherwise stated, it is the extent to which an EBI becomes integrated into existing systems. A primary goal of D&I science is for the intervention to become a routine organizational practice that is sustained over the long term. Maintenance also refers to long-term effects on target health and behavior outcomes. This is arguably among the most important areas of D&I research for investigators from the Global North seeking to achieve health equity in the Global South. Maintenance necessitates working within school structures to ensure routine and repeated quality implementation of an EBI with multiple groups and generations of youth.

### Strategies for Maintenance

Through our experiences, we identified implementation strategies that may be particularly beneficial to facilitating maintenance of school-based EBIs in LAC (e.g., Powell et al., 2015). First, we found sustainability was achieved by having endorsement from leaders within school hierarchies. In the DR, this meant that the Ministry of Education would take responsibility for program implementation and maintenance by integrating it into the official curriculum. In Nicaragua, hierarchical support was at the school level and highlighted a need for embedded implementation routines, or normalization (May & Finch, 2009). In both cases, there was a need for flexibility to effectively promote maintenance. Election cycles, for example, can bring sweeping

changes to government officers. Thus, even though one official has approved a project, this does not necessarily mean a new official will. Interventions work within complex systems (Moore et al., 2019); therefore, changes in leadership can have vast implications for programs and research. Our experiences echo others' suggestions for a team of program champions, people within and/or outside decision making groups who support buy-in from program leadership. More broadly, our experiences point toward an opportunity to develop the science of D&I in health policy (e.g., how to tailor messaging about school-based programs that persists through government changes).

Also important for maintenance was distribution of the pre-developed EBI curriculum that provided simple, easy-to-understand lesson plans for teachers that could be re-used. Curriculum materials and training need to provide accessible resources (e.g., electronic and printed versions of curriculum materials) and also encourage an ownership mindset that facilitate buy-in from teachers. In the DR, stakeholders suggested that maintenance could also be facilitated by using a teacher buddy system to promote group learning, information sharing, problem-solving, and a collective vision for implementing the EBI.

Additional suggestions for maintaining the program were to offer different kinds of incentives within school systems. For example, DR stakeholders suggested that implementers be granted continuing education credits to help increase accountability to maintain the EBI. The Nicaragua team suggested holding a “matriculation ceremony” for teachers who have delivered the program, or a formal post-implementation certificate that releases schools, teachers, and counselors to continually offer the EBI. “Such ceremonial and practical events may also help demark involvement from program developers to empower institutions to sustain the program for their students’ and the social good” (Pettigrew et al., 2021, p. 364). While this reflected a cultural value (i.e., earning a certificate), the general practice of celebrating teachers’ abilities to impact the lives of children and youth may be something the Global North could also adopt.

### Identifying and Addressing Barriers to Maintenance

We also noted key contextual barriers and facilitators to maintenance in our LAC settings. These related to characteristics of the EBI, individuals who implemented the intervention, and implementation culture within the schools. In Nicaragua, some schools expressed a need for ongoing involvement from program developers. They wanted developers to provide direct instruction to students and required more accountability to maintain the program (Pettigrew et al., 2021). This may reflect low self-efficacy to implement the intervention, low buy-in, or competing demands that took priority. These schools never institutionalized

or “normalized” the curriculum into their organizational practice. Alternatively, schools that maintained the EBI, expressed having “all they needed to continue the program and effectively influence their youth” (Pettigrew et al., 2021, p. 363). Finally, like cost can be a barrier for adoption, we noted it was also important for maintenance. To overcome this barrier, we encouraged sustainable design features for the curriculum. Whereas in the US, color-printed, bound program books may add credibility, in LMICs like Nicaragua, this type of printing is cost-prohibitive. Instead, materials that we provided schools fit more precisely with the cultural expectations. Therefore, we included spiral bound, white pages with black ink, which aligned with other curricula used by schools and students we served.

### Conclusions

Our experiences planning, adapting, and evaluating implementation of school-based health promotion EBIs in LAC provide a foundation for understanding how to produce actionable knowledge that can improve D&I research in both the Global North and South. This paper describes case studies of D&I work in two LAC countries. We detail processes we encountered across the spectrum of school-based health promotion research and practice, utilizing the RE-AIM framework to discuss activities and lessons learned related to reach, effectiveness, adoption, implementation, and maintenance. Our reflections offer plentiful examples of successes and mistakes we encountered both doing D&I work and conducting D&I research. They also offer suggestions for where the Global North can draw lessons from the Global South. We believe that working in school settings provides a meaningful avenue to address priority health outcomes. And, by recognizing ways to enhance D&I in schools, practitioners and researchers will be equipped to drive population health improvements. It is in that spirit of collaboration and hope, that we share and compare our experiences. Equally important, we recognized that doing this work in the context of Nicaragua and the DR, required a shift in thinking. It became more than simply *evaluation* research but also an opportunity to “level the playing field” and encourage, train, and support teachers. Finally, this paper juxtaposes our disparate but overlapping experiences against some of the D&I research literature. We both illustrate and inform D&I models. For example, integrating flexibility across all levels of RE-AIM was important in Nicaragua and the DR. At the same time, flexibility should also be an important consideration in the North, even in the context of a more stable sociopolitical landscape. From the numerous examples we share, we hope there are take-aways that researchers and practitioners outside of LAC will find useful. In sum, this paper aims to offer health investigators and practitioners

transferable lessons that can encourage new expeditions into D&I research or provide new ideas on how to improve the quality and utility of their existing D&I research and practice within the LAC region and beyond.

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**Data availability** The Case Comparison Procedures reports the methods used to describe and compare case studies; no datasets were generated or analysed for this study.

## Declarations

**Conflict of interest** The authors have no competing interests to declare that are relevant to the content of this article.

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