



Start-Up and Implementation Costs for the Trust Based Relational Intervention

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Abstract

Capturing costs associated with prevention activities related to substance use disorders (SUD) and mental health (MH) is critical. In this study, Trust Based Relational Intervention (TBRI®), an attachment-based, trauma-informed intervention, is conceptualized as a preventive intervention to reduce substance and opioid use among youth involved with the legal system. When implemented alongside community reentry, TBRI leverages family systems as youth transition from secure residential care into communities through emotional guidance and role modeling. Activity-based cost (ABC) analysis was used to guide cost data collection and analysis for both start-up and implementation of the TBRI intervention. Start-up costs were estimated using data across eight sites during their start-up phase. All components, activities, personnel involved, and time associated with implementation of TBRI sessions according to protocol were defined. National wages were extracted from O*NET and utilized to calculate total costs for each TBRI component. Total and average TBRI intervention costs were calculated with a breakdown by TBRI sessions and number of staff and participants. A sensitivity analysis was conducted to estimate TBRI implementation costs with travel. The total cost for the TBRI intervention, representing 42 sessions, ranges from \$6,927, without travel expenses or \$12,298, with travel expenses. The average per family cost ranges from \$1,385 (without travel) to \$2,460 (with travel). Costs are primarily generated by time investments from primary interventionists. The sensitivity analysis shows costs for responsive coaching would double with travel costs included. Results aim to show that using ABC for prevention activities, like TBRI, to understand cost drivers can facilitate future intervention sustainability.

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Keywords Substance use prevention · Costing · Trust based relational intervention · Implementation costs · Juvenile justice

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Introduction

The national opioid crisis in the United States has mobilized efforts to implement treatment, prevention, and harm reduction strategies targeting opioid use and misuse and opioid use disorder (OUD). These concerns are particularly relevant due to the rising rates of SUD and OUD in youth and young adults (Abrams, 2024; Ahmad & Sutton, 2023; Ciccarone, 2019; National Institute on Drug Abuse, 2022). The National Institutes of Health has funded several programs under its Helping End Addiction Long-term (HEAL) initiatives, including the HEAL Prevention Cooperative (HPC), focused on preventing opioid initiation and escalation among youth and young adults in a variety of settings, including the legal system, schools and healthcare clinics (Andersen & Fishbein, 2023; Dunlap et al., 2022; Ridenour et al., 2023). The Leveraging Safe Adults (LeSA) Project is one of the ten research projects that comprise the HEAL HPC. LeSA uses Trust-based Relational Intervention® (TBRI®), a trauma-informed, attachment-based intervention, to address underlying relational, coping, and emotional needs among youth in secure residential facilities through interactions with responsive adults (Knight et al., 2021). Concerns regarding opioid use in youth involved in the legal system are high considering that the number of youth who are entering the system with substance use and mental health disorders is on the rise (Bowser et al., 2019; Kim et al., 2021; Puzanchera, 2022). While there have been a number of initiatives to coordinate substance use and mental health services for youth while they are in the legal system (Becan et al., 2020; Suarez et al., 2012), preventing the initiation of or continued substance use and addressing co-occurring mental health issues needs to happen continually while youth transition back to their communities (Bondoc et al., 2021; Knight et al., 2021). This process is complicated by the parallel but not integrated systems of criminal-legal processing and behavioral health assessment and treatment (Bowser et al., 2018).

There are some evidenced-based practices that have been used to assist youth involved in the legal system (YILS) with SUD, including OUD, as they transition back to their communities (Bird et al., 2020; Griller Clark & Mathur, 2021). While these evidence-based treatment models include cognitive behavioral therapy (CBT), contingency management, and family-based therapy, they lack a comprehensive approach that incorporates trauma-informed, attachment-based principles that are included in TBRI (Purvis et al., 2013a, 2013b). Effective programs for YILS focus on improving adaptive functioning (e.g., relationships, personal insight, and skill building) rather than on control-oriented approaches (e.g., those that aim to suppress delinquency through discipline, deterrence, and surveillance) (Evans-Chase & Zhou, 2014; Young et al., 2017). As part of the HPC, the Trust-based Relational Intervention (TBRI) caregiver package has been adapted and is currently being tested to assist in the community reentry of youth at risk for OUD who have had contact with the legal system (Knight et al., 2021). TBRI leverages family systems in providing emotional and instrumental guidance, support, and role modeling as youth transition back to the community (Knight et al., 2021). This is an important intervention to use with this population because youth in the

legal system often have high complex trauma (Duron et al., 2022) and come from dysfunctional families (MacKinnon-Lewis et al., 2002; Osher & Hunt, 2002). The intervention has been used in various settings, including residential treatment facilities, foster care families, and schools. A recent pilot study indicates the feasibility and acceptability of an adapted TBRI among youth in secure residential facilities and their caregivers (Knight et al., 2021; Purvis et al., 2013a, 2013b; Razuri et al., 2023; Yang et al., 2024). TBRI implemented in other settings such as a charter school with at-risk youth reported improved behavioral outcomes (Parris et al., 2015). Implementing TBRI in child welfare systems has not only improved outcomes for youth, but also improved relations and communication between employees (Crawley et al., 2021), suggesting that the intervention may have impacts beyond the participants.

Substance use disorder preventive interventions and the evaluation of these interventions, especially for youths involved in the justice system are limited. While there have been a number of studies estimating the cost and cost effectiveness of treatments for substance use and mental health for adults and youth in general (Fardone et al., 2023; French et al., 2008; Jalali et al., 2022; Onuoha et al., 2021), less has been studied and published on the cost and cost effectiveness of prevention of substance use for these populations (Dunlap et al., 2022). There have been no studies to date examining the costs of implementing TBRI. If additional investments in prevention are warranted, the budgetary impact of starting such interventions will be essential.

While there are numerous SUD treatment programs for YILS, there are far fewer preventive interventions. The Washington State Institute for Public Policy (WSIPP) records show only seven prevention programs for SUD and risky behaviors. Additionally, limited efforts are dedicated to the prevention of SUD for YILS and youths generally (Compton et al., 2019). Several research studies have examined the importance of SUD prevention for youth (Nelson et al., 2022), and adolescents in the legal system (Knight et al., 2016), however, these models are not widely employed to the nuanced conditions presented by YILS, and do not utilize trauma-informed intervention strategies, such as those seen in TBRI, thus emphasizing the need for study of this prevention models.

This study is one of the first to provide a detailed look at the resources and costs required to implement a trauma-informed intervention as a preventive intervention, TBRI, targeting opioid use/misuse in collaboration with secure residential facilities. The goal is two-fold: first, to provide stakeholders (i.e., agencies or teams providing service to YILS) with an understanding of the financial and budget impact of implementing this program going forward; second, to generate cost data that can be used in full economic evaluations looking at cost effectiveness or net economic benefits, or used in cross-study analyses of the economic impact of preventive interventions for YILS. Cost data can also be used to assess reimbursement mechanisms and determine a minimum-amount needed to sustain these services. Results in this study estimate the cost of implementing TBRI according to a standard protocol, utilizing costs inputs from implementing TBRI as part of the LeSA study.

Methods

Activity-based costing (ABC) principles were used to guide the cost data analysis to estimate the cost of TBRI according to a standard TBRI implementation protocol (Bray et al., 2012; Cidav et al., 2020; Dunlap et al., 2022). Following standard ABC methodology, relevant costs to implement TBRI according to the protocol were decomposed into pre-defined activities (sessions, meetings, etc.) with defined frequencies and associated personnel, youth and/or caregivers to arrive at a total cost for the TBRI protocol and relevant components of the protocol.

Using the TBRI protocol as a guide, the planned activities and sessions involving both caregivers and youth in the legal system and the community were defined. As shown in Annex Table 1, per protocol, the TBRI intervention included one 1-h one-on-one caregiver interview, nine 1-h caregiver group sessions as part of the Caregiver Curriculum, nine 45-min youth group sessions as part of the Youth and Young Adult Training, and four 1-h caregiver-youth Nurture Groups prior to release from secure residential facilities (see Annex Table 1 for details). Booster sessions, provided on a per-case basis, were included in the protocol, assuming each youth requested one booster session. Two responsive coaching sessions, which normally occur after the youth has transitioned out of the secure setting, were included as part of a standard TBRI protocol. To calculate the cost of the TBRI intervention per protocol, we assumed five youth-caregiver dyads participated in the intervention.

Using the defined TBRI protocol activities, all relevant personnel involved in implementing each of the TBRI components and time required for each component were defined. As shown in Annex Table 2, in addition to the intervention activities (meetings with caregivers and youth), the costing of the TBRI intervention also included meeting preparation and debrief for those delivering the TBRI intervention.

Using annual local salaries and titles for each individual involved in the intervention were matched with similar job titles from O*NET. National wages for each

Table 1 Primary and secondary TBRI intervention costs per family and per session (without travel), USD (2024)

| TBRI components | Total cost | Per family | Per session |
|---|------------|------------|-------------|
| Caregiver interviews (completed once per family) | \$460 | \$92 | \$92 |
| Youth and young adults (9 modules; group sessions) | \$1,991 | \$398 | \$221 |
| Caregiver curriculum (9 modules; group sessions) | \$1,506 | \$301 | \$167 |
| Youth and caregiver nurture groups (4 modules) | \$951 | \$190 | \$238 |
| Booster sessions (1 h per session; monthly) | \$741 | \$148 | \$148 |
| Responsive coaching (2 in-home sessions post-discharge) | \$1278 | \$256 | \$128 |
| Total costs (all components implemented together) | \$6,927 | | |
| Average total costs per family costs | \$1,385 | | |
| Average total costs per session costs | \$165 | | |

Estimated intervention total costs, per family costs, and per session costs across TBRI components, including two responsive coaching sessions. Total costs were calculated assuming five families. Per session costs assumed 42 sessions

Table 2 Estimated start up costs, USD (2024)

| | Cost | % of Total |
|--|-----------------|------------|
| Planning meetings | \$ 3,098 | 76% |
| Training | \$ 168 | 4% |
| Project management | \$ 132 | 3% |
| Intervention development | \$ 157 | 4% |
| Adaptation | \$ 52 | 1% |
| Non-labor cost (i.e., contracted cost, supplies) | \$ 466 | 11% |
| Total cost | \$ 4,074 | |

Estimated start-up costs for TBRI implementation across six major categories. Intervention development was defined as activities related to the development of policy and procedures. Adaptation was defined as activities related to adapting the intervention to caregivers, youth/young adults, and to deliver joint nurture group sessions

matched job title were extracted from O*NET. Salaries were converted into hourly wages, assuming individuals worked 40 h per week and 52 weeks a year. A rate of 30.2% was utilized in order to capture benefit costs. The 30.2% represented the average between the private benefit rates (29.4%) and civilian benefit rates (31.0%), as reported by the Bureau of Labor Statistics. This rate was utilized to capture any additional employer insurance costs, paid leave, and legally required benefits (i.e., Social Security, Medicare, unemployment insurance and worker's compensation). Since none of the youths were of working age, youth time was estimated using the minimum wage in the same state where O*NET salaries were extracted, which was \$7.25 in 2020. Similarly, since caregiver salaries were not available, caregiver time was also evaluated at the minimum wage. The hourly wage for each individual was multiplied by the length of time for each activity in each component to determine the per individual cost per component and the total cost of implementing TBRI per the protocol. The costs for both caregivers and youths were included to capture the portion of program costs that would be incurred by families.

Excel was used to develop a costing template for all cost inputs and cost calculations for the TBRI protocol. The cost to implement TBRI according to the protocol was analyzed by TBRI component and total cost, cost per family (youth and caregiver unit) and cost per session, assuming 5 youth-dyads. All costs were reported in 2024 USD.

TBRI Start-up Costs

ABC principles were also used to collect and analyze data to understand the costs to “start-up” a TBRI intervention. It was necessary to understand start-up costs for other researchers or community organizations seeking to implement similar TBRI programs that may not have existing infrastructure, such as secure site partners or resources. As there was no standard protocol for start-up activities, data related to start-up activities were collected and summarized across eight LeSA sites as they were preparing to begin implementing TBRI

with juveniles in the secure facility. Data were collected by through the use of broader methodology aligned with the HEAL HPC Health Economic Working Group (HEWG). Relevant start-up cost data were decomposed into pre-defined activities and measured the quantity and unit price of resources which included labor, contracted services, travel, and materials, supplies, and equipment (Dunlap et al., 2022). The pre-defined activities included: meetings to engage stakeholders outside of the core research project (i.e., partner engagement); initial staff training for program implementation; initial staff hiring and acquisition of minor equipment and supplies (e.g., purchase of licensed software); development and/or revisions to policies and procedures to accommodate organizational workflow and processes (e.g., producing a workflow manual for implementation in a particular site); management of the project (e.g., weekly team meetings), and non-labor costs that included costs such as swag and marketing materials. The specific data collected from the eight LeSA sites were collected throughout the start-up process by monitoring and tracking the time and resource investments for all activities listed above by research staff facilitating implementation of TBRI. Further information on methods for start-up data collection and analysis across all research projects is detailed in Dunlap et al., (2022).

The calculation of start-up activities followed the same methodology as the cost calculation for TBRI protocol costing, including the use of O*Net wage estimates (U.S. Department of Labor, 2024). O*Net salaries were converted into hourly wages, assuming they worked 40 h per week and 52 weeks a year. The total start-up costs were calculated by multiplying the total labor time for each job title by the O*Net wage estimates for each site. As described above with implementation costs, 30.2% was used to capture standard benefit costs. The average start-up costs across all eight LeSA sites that were included in the start-up calculation were utilized to proxy start-up costs for the TBRI implementation.

Sensitivity Analysis TBRI Protocol Costs with Travel

Travel costs were included as a sensitivity analysis to estimate protocol costs for TBRI components that may require staff to travel to deliver the intervention in person (Youth and Young Adult Training and Nurture Groups), assuming these components took place at the study site (a secure residential facility). Travel costs were comprised of both mileage cost and personnel costs associated with the travel. Mileage costs were calculated using the approximate distance from the research institute to the juvenile detention site, approximated using a three-hour drive or 178 miles (at 60 miles per hour). The mileage cost was calculated based on the IRS's standard mileage rate for business travel, 62.5 cents per mile (IRS, 2022). Round trip travel time and mileage to the youth home, the location of some study components, was assumed to be approximately the same as travel to the study site, approximately 178 miles. Personnel costs for travel were calculated utilizing the total travel time for the traveling staff members multiplied by their hourly wage.

Results

The protocol costing results for TBRI components, without travel, are presented in Table 1 (see Annex Table 1 for additional details on TBRI components). Table 1 shows that the total for the entire TBRI protocol, including the TBRI components listed in Table 1, is \$6,927 USD with the average cost per session is \$165 USD and the average cost per family is \$1,385 USD. The Youth and Young Adult Training component has the highest total cost, cost per family, and cost per session.

The costing results for the standard TBRI protocol, including travel, are presented in Annex Table 3. The total cost for the TBRI protocol including two responsive coaching sessions is \$12,298 USD. The average per session cost is \$293 and the average per family is \$2,460 USD.

Figure 1 summarizes the proportion of total costs by human resource type and study component, per protocol. Annex Fig. 1 shows the total component costs that do not involve secure site staff. Seen in Fig. 1, the three pie charts present the human resource investment for TBRI components that involve a secure site staff member. For these activities, secure site members comprise between 16 and 24% of total costs. Across all components, the primary interventionist constitutes the majority of costs. This ranges from 92% of the caregiver interview costs to 48% of nurture group session costs. Some sessions require non-facility staff investments, such as a secondary interventionist. Youth and caregiver investments, which capture the portion of the costs that are incurred by families, comprise between 5 and 15% (youth) and 5% and 32% (caregiver) of total costs across all components.

Figure 2 summarizes the results of the sensitivity analysis that examines the difference in cost with and without travel, for all TBRI Intervention components. The largest differences between protocol without travel and with travel costs are in the youth and young adults component, responsive coaching, and nurture groups. These higher costs with travel are due to protocol details as these components are to be conducted in person. The other components, caregiver curriculum, booster sessions, and caregiver interviews do not incur a cost difference with travel.

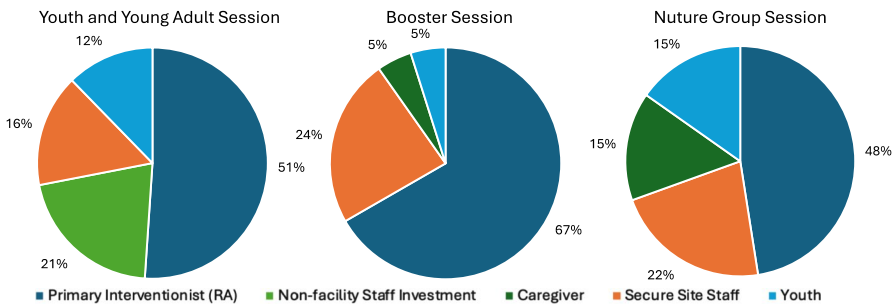


Fig. 1 TBRI component costs that involve secure site staff members. *Note* breakdown of costs for TBRI components for youth and young adult sessions, booster sessions and nurture group sessions which require secure site staff

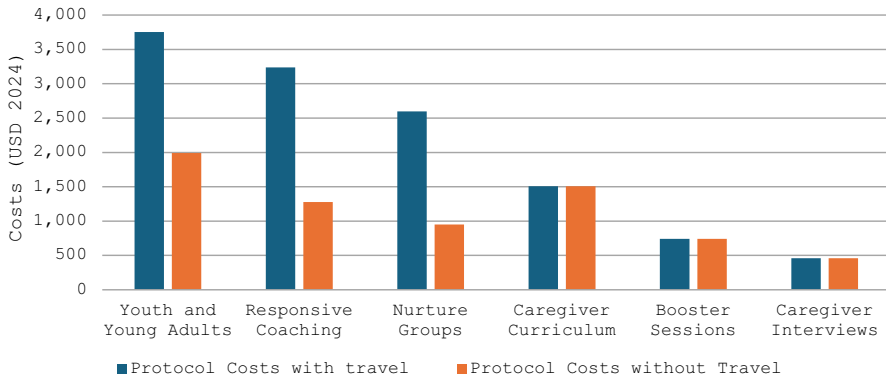


Fig. 2 Travel cost sensitivity analysis, TBRI components with and without travel, USD (2024). *Note* protocol costs for TBRI components shown with and without travel expenses. Travel costs result in increased costs for responsive coaching, youth and young adult and nurture group components. Minimal differences are found for caregiver curriculum, caregiver interviews and booster sessions

Table 2 shows the estimated average start-up costs, based on eight LeSA sites as they were preparing to begin implementing TBRI. The results show that labor costs, in particular planning meeting costs, comprise the majority of start-up costs (76%), compared to non-labor costs (11%).

Discussion

This is one of the few studies that has examined in detail the costs associated with starting the implementation of a manualized version of TBRI, a trauma-informed and relational prevention activity focused on reducing substance use for youth that are transitioning out of the legal system. The results are important as rates of substance use, especially among youth and young adults, continues to rise (Abrams, 2024; Ahmad & Sutton, 2023; Ciccarone, 2019; National Institute on Drug Abuse, 2022). The results show that the cost to implement a prevention activity like TBRI is approximately \$6,927 USD, without travel expenses, and \$12,298 USD, with travel expenses. Understanding the costs of prevention activities like TBRI, that often have broad social impacts, will assist organizations in planning for prevention initiatives focused on preventing substance use disorder (SUD).

Incorporating a sensitivity analysis related to travel is important for several reasons. First, during the COVID-19 pandemic, health care and other systems had to pivot to virtual service delivery. Given the continual risk for COVID-19 and other infectious diseases, the ability to pivot to virtual service delivery is necessary and, as shown above, less costly. Secondly, as shown above, costs can potentially double if travel is included in implementing this model as a research intervention. Practical implementation, outside of research, may not incur these costs as sessions could be delivered by someone locally, such as employees of the facility or others in the community, reducing travel costs. As organizations plan to incorporate TBRI into their

operations, individuals who live near the secure setting can be hired, and the results above show that costs can be saved through reduced need to travel. However, there are some disadvantages associated with practical implementation including reduced implementation fidelity without a research partner, potentially reducing monitoring and tracking of goals, greater risk of attrition of youth due to lack of incentives, and site staff turnover issues, which may reduce implementation fidelity. The operationalization of a TBRI intervention conducted remotely has demonstrated that utilizing virtual methods for intervention delivery is possible in certain settings (Yang et al., 2024). As a result, total cost amounts can be reduced significantly with less travel. The potential savings of reducing travel will need to be weighed against the outcome and performance of the intervention to determine if virtual platforms are preferred. Challenges associated with virtual intervention delivery include access to digital technologies (e.g., computer and internet access; (Mistry et al., 2022)) logistics (e.g., scheduling groups, shipping materials), and engagement (e.g., distractions in the home, limited participation in experiential activities). However, offering virtual interventions can also increase access and participation for families separated due to the youth's legal involvement (Tolou-Shams et al., 2022).

The results above provide a detailed calculation of the implementation costs of the TBRI intervention. The costs of this OUD-focused implementation of TBRI are in line with other home/family-based SUD prevention programs. The WSIPP provides an excellent resource for comparing the costs and net benefits of evidence-based prevention and treatment interventions (WSIPP, 2023). For instance, the average cost per family in the Familias Unidas program is \$1,756. Familias Unidas is a well-known and widely tested SUD and HIV risk preventive intervention that, like TBRI, involves sessions with both youth and parents or caregiver (Coatsworth et al., 2002; McCollister et al., 2014; Prado & Pantin, 2011). As a next step, a cost effectiveness for this study should be conducted to understand the cost per outcome achieved. This study, one of ten projects that are part of the HEAL Prevention Cooperative (HPC), will contribute to the overall cost-effectiveness reported for the entire HPC.

Finally, costing analyses like the one presented above are essential to understand the cost impact of prevention activities. As highlighted in the Second Panel on Cost-Effectiveness in Health and Medicine, many of the cost effectiveness analyses that have been conducted take a health care perspective, where the main cost inputs to the analysis are derived from third-party payers and out of pocket payments, including co-insurance and co-payments (Neumann et al., 2016). The issue with prevention activities, such as TBRI, is they are not implemented in the health care sector. As a result, a broader societal perspective is required that involves collecting data on services that are not often reimbursed through a third-party payer. In the absence of formal health care payment data, activity-based costing is necessary and required. As researchers and policy makers strive to understand more fully the importance of prevention programs with societal impacts, the analyses conducted in the manuscript will be utilized more frequently.

There are a number of assumptions embedded within costing studies such as the one presented above. A key assumption made for all costing studies are the income/salaries of those involved in the study. While accurate salary information was available for

all of the individuals implementing the intervention, information on the salaries of the caregivers and/or the youth was not collected. Therefore, following common practice in economic evaluation studies (McCollister et al., 2009, 2016), the federal minimum wage to value time invested by caregivers and youth in participating in the intervention was used. As a result, the cost estimates may be biased downward. Additionally, while costs were included as a sensitivity analysis, actual costs incurred by a facility are likely lower as this project has relied on a research institute for delivery where pilot sites are located much further from the sites than expected in practice. Another limitation is that this study only includes costs of the intervention, but not the associated outcomes. However, future plans include collaborating with implementation sites to obtain the outcome data and conduct a complete cost effectiveness analysis. Finally, as this analysis was completed with protocol data, future studies will examine costs across more implementation sites, allowing further exploration of variation in implementation costs.

Conclusion

It is imperative to understand the costs associated with prevention activities. The results above demonstrate that there are modest costs associated with implementing an intervention like TBRI. These results can be useful to policy makers and implementers as they plan and budget for prevention initiatives in the future.

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Declarations

Conflict of Interest Authors declare no relevant competing interests.

Ethics Approval All studies that are described or referenced herein have been reviewed and approved by the Investigators' respective Institutional Review Boards. All procedures with human subjects were performed in accordance with the ethical standards of the institute and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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