Summary Overview Report

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Link for Schools: A system to prevent violence and its adverse impacts

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Summary of the project

Major goals and objectives

The University of Iowa in collaboration with the Cedar Rapids School Community District (CRCSD), and the University of Minnesota, conducted an effectiveness study of a theory-based system, called Link for Schools (Link), that provides a sustainable infrastructure of upstream support for youth at-risk of violence. Link is built upon the principles of Trauma Informed Care (TIC) and Psychological First Aid (PFA), to identify and intervene on mental health and behavioral precursors of violence, and to mitigate the immediate impacts of violence among exposed youth. The study took place in a high risk school system in Cedar Rapids, Iowa.

CRCSD is the second largest school district in the state of Iowa with nearly 16,000 students and over 3,000 staff in 21 elementary, 6 middle and 4 high schools. The district also includes an alternative education center and created a virtual academy in response to COVID-19. Compared to neighboring school districts, CRCSD students are disproportionately minority and poor. About 40% of students are ethnic minorities, compared with 25% across the state of Iowa. Half of all CRCSD students are eligible for free/reduced lunches, and 15% live in poverty. In recent years, Cedar Rapids has been plagued by community violence. Increases in gun violence, including the highest number of gun-related homicides in a 12-month period in at least 60 years in Cedar Rapids occurred in 2020. A growing number of CRCSD students have exhibited violent behaviors of concern. In the first two weeks of the 2021 academic year, nearly 400 office referrals were made due to various behaviors including abusive language, defiance, fighting, theft, bullying, vandalism, and possession of drugs/alcohol/weapons. Between 2017 and 2021, School Resource Officers alone initiated 678 student arrests.

In the last decade, the CRCSD has adopted a number of violence prevention and intervention strategies using a Multi-Tiered System of Supports[1] (MTSS) and the Positive Behavioral Interventions and Supports[2,3] (PBIS) framework, as well as enhanced organizational partnerships with public health and

mental health providers, and increased security measures (e.g., locked entrances, video cameras and school resource officers at secondary schools). Despite these efforts, the number of violent incidents remains high; personal safety was identified as a key strategic priority in the 2017 Linn County Community Health Improvement Plan. The Link system filled a critical gap in the existing violence prevention strategies in schools. State of the art approaches to violence prevention emphasize the need to implement a full continuum of prevention strategies that include: 1) early intervention during elementary and middle school that identifies behavioral problems; improves social interactions; and strengthens children's connectedness to families, schools and community groups to reduce exposure to violence,[4] and 2) secondary and tertiary preventive care to support those exposed to violence and at high risk for continued exposure to violence.

The decision to adopt effective violence prevention programs must be weighed against the costs of implementing such programs. The CRCSD has faced budgetary challenges in recent years due to low State Supplemental Aid Growth and a decline in spending two of the past four years. These budgetary constraints have necessitated spending reductions and have affected staffing as well as commitments to new programs and services. Therefore, it is also important to evaluate the costs necessary to achieve a given reduction in violence (i.e. the cost-effectiveness of the proposed intervention).

The goals of this research are to improve school safety, prevent and intervene in violence that impacts students, assess school-based violence prevention strategies, and assess cost-effectiveness. To achieve these goals, we implemented and tested Link, a comprehensive prevention model that addresses mental and behavioral problems (precursors of violence) as well as the immediate impacts experienced by violence-exposed youth. Link integrates TIC with use of PFA. Link engages the school community in a series of comprehensive steps: an entire school community becomes trauma-informed with a clear understanding of how violence impacts individuals through a cultural shift in awareness, recognition and response; then, a safety net of trained school providers (e.g., nurses, counselors,

teachers, and support staff) work collaboratively to ensure that best practices in prevention are delivered to at-risk youth. To further enhance this system, school personnel were equipped with tools in Psychological First Aid (based in Motivational Interviewing (MI). Personnel were also trained in tools for screening of non-specific stress and referral, in order to intervene with at-risk students and provide linkages to appropriate care, which involved referral to a school mental health professional or referral to other district-provided programs and services. Students whose needs exceeded existing school resources were directly referred to appropriate care. Our central hypothesis was that the Link program would reduce violence and its adverse impacts by enhancing the capacity of schools in addressing social and behavioral concerns and build resiliency through the support of trained adults on campus.[5,6]

Research Objectives

Objective 1: Evaluate the effectiveness of Link in improving climate and student performance.

Objective 2: Evaluate the effectiveness of Link in reducing school violence (i.e., overall referrals and aggression referrals).

Objective 3: Measure the costs associated with Link administration, implementation, and training and estimate its cost effectiveness.

Research design, methods, analytical and data analysis techniques

Design

This project was a two-level randomized controlled trial of students from 12 schools in three clusters. A cluster was composed of a middle school (grades 6-8) and its three feeder elementary schools (grades k-5). Cluster 1 and 2 schools were randomly selected to receive staggered intervention. Staff and students in Cluster 1 schools began receiving interventions in August 2017, and they continued intervention through May 2020. Staff and students in Cluster 2 schools began receiving interventions in August 2018, and they continued intervention through May 2020. Staff and students in Cluster 3 schools were designated as controls and received no intervention. However, upon examination of the secondary

data related to Cluster 3, control group schools, the study team found that neither this cluster, nor any other cluster within the district, was comparable to the intervention clusters regarding demographics, office referrals, and other key variables.

Students within Cluster 1 and Cluster 2 schools were identified for intervention. Students were identified based on CRCSD data from the previous academic year. This data included office referrals, attendance, academic scores, and Pediatric Symptom Checklist scores.[7] Once identified, students were randomized into an immediate treatment group or a wait-list control group at a 1:1 ratio, and they were randomly assigned to a trained interventionist. For analysis purposes, students were categorized into three groups: 1) those in Clusters 1 & 2 who received staggered intervention, 2) those in Clusters 1 & 2 who were eligible but did not participate, and serve as "within-school controls," and 3) those in Cluster 3 who would have been identified for intervention, but no intervention was available, and serve as "Cluster 3 controls."

Methods

Universal Training: Trauma Informed Care (Tier 1)

School staff from Cluster 1 and 2 schools were invited to attend one of several in-person training sessions about TIC. These group training sessions were scheduled at each school site for convenience of staff, and each session lasted from 30 minutes to 1 hour. During the training session, participants watched a video (https://uicapture.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=3f079edb-7462-44bf-86f5-8be34d06fc54) developed specifically for this research project, and they participated in a discussion following the video. At the end of each session, participants were provided a consent letter, and they were invited to complete an anonymous post-training survey. Completion of the survey implied consent to participate. Alternately, staff not able to attend the in person training were sent an email from their school administrator that contained a link to the training video, consent information, and survey invitation, to be completed at their leisure.

Specialized Training: Link Training (Tier 2)

CRCSD administrators, and CRCSD research staff (i.e., Link Specialists), identified fellow teachers, nurses, and other school support staff to serve as interventionists. The chosen staff and received in-depth, specialized training in the Link for Schools program in order to serve as interventionists. Trained staff were required to attend sessions throughout the academic year to provide both training in intervention skills and coaching/practice using the skills. Each training session was approximately two hours in duration, and each practice session was one hour in duration; all sessions were scheduled during in-service days to allow for attendance of staff.

During the initial training session, the interventionists were provided training by University of Iowa Institutional Review Board (UI IRB) and the University of Iowa Research team for their role as research team members, and for purposes of assenting students participants and conducting the intervention according to study protocol. These interventionists were also consented to participation as research subjects to evaluate the effectiveness of the in-depth training. Following consent, interventionists were invited to complete a survey about their previous experience using specific communication skills related to the intervention.

The second training session was conducted approximately 4 weeks later, just prior to the start of the student intervention. During the second training session, these interventionists learned data entry procedures, watched a Link training video and were trained by the University of Iowa research team and a member of the Motivational Interviewing Network of Trainers (MINT). This training focused on communication skills based in Motivational Interviewing, which is a collaborative communication style used to strengthen a person's own motivation and commitment to change. Key skills of MI include the use of open questions, affirmations, reflective listening statements, and summaries, with a focus on minimizing the number of questions used in favor of affirmations and reflections.[8] Motivational Interviewing has been applied in many settings, including education, where there is evidence that it can

be applied to issues such as reducing truancy,[9] classroom management,[10] and handling disciplinary referrals.[11] MI can also be used with a variety of populations including children and adoleschents.[12-14] Interventionists were also trained in the use of a non-specific stress screener, Kessler K-6,[15] which has been used as a brief six-question scale to measure non-specific distress in traumatized populations.

Following this training session, participants were randomly assigned students with whom they used the Link Program skills. Following each student encounter, the interventionists were instructed to complete a Link Case Management Tool for process evaluation.

The third training session occurred early in the spring semester (January) of each intervention year. During this training session, interventionists were introduced to new skills and trained in a protocol that allowed them to determine the intervention dose for students in their current caseload. Training in this protocol was necessary to allow for interventionists to adjust their capacity and take on wait-listed students. All videos used for these training sessions are available for viewing at: https://uicapture.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=e4d017e6-6133-4d0b-819d-495f72c74284.

Researchers have suggested that repeated training of, and feedback to, practitioners are typically needed to improve MI skills.[16] Given this suggestion, practice sessions were offered approximately every other month throughout the second and third years of intervention. These coaching/practice sessions were led by a member of the MINT. During these sessions, interventionists were provided content to compliment the skills training they had already received, and then provided the opportunity to practice skills and receive immediate and direct feedback about their ability. Interventionists also received periodic mentoring from research team staff (Link Specialists) throughout the intervention period. These specialists ensured the interventionists were delivering the intervention per protocol and provided guidance on skill improvement, as well as assistance with data entry.

At the end of each intervention year, a debriefing session was conducted to allow interventionists an arena to discuss their implementation of the intervention for the purpose of improving the process for the next year. During the final year of data collection, this debrief session was conducted remotely via zoom, due to school cancellation related to COVID-19.

All training sessions were audio recorded, with participant permission, for the purpose of training content analysis and identifying any themes that may improve future training sessions.

Link Intervention

Parent consent

At the beginning of each school year, parents and/or legal guardians provided consent for their child to participate in the program via the school registration process. The CRCSD provided access for parents to consent via secure technology software platform (PowerSchool in 2017 and 2018, and Infinite Campus in 2019). For parents or legal guardians who were unable to access PowerSchool, a consent packet was mailed to their home address by the CRCSD project staff.

After parents read the electronic parent consent letter, they indicated that their agreement about child participation by checking a box, “I agree.” For parents or legal guardians who were unable to access PowerSchool, a consent packet was mailed to their home address or provided to them by the CRCSD research team. These parents were presented a cover letter and consent document that used the same language as the material posted on PowerSchool/Infinite Campus site. If there was no response to this mailed correspondence, they were not contacted again until the next school year. Parents were also notified that their child's de-identified data will be used for research purposes, unless they opted out; this letter was available in the online format and the mailed format. Because there is a large non-English-speaking population within the CRCSD’s geographical boundaries, the parent consent materials were translated by the District’s translators into Spanish, French, and Swahili versions. However, only students who could fluently speak English were enrolled into the intervention.

Additionally, parents were provided a letter at the beginning of the school year, via PowerSchool/CRCSD website, notifying them that the CRCSD would be providing de-identified student data to University of Iowa researchers for research purposes. If parents objected, they were provided contact information of a school district official (listed on the letter), and their student's data was removed from the data set shared with investigators.

Identification procedures

Following parent consent, the CRCSD gave the University of Iowa a data file for the purpose of identifying students. The file contained a list of de-identified student numbers, which represented students for whom parents had given consent to participate as well as associated student data from the previous academic year. For example, for the first year of intervention (2017-2018), we used data from 2016-2017 to identify students for intervention. Because data from the previous school year were used for identification, students new to the district and students without parent consent were not in our identification pool. Additionally, kindergarteners were not able to be identified for intervention and were excluded.

Data was provided by the district at the individual student level, and included academic year counts of behavioral referrals, counts of health office visits, English language arts (ELA) proficiency for certain grades (6^{th} and 7^{th}), math performance scores, social-emotional-behavior screener (SEB) scores for certain grades, mobility data (changing schools) and attendance (both absences and tardies).

Students were identified for intervention if they had one or more behavioral referrals in the previous academic year, or if they met at least 2 of the following indicators in the previous academic year: attended 80% or less of enrolled school days,[17] were in the 90th percentile and above on tardies, had changed schools since the previous year, were not proficient in ELA (tested only in 6th and 7th grade), were in the 10th percentile or below on math performance,[18] were in the 90th percentile or

above on health office visits, or had a positive score on the district-administered Pediatric Symptom Checklist.[19-21]

For identification purposes, the research team calculated percentiles for the entire sample of consented students rather than using full district enrollment data, which was unavailable at the time. We chose the distribution of scores for identification,[4,22,23] and using distribution cut-offs is common. Across years, the ELA and Math performance criteria did change because of availability of data. A large number of students were not proficient, and using this criteria was not meaningful.

Once identified, students were then randomly assigned to either an immediate or wait-list intervention group. This design is ideal for evaluating the effectiveness of a program that is realistically rolled out over time. The design allows for comparisons between students who received immediate support versus those who did not, and comparisons of students in a mature program versus newly implemented program. The design was an ethical approach used in other intervention evaluation studies of mental health treatment programs for at-risk children exposed to violence.

Immediate-list students were approached for intervention during the first semester of the school year, as soon as they were assigned to an interventionist. Wait-list control students were approached for intervention the semester following the implementation of the immediate intervention. While on the wait-list, students assigned to this intervention arm received the same standard services offered by the CRCSD to students at control group schools. Following randomization, the students were also randomly assigned to an interventionist.

Assent Procedures

Following identification, Link Specialists contacted the consenting parent to notify them about the child's eligibility to receive intervention, then the assigned interventionist arranged a time to meet with the student to assent. Interventionists either read an assent document to students, or allowed them to read if capable, and students provided verbal assent to participation. Due to the young age of

the population (5-14 years of age), some students may have had difficulty understanding and signing a formal assent document. Because of this concern, and in order to maintain consistency across sites for the intervention delivery, all students, regardless of age, assented using the same procedures.

Intervention Procedures

Following assent by an interventionist, individual students had a one-on-one conversation with the assigned interventionist in which the interventionist used specific communication skills they learned through their training, described above. Students were invited to meet with the interventionist several times (up to 2 times per week) during the remainder of the school year. These encounters were intended to last approximately 10-30 minutes in length, and occur during the school day in a private location determined by the interventionist and the CRCSD research team. The interventionist also used specific tools they were exposed to during the training sessions (i.e., K-6 stress screener) at strategic points to assist with decision-making about dosage of intervention and referral. Students were referred to additional resources based on needs assessed during the meetings.

Due to COVID-19, the CRCSD moved to online instruction in March 2020. Due to this event, no new students could be assented, and current students could only participate in study activities in a virtual manner. Link interventionists contacted parents of enrolled students via phone (numbers are available to school staff from district enrollment database) to check-in with the family and student. During this phone call, the interventionists assessed whether the student was interested in continuing the intervention electronically (phone or web meeting). Depending on the students' preference, the interventionist then conducted any future sessions via phone (using the phone number listed in district enrollment database) or web meeting (an email invitation was sent to the student participant’s school-based email address from the interventionist).

Primary Data Collection Instruments:

Trauma Informed Care Post-training evaluation. This eight-item questionnaire collected information about participants' school site, role, school type (i.e., a general education school site, district office, charter school, special education school, or other), and years of experience as an educator. Participants' knowledge of trauma, before and after training, was assessed using a 10-point scale, where 1 = "Low" and 10 = "High." The questionnaire also assessed participants' agreement about how watching the video helped them to understand: 1) different causes of trauma, 2) different types of trauma, 3) signs and symptoms of trauma, 4) the impact of trauma on health and learning, and 5) rates of trauma using a 10-point agreement scale, where 1 = "Disagree" and 10= "Agree." Two open-ended response questions were also asked to capture the most important take-away from the video training and areas where participants would like additional training.

Link Training Evaluations

Pre-program evaluation. This six-item questionnaire collected information about participants' school site, and years of experience as an educator. Participants reported their use of a variety of communication skills, using a 10-point scale, where 1 = "Never" use and 10 = "Always" use. The questionnaire also assessed participants' previous experiences with Motivational interviewing, and any previous training they may have had in motivational interviewing.

Post-training evaluation 1. This seven-item questionnaire collected information about participants' school site, and years of experience as an educator. Participants reported their level of agreement, using a 10-point scale, where 1 = "Disagree" use and 10 = "Agree," about how the training: raised their awareness about effective ways to listen to students; helped them feel more prepared to interact with children with trauma histories; introduced them to tools to support traumatized children; and increased their confidence in using MI-consistent communication skills. Participants also rated their agreement with statements about their knowledge of how to implement the Link Program, before and

after the training, using a 10-point scale, where 1= “Low” agreement and 10= “High” agreement. Two free response questions were asked to capture the most important take-away from the training and areas where participants would like additional training.

Post-training evaluation 2. This six-item questionnaire collected information about participants’ school site, and years of experience as an educator. Participants’ reported their level of agreement, using a 10-point scale, where 1 = “Disagree” use and 10 = “Agree,” about how: trainers addressed their concerns and needs; how participating helped them feel more prepared to interact with children with trauma histories; how participating strengthened their communication skills when talking with students; and how participating increased their confidence in using MI-consistent communication skills. Two free response questions were asked to capture the most important take-away from the training and areas where participants would like additional training.

Post-program evaluation. This eight-item questionnaire collected information about participants’ school site, and years of experience as an educator. Participants’ reported their use of a variety of communication skills, using a 10-point scale, where 1 = “Never” use and 10 = “Always” use. Participants rated the program’s effectiveness in: 1) helping students cope with trauma, and 2) their own ability to deliver the Link Program, using a 10-point scale where 1= “Ineffective,” and 10 = “Very Effective.” Three free-response questions asked whether participants would recommend the Link program to other school districts, why or why not, and any positive or negative experiences they encountered while implementing the Link program.

Link Case Management Tool. This eighteen-item tool, collected information about each intervention session conducted by the interventionists. Identifying information about the interventionist was captured, along with student information, session details, assessments of key MI skills, assessments of student stress, a description of other intervention tools used, a rating of session effectiveness, and a description of any planned follow-up actions for student support. Identifying information pertaining to

the interventionist included their study identification number, name, and job title. Student information collected included student ID (specific to the study), school of enrollment and grade. Session details collected included preparation time, date, duration, and location of encounter. Interventionists were asked to rate the helpfulness of key MI skills used on a 5-point scale where 0 = "Did not use," 1 = "Not at all helpful," 2 = "Somewhat helpful," 3 = "Helpful," and 4 = "Very helpful." Interventionists were asked to periodically rate student stress using the Kessler K-6,[15] "6 simple questions," stress screener. Interventionists also recorded their use of the following tools, and a description of how each was used during the session: feelings thermometer, reading, journaling, progressive muscle relaxation, or other tools. Interventionists rated the effectiveness of each session using a 10-point scale where 1= "Very Ineffective" and 10 = "Very Effective." Finally, interventionist recorded any planned follow-up actions that resulted from the session, such as: a call to parent; plans to meet again; referral to enrichment program, school counselor, building mental health therapist, or services for basic needs; plans to discuss concerns with building administrator; any other actions; or nor planned action.

Training Attendance Tracking Logs. We estimated overall implementation costs of the Link program. To estimate costs, attendance logs were kept to track: training event, date of event, preparation time, duration of event, job title, and role. Using this log, annual effort was calculated for each role using annual wage rates collected from the Bureau of Labor Statistics (BLS).

Secondary Data Sources:

Table 1 presents existing data sources that were used to gather secondary data, collected by the school district, that were used in conjunction with the primary data collection. The school district provided composite counts of overall referrals and aggression referrals. The overall referral composite was comprised of referrals for physical aggression, verbal aggression, bullying/harassment, drug-related, weapon/violence-related, property damage, technical rule violations, dishonesty, attendance, gang-

related, or other. The aggression referral composite was comprised of referrals for physical aggression, verbal aggression, bullying/harassment, weapon/violence-related, or gang-related referrals.

Table 1. Secondary Data Sources

Data Source*	Variables	Purpose
Administrative Records: Behavioral Management System	Composite counts of overall discipline referrals and aggression-related discipline referrals	Intervention Effectiveness (Objective 2)
Administrative Records: Enrollment, attendance, and academic records	School Engagement Outcomes unexcused days absents, truant days, failing grades, suspensions	Effect on school climate/performance (Objective 1)
Administrative Students Records	Age, gender, free/reduced meal (SES proxy), existing mental health diagnosis, ethnicity	Intervention Effectiveness & Effect on school climate/performance (Objective 1 and 2)
Iowa Department of Education	Enrollment size, student-to-teacher ratio, % student free/reduced meals, % minority	Intervention Effectiveness & Effect on school climate/performance (Objective 1 and 2)
Link Specialists	Types of violence prevention programs used at each school	Intervention Effectiveness & Effect on school climate/performance (Objective 1 and 2)

Analysis

Objective 1: Evaluate the effectiveness of Link in improving climate and student performance

The first objective of the study was to evaluate the effectiveness of Link in improving school climate and student performance. We hypothesized that Link would improve school climate through two tiers of training: TIC training (tier 1) and specialized training in intervention delivery using motivational interviewing communication skills (tier 2).

Survey data collected to evaluate Tier 1 and Tier 2 training were analyzed using frequencies and percentages to provide descriptive summaries, and t-tests were used for paired comparisons.

Data from the LCMT were summarized to assess Link interventionists' skill use and the impact on student performance (i.e., K-6 stress screener scores). Data were analyzed using frequencies and percentages to provide descriptive summaries, and t-tests were used for paired comparisons. We calculated a difference in K-6 score between the first screener administration and the last screener administration to assess the change in student stress during the study. Because interventionists were trained to use the K-6 screener at strategic points in the intervention, there is an expectedly high level of missing data.

Objective 2: Evaluate the effectiveness of Link in reducing school violence and behavioral referrals

For this analysis, data were acquired from CRCSD. The data is comprised of administrative data such as demographics, composite discipline referrals (i.e., overall and aggression-related referrals), and enrollment records. This was combined with primary data collected by Link interventionists and specialists, who recorded the number of intervention sessions students had received. The data structure is based on the number of academic weeks that students were involved in our study. Each student has one cross-sectional observation that contains the total number of referrals received, along with the number of weeks they were in the study. The study lasted three academic years, where the final year was shortened due to COVID-19.

The primary outcomes are the average weekly rate of discipline referrals students received during the study period for all referral types and referrals linked to aggression. To examine the mean difference between the three intervention groups, two generalized linear models (GLM)[24] were fitted for each primary outcome. One model assumed the student rates were independent and was fit using maximum likelihood; the other accommodated within-school clustering and was fit using generalized estimating equations (GEEs).[25] A negative binomial distribution was assumed for the total number of discipline referrals, and an offset was included based on the number of weeks of study participation. An exchangeable working correlation structure was specified for the GEE models. These models did not

include covariates to account for differences between the students' demographic groups. After examining the within-cluster correlation values for the two GEE models, which had a negligible correlation values of 0.003 and -0.001, accounting for within-school clustering was deemed unnecessary. Therefore, the primary analysis will strictly be based on GLMs and a qualitative covariate distinguishing the intervention groups. For each primary outcome, a likelihood ratio test (LRT)[24] will determine if the differences among the three mean referral rates is statistically significant.

Objective 3: Cost Effectiveness of Link Administration, Implementation, and Training

Costs were calculated for the Tier 1 (TIC) and Tier 2 (Link) intervention components separately. For each year, individuals' event duration times were multiplied by their assigned BLS wage rate (according to job title), and percent effort. These costs were summed, and categorized into Tier 1 and Tier 2 components.

Tier 1 costs include training video development and training session participation for trainers and attendees (all school staff). Tier 2 costs include training session participation for trainers and attendees (Link interventionists), mentoring session participation for trainers (University staff, Link specialists and motivational interviewing consultants) and attendees (Link specialists and Link interventionists), and Link implementation (intervention preparation, delivery, and follow-up actions by Link interventionists).

Expected applicability of the research

This research advances the science of school safety by addressing gaps about: 1) comprehensive school safety programs, 2) TIC and Link, 3) strategies for dealing with children who have problem behaviors, and 4) the costs of adopting Link.

The Safe School Initiative, and researchers[26,27] call for comprehensive school strategies that integrate prevention through critical response; use comprehensive coordinated approaches that encourage "connectedness, academic engagement and positive relationships among youth and adults at

school,"[27] and address multiple forms of violence (i.e., bullying, fights, aggression). Link fills this gap by providing upstream universal and selected interventions to improve school culture and increase connectedness and engagement with students at-risk for all types of violence. Our study determined the effectiveness of this approach.

Link is based on the principle that children with histories of trauma are at risk for reduced school engagement, poor connectedness with adults, problem behaviors and thus increased exposure to violence. Agencies and practitioners have recently promoted TIC and PFA to support traumatized children but without a sufficient evidence-base.[28-31] Using a rigorous design, this project provides evidence of effectiveness supporting strategies.

Children at risk for violence show early behaviors of concern, and "research is needed to understand how the ways in which schools deal with challenging behavior may contribute to the 25 risk of violence," according to 12 experts gathered by the National Science Foundation.[32] Our research responds directly to this knowledge gap.

Finally, our study provides important information about the costs of Link (including time for development, training and 1-, 2- and 3-years of implementation), which is essential for its scalability to other school districts throughout the country and its sustainability. It is equally important that data on a program's cost-effectiveness be clear. With limited funding, schools will be able to determine: how much will it cost to train and implement Link in order to achieve a reduction in school violence? This study was a first step to evaluating the effectiveness of Link in eight schools from the CRCSD; and its generalizability to other settings will need testing. However, this study produced training materials, implementation protocols and a case management tool to support translation to other school districts throughout the country.

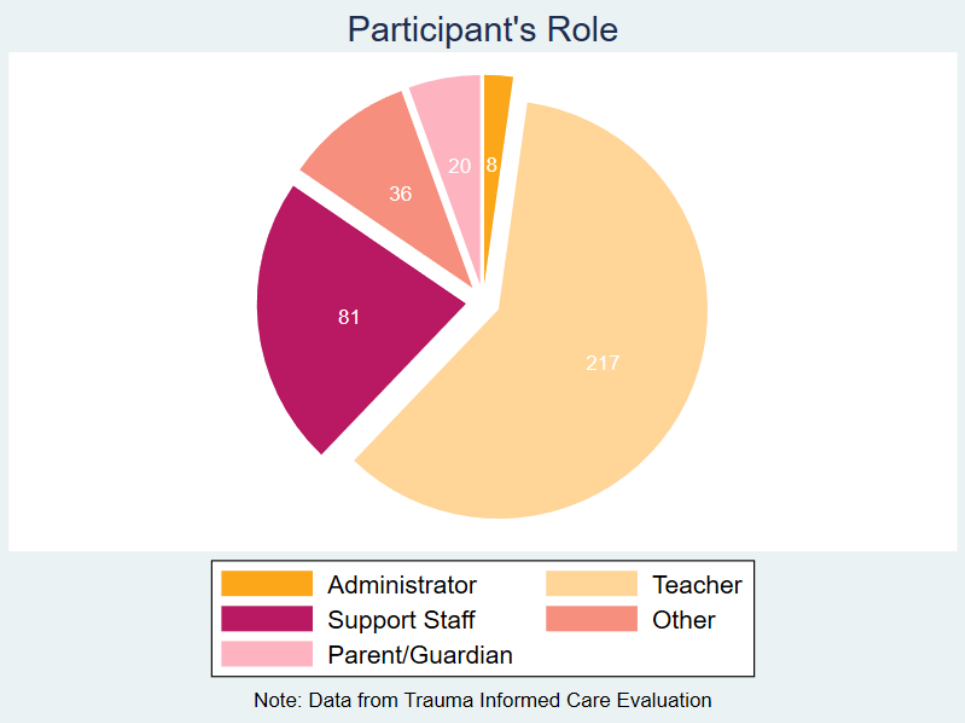
Participants and other collaborating organizations

Description of Participants

Trauma Informed Care Participants

A total of 364 participants completed the TIC evaluation survey, and most were teachers and support staff. Figure 1 illustrates counts of participation, by role. Participants who were not educators were parents, guardians, or other (e.g., custodial staff, kitchen staff, mental health therapists, and health secretaries, etc.).

Figure 1. Trauma Informed Care Participants, by role



Note: 2 respondents did not report their role.

Three hundred forty-four participants (94.5%) completed the training in person, and 20 (5.5%) completed the training online. On average, the educators who completed the training had over 10 years of experience in education, see Table 2.

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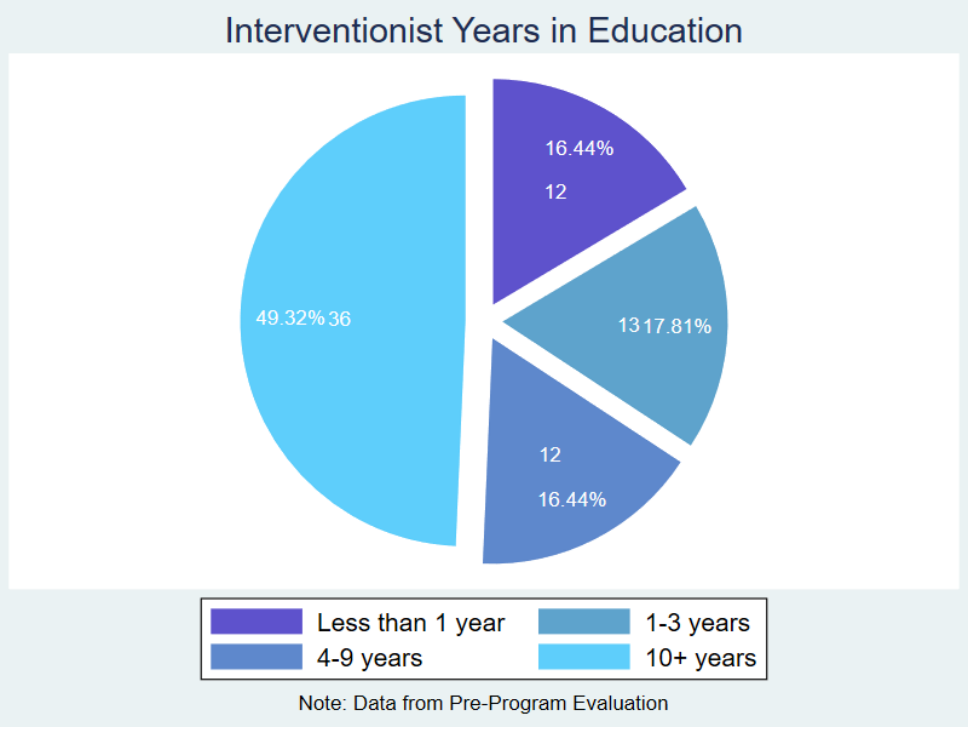
Table 2. Trauma Informed Care Participants, by experience

Number of Years Working in Education	Frequency	Percent
Less than 1 year	24	6.59
1-3 years	45	12.36
4-9 years	72	19.78
10+ years	171	46.98
Missing / Not Applicable	52	14.29
Total	364	100.00

Link Interventionists

There were 76 Link interventionists throughout the duration of the study. Figure 2 shows a distribution of the interventionists' experience working in the education field. Nearly half of respondents reported being an educator for 10 or more years, and a majority of them (79.5%) reported having no formal training experiences in motivational interviewing prior to the training offered during Link.

Figure 2. Link Interventionists, by years of experience



Note: 3 respondents did not report their years working in education.

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Student Participants

Student participants attended a school in Cluster 1 or Cluster 2. Cluster 3 served as a control, therefore no students attending those schools received interventions. As mentioned previously, Cluster 3, nor any other cluster within the school district was a sufficient comparator, when conducting analyses. Table 3 describes demographic characteristics of students attending the three clusters of interest. Note that disparities exist when comparing Cluster 3 to Clusters 1 and 2; Cluster 3 has a drastically higher distribution of white students, and drastically lower distribution of students whom receive free or reduced lunch prices. Cluster 3 also has a drastically lower number of total discipline referrals across all years of study data.

Table 3. Student Demographics by Cluster and Year

	Cluster 1			**Cluster 2**			**Cluster 3**		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Total Students (*N*)	1,688	1,664	1,845	2,122	2,168	2,194	2,263	2,204	2,178
Percent Male (%)	53%	53%	52%	51%	53%	52%	53%	54%	52%
Percent White (%)	55%	53%	48%	48%	45%	45%	61%	61%	62%
Percent Free reduced price lunch (%)	75%	81%	75%	66%	78%	75%	47%	56%	56%
Total Discipline Referrals (*N*)	5,293	5,996	3,395	2,918	4,434	2,996	3,038	3,094	1,439
Total Physical Aggression Referrals (*N*)	1,831	1,944	1,154	1,277	1,980	1,206	1,086	1,162	612

Overall, 4,358 link sessions were conducted during the intervention period, and 4,318 were conducted face-to-face, with the remaining 40 conducted on the phone or web during COVID-19. There were 665 students who received at least one intervention session over the three years, and these

students are considered our intervention students. However, for analysis purposes, only students with complete enrollment records were analyzed (n=656). This study had two potential control groups. The first set, "within-school controls," represents 155 students who were identified as eligible for Link, but didn't receive intervention because of various reasons (i.e., declined intervention, were not able to schedule, or were on the wait-list and weren't able to be seen due to move to online education in March 2020 due to COVID-19 (*n*=32)). These controls were located at the same schools that the intervention students attended. The other control group, "Cluster 3 controls," consisted of 725 identified students who attended a separate "control cluster" of schools in the school district, where no students received Link. These 725 students were designated to serve as a comparison group using the same criteria that we used to identify the treatment students who attended the intervention schools. In other words, if these students had been attending intervention schools, they would have been selected to participate in Link. Table 4 presents the sex, ethnicity, and grade-level of students, by group.

Table 4. Demographics of students

	Cluster 3 Controls *N* (%)	**Within-school Controls** *N* (%)	**Intervention** *N* (%)
Sex			
Male	494 (32.16)	99 (6.45)	386 (25.13)
Female	231 (15.04)	56 (3.65)	270 (17.58)
Ethnicity			
Two or more, Hispanic, Other*	160 (10.42)	36 (2.34)	137 (8.92)
Black	184 (11.98)	41 (2.67)	137 (8.92)
White	381 (24.80)	78 (5.08)	382 (24.87)
Grade			
Elementary	374 (24.35)	63 (4.10)	309 (20.12)
Middle	351 (22.85)	92 (5.99)	347 (22.59)

*Other race consists of Asian and American Indian/Native Alaskan

Ψ "Elementary" represents grades 1-5; "Middle" represents grades 6-8

Collaborating Organizations

University of Iowa

The University of Iowa team, led by Dr. Karen Heimer, was responsible for primary oversight and administration of the project, including study design, implementation, training of research staff, primary data collection, analysis, and interpretation and dissemination of research findings.

Cedar Rapids Community School District

The Cedar Rapids Community School District team, led by Wellness and Community Partnership Supervisor, Stephanie Neff, was responsible for administration and data collection of the student intervention. As part of intervention administration, school staff were trained in human subjects research protections, Motivational Interviewing, data collection, reporting and analysis. The CRCSD team provided coaching and mentoring to interventionists throughout the duration of the intervention.
A partnership with a local youth mental health service provider (Tanager Place) was formed to ensure the availability of school-based mental health assessment, treatment, consultation and referral for students identified as at-risk by Link Interventionists.

The CRCSD was also responsible for providing cleaned secondary data sets to the University of Iowa for the purposes of identifying students for the intervention and final analyses.

University of Minnesota

The University of Minnesota team, led by Dr. Marizen Ramirez, assisted with study design, analysis, and interpretation of findings. Staff on the study team also advised on methods and conducted analysis of cost effectiveness of the Link Program.

Changes in approach from original design and reason for change

Budget Modifications

A budget modification to NIJ was submitted in 2017 to account for the delay in the start of the project and other changes, including a sub-contract to the University of Minnesota, to accommodate the work of our Co-PI, Professor Ramirez, who left the University of Iowa prior to the award. A health economist also located at the University of Minnesota led the cost effectiveness analysis.

Based on the number of eligible students and intervention experiences from the first academic year of the study (2017-18), we determined additional help was needed for intervention delivery. CRCSD hired an additional Student and Family Advocate to serve as a full-time Link Specialist within the school district. This change increased the number of Link Specialists to 5 (an increase of 1 from what was originally planned).

The communication skills used in the intervention required continued, on-going mentoring provided by a member of the Motivational Interviewing Network of Trainers (MINT). Additional mentoring was necessary, beyond what the University of Iowa originally budgeted. A MINT consultant was hired by the CRCSD for this purpose.

Additional modifications were made to the CRCSD budget to accommodate secondary data compiling and cleaning needs, as well as to develop interactive videos for on-going training of school staff. All modifications were made with no increase to the approved budget for Cedar Rapids.

Impacts of COVID-19

Beginning March 17, 2020, the UI IRB implemented restrictions due to COVID-19, in which no new child subjects could be recruited. This restriction was implemented just after the start of the wait-list intervention, in the final year. This restriction prevented 32 students who were assigned to the wait-list intervention group in year 3 to be excluded from intervention, and these students were ultimately

analyzed as part of the within-school control group. The restrictions weren't lifted until after the school year and intervention period had ended.

Additionally, the final Post-program evaluation to evaluate the Link Training sessions was delivered electronically. Following the final debrief session, a survey link to the evaluation survey was emailed to participants via REDCap's automated survey function and completed electronically. Data was stored in a REDCap database maintained by the University of Iowa.

Secondary data collected during the 2020-21 academic year was also impacted by COVID-19 and remote learning options in the school district. Key data such as attendance and office referrals was sparse compared with previous years' data sets.

No Cost Extension

A no cost extension (NCE) was submitted to the National Institute of Justice, and approved, to extend the grant period through December 31, 2021.

Outcomes

Activities/accomplishments

University of Iowa Human Subjects Approval

This project received full approval from the University of Iowa Institutional Review Board (UI IRB) on June 29, 2017. The NIJ HSPO approved the project's initial Human Subjects and Privacy Certifications IRB application package on 7/25/2017.

Nineteen modifications were submitted over the course of the project, and approved by the UI IRB. These modification are listed and described here:

Modification #1, approved on 7/24/2017. The purpose was to correct language on the "TIC consent" document, and requested by NIJ .

Modification #2 approved on 8/1/2017. The purpose was to add research team members, add the approved data sharing agreement, and update consent materials for the intervention.

Modification #3 approved on 9/29/2017. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #4 approved on 10/10/2017. The purpose was to update study details such as the anticipated number of minor subjects, and edits to the primary data collection tool.

Modification #5 approved on 11/14/17. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #6 approved on 12/28/2017. The purpose was to update study procedure for adult subjects, add research team members from the Cedar Rapids Community School District, and attach approved reliance agreement.

Modification #7 approved on 2/6/2018. The purpose was to make minor instrument changes to include sub-components of a stress screener on the primary data collection instruments

Modification #8 approved on 3/6/2018. The purpose was to add a research team member from the Cedar Rapids Community School District.

Modification #9 approved on 3/28/2018. The purpose was to correct a privacy certificate formatting error from previous modification.

Modification #10 approved on 5/23/2018. The purpose was to update a section of the protocol in order to move electronic files from UI College of Public Health Servers to Public Policy Center servers.

Modification #11 approved on 9/10/2018. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #12 approved on 11/7/2018. The purpose was to modify study procedures for the subject group who participates in the TIC program evaluation.

Modification #13 approved on 2/4/2019. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #14 approved on 5/1/2019. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #15 approved on 7/31/2019. The purpose was to add research team members from the Cedar Rapids Community School District, and to add translated recruitment and consent documents in foreign languages relevant to the school population.

Modification #16 approved on 9/17/2019. The purpose was to add research team members from the Cedar Rapids Community School District and the University of Iowa.

Modification #17 approved on 10/14/2019. The purpose was to add research team members from the Cedar Rapids Community School District.

Modification #18 approved on 3/25/2020. This modification was not anticipated, and the purpose of the modification was to revise methods to align with the University of Iowa's research restrictions due to COVID-19.

Modification #19 submitted on 5/5/2021 to add research team members from the University of Iowa and the University of Minnesota (described below).

Continuing reviews were submitted annually to the UI IRB, and approved on 5/10/2018, 4/22/2019, 4/9/2020, and 3/8/2021. The latest Continuing Review package was submitted to NIJ HSPO, and returned with a request for correction. We are currently working with the University of Iowa IRB to correct the documentation.

University of Minnesota Human Research Protection Program, Reliance agreement

On December 11, 2017, the University of Minnesota Human Research Protection Program (HRPP) execute reliance agreement with the University of Iowa. The University of Iowa served as the IRB of record for this research project.

Study Participant Recruitment

Active recruitment of child subjects began in August 2017, and continued into the 2018-19 and 2019-20 academic years. Prior to child assent, parents/legal guardians are invited to review a "parent consent letter" and provide permission for their child to participate as a research subject in the Link for Schools program. This parent consent process took place online during the student registration period. Child participants who received the Link intervention were assented at the time of intervention delivery. Additionally, parents in Clusters 1, 2, and 3 were notified that the Cedar Rapids Community School District is providing de-identified data to University of Iowa researchers. Parents were able to opt-out if desired.

Intervention activities commenced in the fall semester of 2017, starting with students in Cluster 1, and assigned to the immediate intervention group. Students assigned to the wait-list intervention

group were approached for intervention the following semester. This pattern continued with newly identified students in the 2018-19 and 2019-20 academic years, for both Cluster 1 and 2 students. Due to COVID-19, the CRCSD finished the 2019-20 academic school year with on-line learning options, only. The research team adjusted the protocol to comply with mandates from the University of Iowa IRB with regard to research subject safety. The CRCSD research team was unable to assent any new child subjects after this date, therefore a portion of wait-list students were unable to participate as research subjects. Child subjects that had already been enrolled by this date were given the option of continuing the intervention via telephone or web meeting.

Active recruitment of adult subjects in Cluster 1 began in August 2017, and continued with Clusters 1 and 2 into the 2018-19 and 2019-20 academic years. Subjects were recruited for the purposes of evaluating the TIC training sessions and the Link Training sessions.

Data Analysis

In January of 2018, the development of codebooks and data dictionaries commenced for all primary data collected, and in accordance with NIJ data archiving policies. Data were cleaned and examined for descriptive statistics of preliminary data, and codes were developed for preliminary and later analyses. Concurrently, the University of Iowa research team began working with data analysts from CRCSD, to develop a milestone schedule for delivery of the secondary data. Secondary data sets were compiled by data analysts and shared in June of 2021.

COVID-19 delayed the timeline of the secondary data, and also impacted the quality of data for the 2020-21 academic year, the year following the intervention. Because of the very high level of remote learning, the data is not comparable to previous years; the referral data proved to be unusable because it was too sparse.

Data Sharing Agreement

The UI research team negotiated an initial data sharing agreement with the CRCSD, which was amended on two occasions. The first amendment was negotiated in May of 2017 and adjusted the timeframe of the agreement. In 2021, the UI team met with the NIJ Program Officer and Social Science Analyst to discuss concerns about NIJ's data archiving requirements, and the current language of the Data Sharing Agreement between the University of Iowa and the Cedar Rapids Community School District. As a result of the meeting, the University of Iowa and CRCSD negotiated a second amendment to the Data Sharing Agreement with the school district in July 2021. This second amendment is pending IRB review.

Opportunities for training and professional development

Staff at all schools in Clusters 1 and 2, including interventionists, were provided training in TIC principles. Training was offered annually, in line with the staggered study design, and occurred in each of the school buildings. Parents were also offered this training, via the internet, on an as-desired basis.

Interventionists in Clusters 1 and 2 were provided training in human subjects protections, study procedures, and specific Link Intervention skills. These topics were covered during four formal training sessions throughout the year, and in line with the staggered study design. In the 2018-19 and 2019-20 academic years, the CRCSD offered additional coaching sessions in Motivational interviewing to interventionists. These 60- minute coaching sessions occurred every two months, and were conducted by a local member of the Motivational Interviewing Network of Trainers (MINT), for the purposes of interventionists' to practice skills, get feedback, and discuss case studies of challenging students with colleagues. Along with coaching, interventionists were also mentored by 5 Link Specialists, who received specialized training in Motivational interviewing at the beginning of the project.

The CRCSD research team participated in additional intensive training in Motivational Interviewing, data collection procedures, referral protocol, and other relevant topics to enhance

capacity to support Link interventionists and align other CRCSD initiatives with the Link program, and to promote integration.

Results and findings

Objective 1: Evaluate the effectiveness of Link in improving climate and student performance.

Participants of the Tier 1 evaluation reported their knowledge of trauma before and after training. Their responses are shown in Figure 3 and Figure 4. The difference between participants' knowledge before training and their knowledge after training was statistically significant, with knowledge after training being significantly higher. Knowledge of trauma after training was, on average, 1.3 units higher than before training (*paired t*(345) = 14.9, *p* = 0.00). These figures demonstrate that there was a general shift in knowledge towards the higher end of knowledge, and this implies that the school staff and community became more aware of trauma as a result of the training. This increased trauma awareness is likely associated with a more supportive school climate.

Figure 3. Staff knowledge of Trauma before Tier 1 training

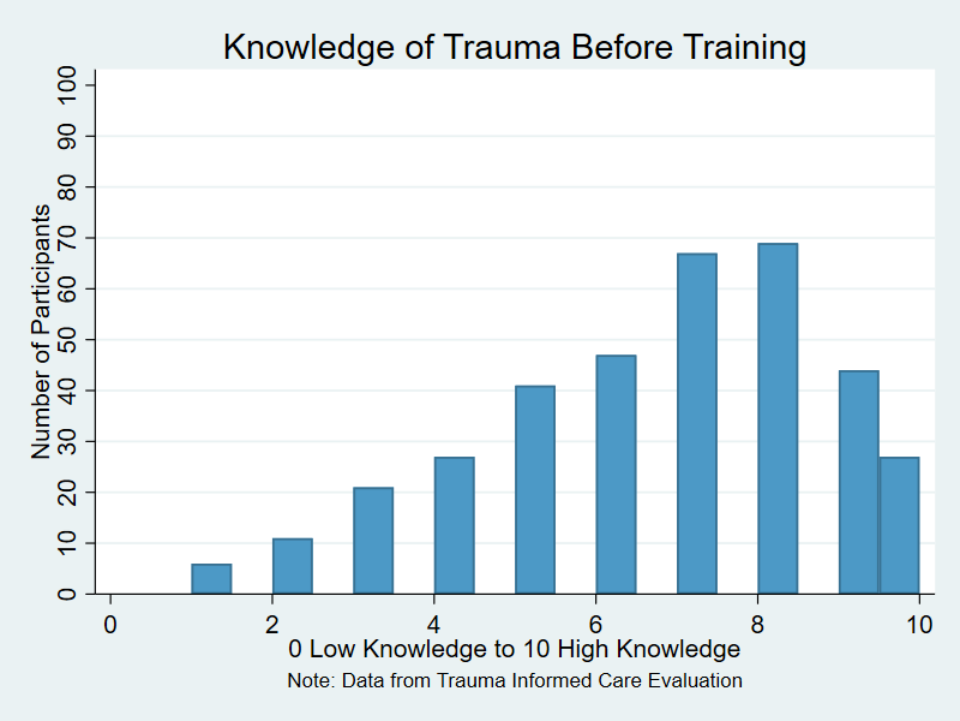
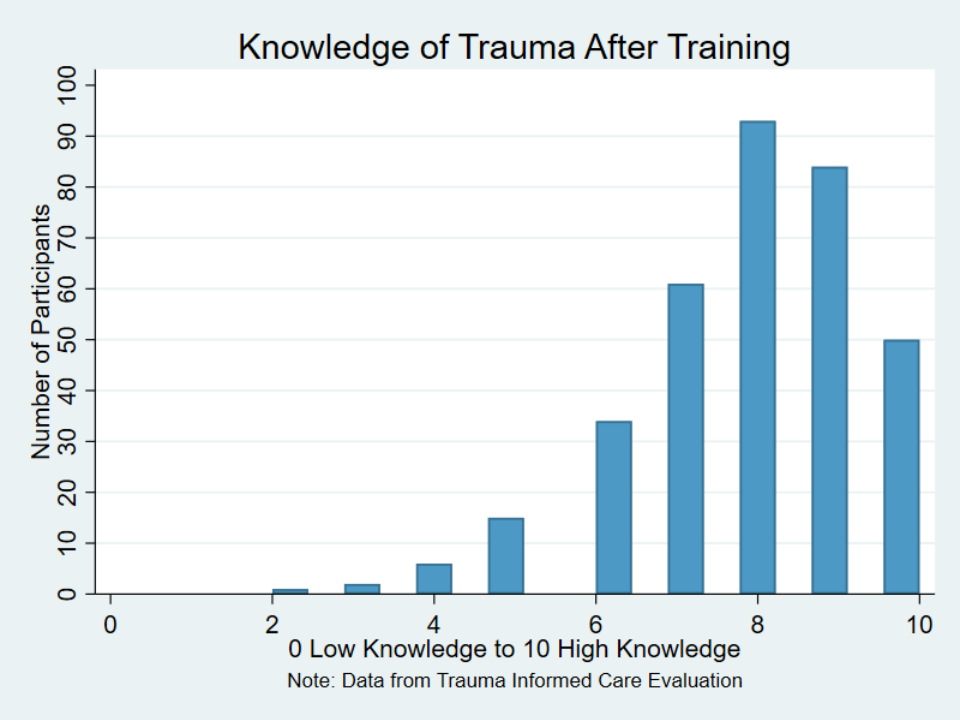
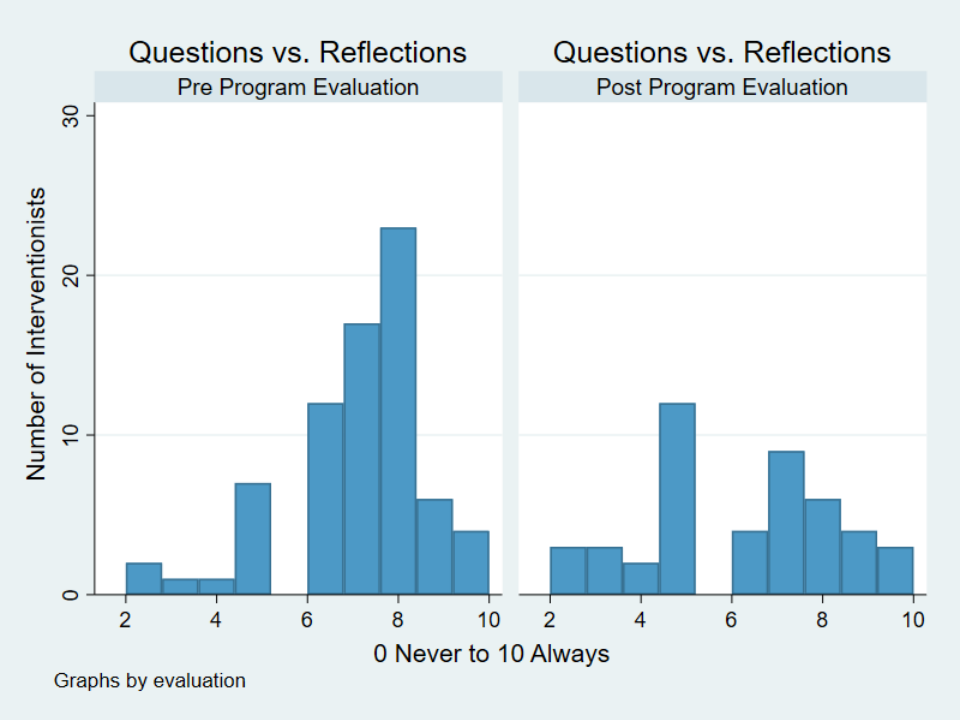


Figure 4. Staff knowledge of Trauma after Tier 1 training



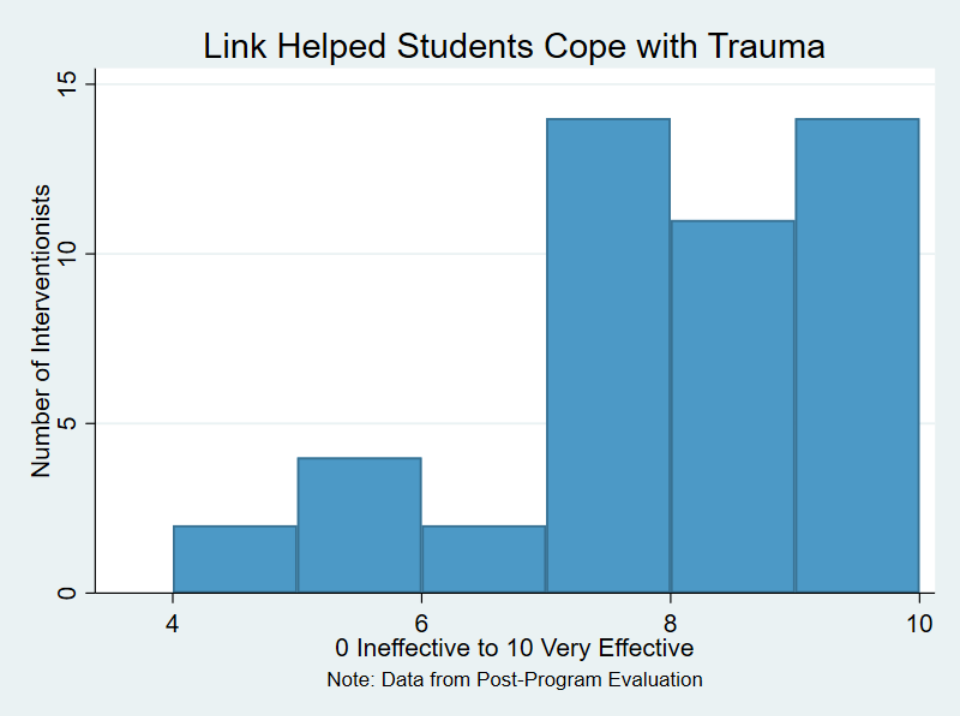
Participants of the Tier 2 training evaluation reported their experiences at several stages of the Link training, and we present the findings from the pre-program and post-program evaluations. On pre- and post-program surveys, Interventionists were asked to rate, "When talking with students, I use more questions than reflections," on a scale of 1-10 the statement (where 1 is "never" and 10 is "always"). Reflections are a key communication skill that interventionists utilized during the Link program. Reflections are critical when developing supportive relationships with students, and the resulting relationships impact school climate.[8] Figure 5 demonstrates how the use of the use of open questions decreased, in comparison to the use of reflections, from pre-program to post-program time points. While the number of interventionists reporting their behaviors decreased, due to attrition, the peak frequency of question usage shifts downward on the x-axis. This downward shift in the frequency of using open-ended questions at earlier time points, when compared to later time points, demonstrates an improvement in interventionist skill and ability.

Figure 5. Interventionists' self-reported use of key skills before and after Tier 2 training



Most importantly, interventionists indicated that the Link program was an effective way to help students cope with trauma, with an average response of 7.7, on a 10-point scale (Figure 6).

Figure 6. Interventionists' rating of perceived effectiveness of Link



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The skills acquired through the Tier 2 Link training were used throughout the Link intervention sessions. On a scale of 1 to 4, where 1 is "not at all helpful" and 4 is "very helpful," interventionists rated the effectiveness of the intervention skills used during their sessions. Table 5 provides descriptive statistics for each skill used during the sessions. If the skill was not used during the session, the item was treated as missing. The missing values are why the total numbers fluctuate and are not equal to the total sessions conducted (*N* = 4,358). Overall, interventionists rated open-ended questions as the most helpful skill across the sessions (Table 6).

Table 5. Effectiveness Rating for Each Skill or Tool

	Min	***M***	***Mdn***	***Max***	***SD***	***N***
Questions	2.00	2.40	2.00	4.00	0.52	3846
Reflections	2.00	2.35	2.00	4.00	0.50	3312
Affirmations	2.00	2.25	2.00	4.00	0.45	2187
K-6 Stress Screener	2.00	2.40	2.00	4.00	0.55	934
Other	2.00	2.24	2.00	3.00	0.43	248

Table 6. Most Helpful Skill Used During the Link Session

	Frequency	**Percent**
How, What, Tell me more questions	2,601	59.67
Reflections	1,080	24.78
Affirmations	298	6.84
K-6 Stress Screener	356	8.17
Linking student to outside sources of support	21	0.48
Missing	3	0.07
Total	4,359	100

In addition to communication skills, interventionists used the K-6 Stress Screener to assess the student's stress level at various points during the intervention timeframe. The screener was not used during each intervention session, likely because it disrupted the natural flow of conversation between student and interventionist, or because the interventionist decided its use was not warranted. This

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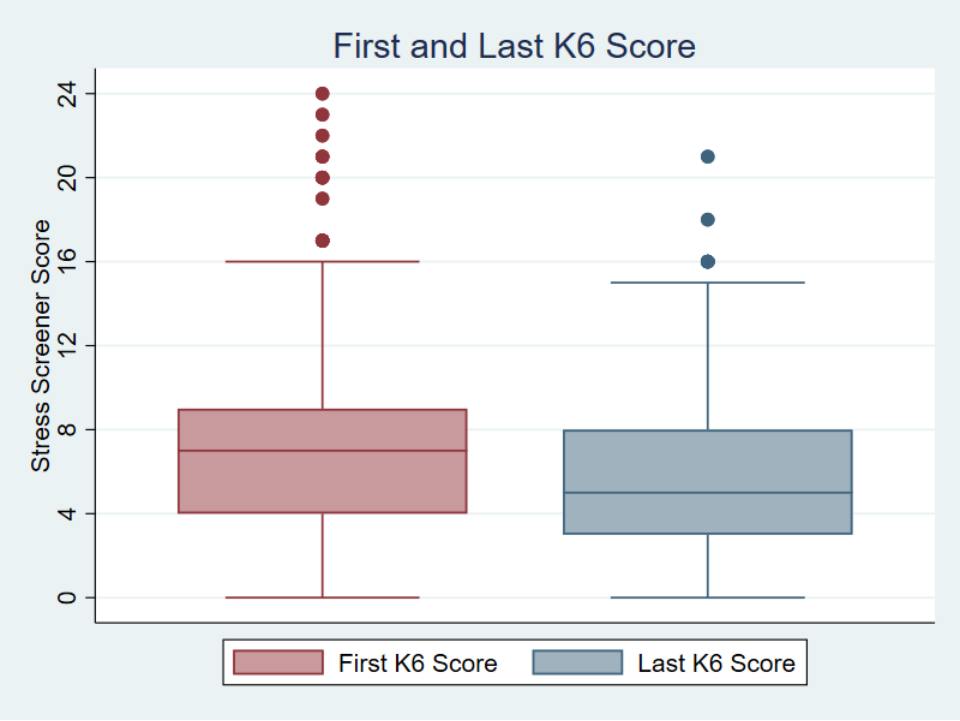
resulted in higher levels of missing data. We calculated a difference score between their first recorded screener and their last recorded screener to assess the change in stress during the study.

The screener was administered two or more times to 379 students. For the 329 students who had 2 or more stress screener scores, the average change was -1 point. A downward trend, shown in Figure 7, indicates students who received the intervention exhibited less stress over time.

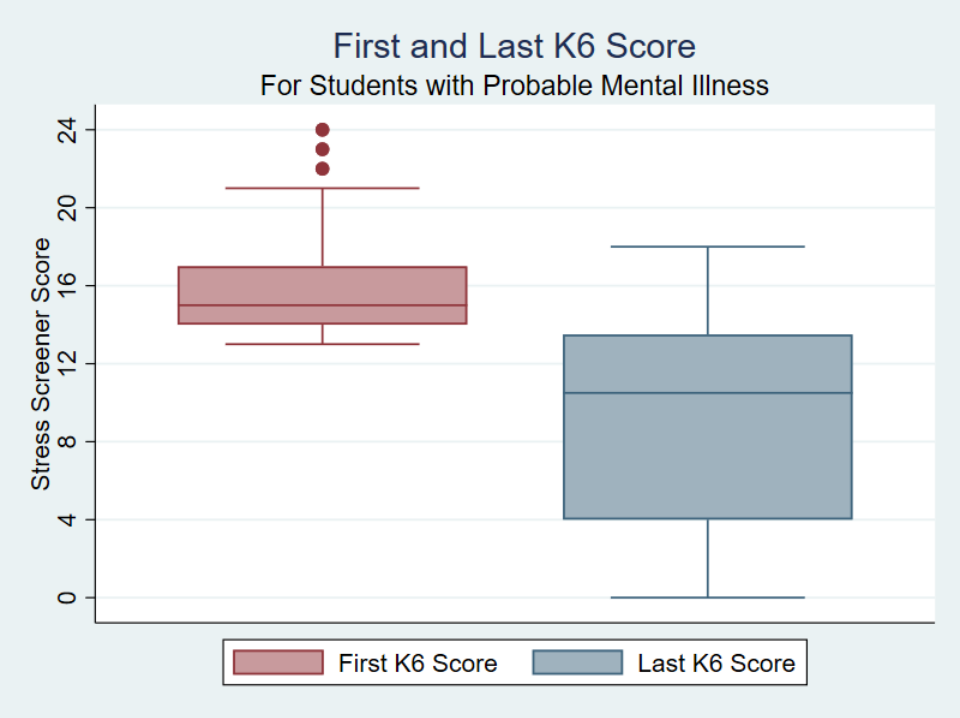
Figure 7. Decrease in K6 Screener Score of Students with At Least 2 Instances of Screener Administration



Previous validation research about the K6 screener suggests that a score of 13 or higher classify respondents as having probable serious mental illness(SMI).[33] This guidance in the use of the screening tool was applied to the Link intervention in regards to interventionist decision-making processes regarding dosage of intervention and referral. To assess the impact of the intervention on non-specific stress and probable SMI, a subset of students were analyzed. This sub-set of students scored 13 or higher on their first screener score (*n*=40). A score of 13 or higher is indicative of a student needing more supports for probable SMI. These 40 students scored high on their first scores, but their scores trended downward over the course of the Link program, with an average decrease of 7 points between

their first and last screener scores. This subset of students showed the most substantial decrease in scores over the course of the study, and is shown in Figure 8.

Figure 8. Decrease in K6 Screener Score of Student's Whose First Screener Score was 13 or Greater

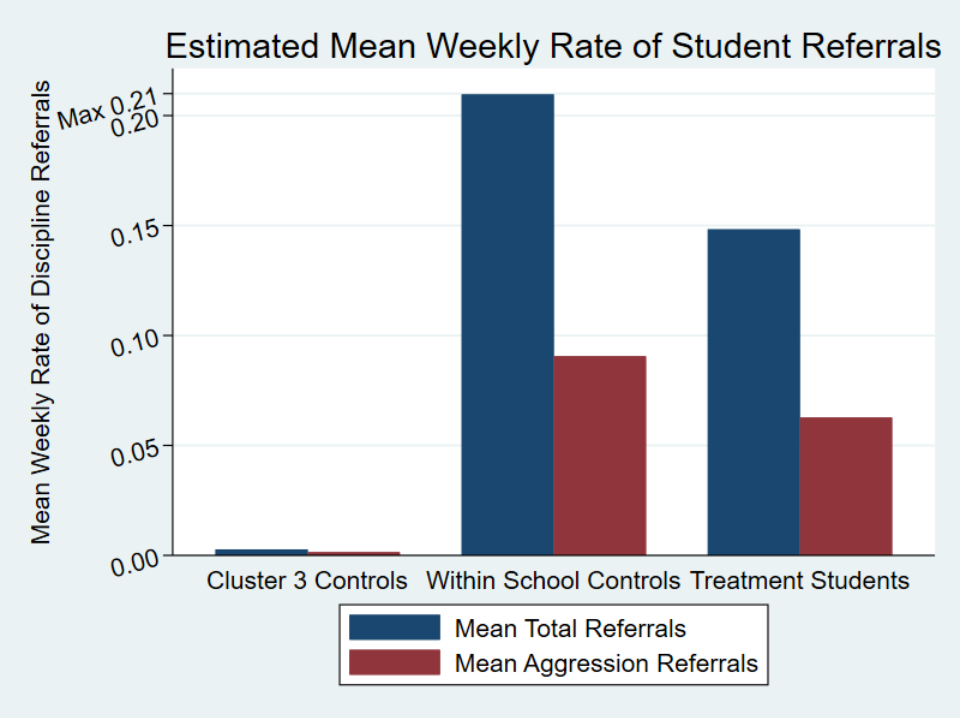


Objective 2: Evaluate the effectiveness of Link in reducing school violence (i.e., overall referrals and aggression referrals).

Across the three study years, there were a total of 6,875 overall discipline referrals reported for intervention students, within-school controls, and Cluster 3 controls, combined. Of these, 3,052 were aggression-related referrals. The estimated mean weekly overall referral rate for the intervention students was 0.1486 during the study period. In comparison, the within-school control students, who received parental consent but who did not assent to meeting with an interventionist (either because they chose not to participate, they were unable to schedule, or could not assent because of COVID-19 restrictions) had an estimated mean weekly rate of referrals of 0.2091, which is significantly higher than the mean weekly rate for the intervention students (Wald *p-value*[24] = 0.0414). The Cluster 3 control

students, who attended a completely different cluster of schools (with no intervention ongoing in the schools), had an estimated mean weekly rate of referrals of 0.0027, which is significantly lower than the intervention students' mean weekly rate (Wald *p-value* < 0.0001). Again, the cluster of control schools that received no intervention, at all, appears to have been qualitatively different from the intervention schools. As such, we consider this group to be a less optimal control group than the group of students who attended our intervention schools and met eligibility criteria but who did not receive intervention. When examining the intervention's effect specifically on aggression-related referrals, we observed a mean weekly rate of referrals of 0.0631 during the study period. For the two control groups: within-school controls and the Cluster 3 controls, the estimated mean weekly aggression related referrals are 0.0914 and 0.0012, respectively. These estimates are statistically different from the intervention group (LRT *p-value* < 0.0001), although the control cluster rates were in the wrong direction. These results are illustrated in Figure 9.

Figure 9. Estimated Mean Weekly Rate of Student Referrals, by overall and aggression-related referrals



Throughout the study, the students who received Link had a lower mean weekly rate of referrals than within-school controls (i.e., those identified as needing Link but declined to be treated, were unable to schedule, or were unable to assent due to COVID-19 restrictions implemented in March 2020). We note again, making comparisons with students from Cluster 3 control schools should be undertaken with extreme caution in future analyses because these students were characteristically different from those attending the intervention schools in terms of referral rates, despite being selected using the same criteria that were used to select students for treatment in our intervention schools.

Objective 3: Measure the costs associated with Link administration, implementation, and training and estimate its cost effectiveness.

The following tables present summary statistics related to the cost analysis of Tier 1 and Tier 2. We present all costs tracked for program implementation as well as research and evaluation activities. Also, we would expect lower costs in a non-research setting because research expenses would not be incurred.

Table 7. Cost of Tier 1: All Staff Training in Trauma Informed Care

	2016	2017	2018	2019	2020	*Total*
Video development and production	$10,672.01	$0.00	$0.00	$0.00	$0.00	*$10,672.01*
Trauma Informed Care training	$0.00	$4,421.42	$2,107.66	$413.27	$0.00	*$6,942.35*
Total						*$17,614.36*

Table 8. Cost of Tier 2: Training and Delivery of 1-on-1 Intervention

	2016	2017	2018	2019	2020	*Total*
Link training	$0.00	$10,724.50	$13,429.37	$18,963.01	$4,501.83	*$47,618.71*
Link mentoring by specialist	$0.00	$0.00	$0.00	$3,136.67	$1,732.83	*$4,860.50*
Link mentoring by University team	$0.00	$2,203.70	$2,100.86	$1,922.98	$0.00	*$6,227.54*
Link mentoring by Motivational Interviewing consultant	$0.00	$0.00	$4,420.50	$6,293.71	$2,132.77	*$12,846.98*
Link intervention delivery	$0.00	$1,023.91	$14,559.50	$22,895.65	$7,876.86	*$46,335.92*
Total						*$117,909.65*

Limitations

Design Limitations

Limitations to the study design existed. Not all schools in the intervention clusters (Clusters 1 and 2) were open to receiving TIC (Tier 1 training), as offered by the research team. Principals of each school had ultimate control of how their schools and staff participated. While all principals were open to the intervention, one school's principal felt repeated TIC training was not warranted.

When identifying students for intervention, the research team calculated percentiles for the entire sample of consented students rather than using full district enrollment data, which was unavailable at the time. We chose the distribution of scores for identification,[4,22,23] and using distribution cut-offs is common. Across years, the ELA and Math performance criteria did change because of availability of data. A large number of students were not proficient, and using this criteria was not

meaningful. Additionally, not all parents register their students for school prior to the start of classes, if at all. The study identification procedures may have missed some students, who may have otherwise qualified, due to this limitation.

In regard to the cost effectiveness analysis, some of the Tier 2 costs (i.e., mentoring, training of interventionists in research protocols) were costs related to research activities themselves, and supported by grant funds. We anticipate costs of real world implementation would be lower.

COVID-19 disrupted the design of the intervention in the final year of data collection. Students who were identified for intervention in the 2019-20 academic year, and randomized to the wait-list intervention group were not offered the opportunity to participate, due to timing of the pandemic and restrictions put in place to mitigate the spread of the disease.

Also, there were challenges in the referral process for students who needed links to additional resources beyond the intervention, due to varying availability of existing programs among intervention schools. In other words, not all programs were available at all schools, to all intervention students.

Data Limitations

In the second year of the study, the CRCSD changed academic data collection systems. The district moved from PowerSchool to Infinite Campus; this change caused re-work of some of the data compiling.

Upon examination of the secondary data related to Cluster 3, control group schools, the study team found that neither this cluster, nor any other cluster within the district, was comparable to the intervention clusters regarding demographics, office referrals, and other key variables. Therefore, we focused on intervention students serving as their own controls (prior to receiving intervention) and also identified students in the intervention schools who had received parental consent but who themselves did not participate (because they declined, could not schedule, or could not be seen due to COVID-19 restrictions).

Some anticipated sources of secondary data weren't available (school-level and student-level climate) in a format that could be used for quantitative analysis. Existing primary and secondary quantitative data sets, such as High Reliability Schools[34] (HRS) and Positive Behavioral Interventions and Supports[35] (PBIS) data, did not provide sufficient data for assessing change in school-level climate/culture, student outcomes or cost effectiveness.

Additionally, documentation of existing procedures within schools (prior to and during our study) for prevention and intervention strategies within a tiered system of student supports was limited. Other school programming (beyond Link) was implemented with varying degrees of fidelity and consistency and not well-documented, according to school personnel. It therefore, was not possible to assess potential impact of other district and school initiatives on our finding regarding the Link interventions.

The compilation and cleaning of secondary data took longer than anticipated due to annual changes in data collection protocol and inconsistency in how key variables were collected over time by the school district.

In August 2020, portions of Iowa were impacted by a Derecho storm event that severely impacted the Cedar Rapids and Iowa City areas. The storm caused significant damage to personal property and school buildings, and residents and businesses in the area were without utilities (electricity, internet service, etc.) for weeks. The storm also caused significant disruptions to the re-opening of some school buildings, which delayed the ability of the school district to share necessary secondary data, and impacted the secondary data collected for the 2020-21 academic year.

Finally, COVID-19 impacted post-intervention measurement of behaviors between March 2020 and the end of the school year and in academic year 2020-21. Because many students were enrolled in online learning, behavioral and referral data were extremely sparse and unusable. Measurements of

academic achievement also were impacted because standardized testing of academic outcomes was not routinely conducted in the academic year of 2020-2021. Administrative Limitations

In general, COVID-19 caused administrative delays with IRB processes at both the University of Iowa and University of Minnesota. These delays slowed down data analysis because critical staff were not approved to access data in a timely manner.

Additionally, changes in school district data personnel caused delays earlier in our project (Fall 2018). New personnel were required by the district to re-create student ID numbers for the study, which caused additional meetings with University of Iowa IRB to understand and clarify study procedures.

Artifacts

List of products (e.g., publications, conference papers, technologies, websites, databases), including locations of these products on the Internet or in other archives or databases

Publications

None to report at this time. Manuscripts related to outcome measures are in development.

Conference Presentations

Branch, CA, Neff, S, Guinn, KM, Ramirez, MR, Heimer, K (2020, September). Link for Schools: A System to Prevent Violence. Poster presented at 2020 School Health Conference, American School Health Association. Albuquerque, NM (Virtual Conference).

Neff, S, Branch, CA, Guinn, KM, Ramirez, MR, Heimer, K (2021, March). Link for Schools: A System to Prevent Violence. Ignite Session presented at 18th International Virtual Conference on Positive Behavior Support, Association for Positive Behavior Support. Virtual Conference.

Neff, S, Branch, CA, Guinn, KM, Ramirez, MR, Heimer, K (2021, June). Link for Schools: A System to Prevent Violence. Breakout Session presented at Nebraska School Mental Health Conference. La Vista, Nebraska. Virtual Conference.

Videos and intervention tools

Prior to the start of the grant funding, the University of Iowa developed a series of training videos to be used for the project interventionist training. A video about TIC was developed to be used for the universal training of all school staff. Several videos about the Link intervention skills and supplementary tools were developed to be used along with the psychological first aid and motivational interviewing training of interventionists; eight topic-specific videos were developed to demonstrate conversations around student experiences with suicide, sports injury, shooting, parental violence,

parental incarceration, divorce, and bullying. These videos are available for viewing at: https://uicapture.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=e4d017e6-6133-4d0b-819d-495f72c74284.

The CRCSD produced a number of products as a result of this project. During the intervention period, Interventionist Toolkits were developed to be used by interventionists to help students decrease stress, build trust, and practices communication skills during intervention sessions. These portable containers were located in the health office of each building, and contained books, games, and various manipulatives (i.e. stress balls). Also Included, was a resource binder for staff with available programs and services, and information and notepads with the student stress screener questions.

A Training Aid was developed and deployed in 2019. This training aid consisted of a lanyard tag with printed skill reminders (i.e., open-ended questions, affirmations, reflections, and summaries), indicators of change talk, and ways of responding to change talk. This was used to prompt staff to use motivational interviewing skills during conversations, and to maintain Spirit of MI with reminders of key concepts.

The CRCSD developed a series of targeted videos, to be used for continued training in Link skills. The videos are:

1) CRCSD Link Video: Highlight school staff experiences of using Link for Schools to connect with students. Used to inform key stakeholders of the program purpose and benefits.

2) Link Training 1: Defines motivational interviewing, its purpose, and four processes. Demonstrates the difference between open and closed questions. Recognizes the different types of reflections. Teaches staff how to actively establish a connection with a student.

3) Link Training 2: Summarizes different types of reflections. Teaches staff to understand how MI is a trauma-informed response to student stress. Demonstrates how to identify and respond to change

talk. Distinguishes between statements of praise and affirmations. Teaches staff how to direct conversations and draw out student ideas.

3) Link Training 3: Summarizes the process of using the Elicit-Provide-Elicit (E-P-E) skillset for guiding students toward behavior change. Identifies the use of affirmations in conversation. Demonstrates how to use E-P-E in the context of MI. Identifies appropriate referral resources based on student needs. Teaches staff how to help students set a goal and develop a plan.

4) Interventionist reflection videos: A collection of feedback verifying qualitative data collected during annual debriefing sessions with interventionists, where they reflect on experiences using Link skills during the course of the intervention, including COVID-19.

Theme 1- Interventionists respond to the question, "How has capacity to roll with resistance (and other Link skills) affected your confidence in handling difficult situations?" Link training can increase staff confidence and self-efficacy, help prevent adverse situations in the classroom, and help students build capacity by learning to help themselves in interactions. "I can be a good listener, and I can be supportive, but….the people I'm working with in and out of school, I need to let them help themselves." Interventionist also shared how Link builds capacity with non-student groups, "it (Link) facilitates not only a better relationships with the students, but the relationship the parents."

Theme 2- Interventionists respond to the question, "How might using Link for schools more systematically help school staff address student needs?" Interventionists discuss the potential benefits of a training all school staff in the Link skills. "…when you get the buy-in and show the benefits of it, for the teachers and the kids, it's a win-win…I'm just really thankful for it, because I thought it was really powerful. And, this *is* mental health…for the teachers and for the kids." Expanded training would provide a platform for team feedback and improvement and improve climate in the building. "If we got into the habit of talking to each other like that (referring to

Link skills), the climate in our buildings would be better…the more we could expand it, I think, the better."

Theme 3- Interventionists respond to the question, "What examples can you provide about how you saw students change after their participation in Link?" Link improves student outcomes by supporting kids in a way that allows them to guide their own path, and allowed the interventionists to get to know the students on a profound level. "It's creating a two-way street…where both parties are respected, and listened to, and valued…" The use of the stress screener was helpful in contextualizing student experiences.

Databases

No databases were produced as a result of this research.

Data sets generated

For this project, we plan to archive the following data sets and associated documentation:

1. Link Case Management Tool Data: Primary data collected by interventionist trained in Link study procedures. This data describes details (date, duration, etc.) of each intervention session conducted with student participants, interventionists' self-reported rating of intervention skill use, measures of student stress, and planned follow-up actions.

2. Linkages and Other Supports Data: Primary data collected by interventionist trained in Link study procedures. This data describes details (description, date, duration) of actual follow-up actions that resulted from session encounters. Interventionists also recorded other services the student received via the school district.

3. Trauma Informed Care Evaluation Data: Primary data collected by the research team evaluating TIC training (Tier 1) that was delivered to school staff and parents. Participants reported their role, school of employment, years as educator, knowledge before/after training, and how training improved their understanding of key concepts of trauma.

4. Link Pre-Program Evaluation Data: Primary data collected by the research team prior to delivery of the first Link training (Tier 2) to interventionists. Participants provided self-reported ratings of communication skills (both intervention consistent and inconsistent), and their past experience with motivational interviewing.

5. Link Post-Training Evaluation Initial Data: Primary data collected by the research team evaluating Link training (Tier 2) that was delivered to interventionists following their first skills training session. Participants provided feedback on how the training sessions raised their awareness of key communication/intervention skills.

6. Link Post-Training Evaluation Follow-Up Data: Primary data collected by the research team evaluating Link training (Tier 2) that was delivered to interventionists following their second skills training session. Participants provided feedback on how the training sessions raised their awareness of key communication/intervention skills.

7. Link Post-Program Evaluation Data: Primary data collected by the research team at the end of each academic year, evaluating Link training (Tier 2) that was delivered to interventionists and program implementation. Participants provided self-reported ratings of communication skills (both intervention consistent and inconsistent), and the effectiveness of the training in implementing the intervention.

8. Cost Data: Cost data pertaining to program development, training, and implementation.

9. Secondary Data: Student administrative records collected by the school district, pertaining to enrollment, office referrals, and academic achievement, and merged with intervention data from the Link Case Management Tool.

Dissemination activities

See conference presentations above.

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