IMPLEMENTING COGNITIVE BEHAVIORAL THERAPY IN A YOUTH RESIDENTIAL SETTING: AN EVALUATION OF IMPLEMENTATION AND CLINICAL OUTCOMES

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Natalie Rodriguez-Quintana

IMPLEMENTING COGNITIVE BEHAVIORAL THERAPY IN A YOUTH RESIDENTIAL SETTING: AN EVALUATION OF IMPLEMENTATION AND CLINICAL OUTCOMES

Background: Mental health needs in residential treatment facilities (RTFs) are disproportionally higher than in the general population. There are also race, gender, and age disparities in youth who reside in RTFs. A critical gap exists about the effectiveness of evidence-based practices (EBPs) in RTFs and how to facilitate implementation of such practices. **Methods:** Three studies evaluated the implementation of Cognitive Behavioral Therapy (CBT) in a youth RTF using linear mixed models by: Study 1) assessing the impact of CBT implementation on implementation outcomes (i.e., attitudes towards EBPs, and intention to use CBT), Study 2) evaluating the impact of CBT implementation phases on clinical outcomes (i.e., total symptomatology, internalizing symptomatology, externalizing symptomatology, and severity of top problems), and Study 3) assessing the impact of CBT fidelity on clinical outcomes. **Results:** Results from Study 1 revealed that intention to use CBT and divergence towards EBPs changed at distinct implementation stages, and that staff role was important in improving overall attitudes towards EBPs and divergence toward EBPs. Results from Study 2 indicated that youth symptomatology and severity of top problems improved over time, with steeper slopes during the second implementation phase. Results for Study 3 suggested that staff monthly fidelity and therapist fidelity to cognitive restructuring, staff monthly fidelity to distress tolerance, and therapist fidelity to active listening and behavioral activation improve clinical outcomes. In addition, therapist fidelity to distress tolerance led to improvements in youth severity of top problems. **Discussion:** These results may have important implications for understanding how

tailored implementation of CBT can improve implementation and clinical outcomes in youth residential settings.

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List of Abbreviations

AIC: Akaike Information Criterion

AICC: Akaike Information Criterion Corrected

B: Beck

BI: Beck Institute

BIC: Bayesian Information Criteria

BPC: Brief Problems Checklist

BPCtot: Brief Problems Checklist total score

BPCint: Brief Problems Checklist internalizing score

BPCext: Brief Problems Checklist externalizing score

BR: Behavioral Rehearsal

C: Core

CAPES: (CBT core skill for activity scheduling) **C**loseness **A**ccomplishment, **P**hysical Activity, **E**njoyment, **S**leep

CBT: Cognitive Behavioral Therapy

CTS: Cognitive Therapy Rating Scale

DV: Dependent Variable

EBP: Evidence-Based Practice

EBPAS: Evidence-Based Practice Attitudes Scale

EPIS: Exploration, Preparation, Implementation, and Sustainment framework for Implementation

FIDI: Frequency, Intensity, Duration, Impairment

H: High

ICC: Intraclass Correlation

IT: Implementation Team

ITCH: (CBT core skill for problem-solving) **I**dentify the thought, **T**hink of possible solutions, **C**hoose a solution to try, **H**ow well did it work?

L: Low

PWLC: Pioneer Work and Learn Center

PQI: Performance and Quality Improvement

RTF: Residential Treatment Facility

SPEED: (CBT core skill for mood monitoring and intervention mapping) **S**elf-**P**erceived **E**xcess **E**nergy and **D**istress

SST: Safety and Support Team

TIP: (CBT core skill for distress tolerance): **T**oward the senses, **I**ntense physical activity, **P**aced breathing

TPA: Top Problems Assessment

TPB: Intention to Use Cognitive Behavioral Therapy (Theory of Planned Behavior survey)

TRIP: Training Research and Implementation in Psychology Lab

VH: Vassar House

WGRC: Wolverine Growth and Recovery Center

WHS: Wolverine Human Services

WSTC: Wolverine Secure Treatment Center

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General Introduction

A 2016 census survey found that there were 45,567 juvenile offenders in 1,772 residential treatment facilities in the United States (RTFs; Puzzanchera, Hockengerry, Sladky, & Kang, 2018). Although the proportion of youth in RTFs might seem low, the financial impact, such as cost of probation, detention, and recidivism, is large (Miller, Fisher, & Cohen, 2001). The majority of youth in RTFs are male (86%) and come from minority groups (60%), both of which have a longer length of stay than their counterparts (Hockengerry, Wachter, Sladky, & Sickmund, 2016). A recent study exploring disparities in juvenile adjudication found that there were race/ethnicity, gender, and age disparities with mid-teen Black males being adjudicated at higher rates (Evangelist, Ryan, Victor, Moore, & Perron, 2017). A stay in an RTF has impactful consequences; youth who have been in RTFs are at higher risk of recidivism, and negative health, educational, social, and vocational outcomes (Lambie & Randell, 2013; Tarolla, Wagner, Rabinowitz, & Tubman, 2002). Specifically, long-term consequences include higher risk of substance abuse, school dropout, low employment, and interpersonal difficulties, among others (Tarolla et al., 2002).

Youth in RTFs have higher rates of physical and mental health needs (Committee on Adolescence, 2011). A review reported that mental disorders in youth in RTFs are more common than in the general population, and up to 80% of youth in RTFs have at least one mental disorder (Underwood & Washington, 2016). Common mental disorders are internalizing (e.g., Major Depressive Disorder), externalizing (e.g., Oppositional Defiant Disorder), and substance use (Underwood & Washington, 2016). A prevalence study of the juvenile justice system found that 56.0% of females and 26.4% of males have an anxiety disorder, 29.2% of females and 14.3% of males have a mood disorder, 51.3% of females and 44.9% of males have a disruptive disorder,

and 55.1% of females and 43.2% of males have a substance use disorder (Schufelt & Cocozza, 2006). However, only 58% of RTFs assess for any mental health needs and even less provide evidence-based services (Hockengerry et al., 2016). In addition, mental health issues prevail 5-years after youth are released from RTFs, with 45% of males and 30% of females having at least one mental disorder with impairment (Teplin, Welty, Abram, Dulcan, & Washburn, 2012). Mental health needs in RTFs have significantly increased over the years, yet resources have not been available to provide effective services (Underwood & Washington, 2016). Thus, there is a huge need for mental health services that is not currently being met. Efforts are needed to increase standardized screening and assessment that would help identify mental health concerns, modify accreditation to require mental health treatment guidelines, and increase availability of funds for these services (Lyon, Dorsey, Pullmann, Silbaugh-Cowdin, & Berliner, 2015).

Evidence-Based Practices (EBPs) are defined as "the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (APA Presidential Task Force on Evidence-Based Practice, 2006). There are an array of EBPs available for adolescent mental health, suggesting that the need in RTFs *could* be met (Weisz et al., 2017). A recent study found that about 88% of participating residential treatment facilities (*n* = 66) reported offering at least one EBP (James, Thompson, & Ringle, 2017). However, significant concerns undermine this report by agencies, such as low reported fidelity (i.e., intervention being integrated as intended) and EBP training focused on one specific target problem (e.g., only trauma). In addition, RTFs that participated were likely self-selected as those likely to favor of EBPs due to the involvement in the Association of Children's Residential Centers, which has stated their position on the importance of integrating EBPs into RTFs. Given

the high complexity of implementing EBPs, it's not surprising that there is a gap between available EBPs for multiple disorders and their use in RTFs.

Implementation science is the study of methods to incorporate EBPs into routine care settings and can help address the care gap in RTFs (Bauer, Damschroder, Hagedorn, Smith, & Kilbourne, 2015). A recent review reported that efforts to implement EBPs into RTFs have grown over the past decade, however not much is known about implementation processes and outcomes (James, 2017). Only one study, to our knowledge, has employed implementation science methodology to understand implementation of an EBP in an RTF setting. James et al. (2017) found several common barriers to implementation such as lack of resources and burden of training. This finding is consistent with the broader implementation science literature in which similar barriers have emerged (McKenna, Ashton, & Keeney, 2004; Pagoto et al., 2007).

James et al. (2017) identified Cognitive Behavioral Therapy (CBT) as one of the primary treatments of choice for RTFs. This is unsurprising as CBT has been widely studied and found to be effective for a wide-array of mental health concerns in youth (Zhou et al., 2015). CBT is an approach that focuses on the interplay between thoughts, emotions, and behaviors. CBT is skills-based, short-term and present-focused, which are qualities that might align well with RTFs, particularly due to the varied length of stay of youth. Despite its promise, CBT is likely in need of adaptation in order to fit the context of an RTF given youth severity and organizational structure (e.g., team-based approach to care). Adaptation of interventions to fit the context is a strategy used in implementation science, with current efforts being made to understand what impacts adaptation can have on intervention effects (Lundgren, Amodeo, Cohen, Chassler, & Horowitz, 2011; Wiltsey Stirman, Miller, Toder, & Calloway, 2013). A recent review reported that adaptation is often necessary in order to ensure sustained use of EBPs (Shelton, Cooper, &

Wiltsey Stirman, 2018). That is, if an EBP is not adapted to fit a context, it is unlikely to be sustained in that setting.

Conceptualizing Implementation Research

Implementation experts have developed multiple models to guide implementation research, one of them being the Conceptual Model of Implementation Research (Proctor et al., 2009). In this model, there are three main components: intervention strategies, implementation strategies, and outcomes which are all influenced by implementation research methods (Figure 1). Intervention strategies refer to the specific type of EBP (e.g., CBT), whereas implementation strategies refer to activities that are used to implement the intervention in a particular setting (e.g., supervision, training). This model also distinguishes between three different types of outcomes: implementation, service, and client (Proctor et al., 2011). Implementation outcomes (e.g., adoption, feasibility) are defined as effects that occur after the actions taken to implement a service and serve as indicators of implementation success and processes. Service outcomes refer to effects within a system (e.g., safety, timeliness) and clinical outcomes are those that relate to individual clients (e.g., symptomatology). Implementation outcomes are crucial as they have been conceptualized as necessary for change in clinical and service outcomes. All components of the model influence each other, and the authors call for empirical testing of the model given that implementation science is still a relatively young field.

A complementary model that unpacks EBP implementation into four phases is the Exploration, Preparation, Implementation, and Sustainment (EPIS) framework for implementation (Aarons, Hurlburt, & Horwitz, 2011). The Exploration Phase consists of identifying a problem and conducting a needs-assessment (i.e., process used to identify an organization's needs) to determine barriers and facilitators to implementation. The Preparation

Phase is where a team, typically consisting of both researchers and stakeholders, works to align the context and intervention by selecting strategies to address barriers. The Implementation Phase is where strategies, such as training, take place. The Sustainment Phase refers to the maintenance and continued use of the intervention. This framework is frequently used to guide implementation processes and can be helpful in evaluation efforts given that different strategies and outcomes are more or less salient depending on the phase of implementation. For example, during the Implementation Phase, supervision can be used as a strategy and client symptomatology can be tracked as an outcome. Both of these models were integrated to serve as a framework for the studies presented (see Figure 1). Specifically, the Proctor et al., (2009) model captures the importance of the intervention strategies, implementation strategies, and outcomes, while the Aarons et al., (2011) model conveys the various implementation phases where the strategies and outcomes occur.

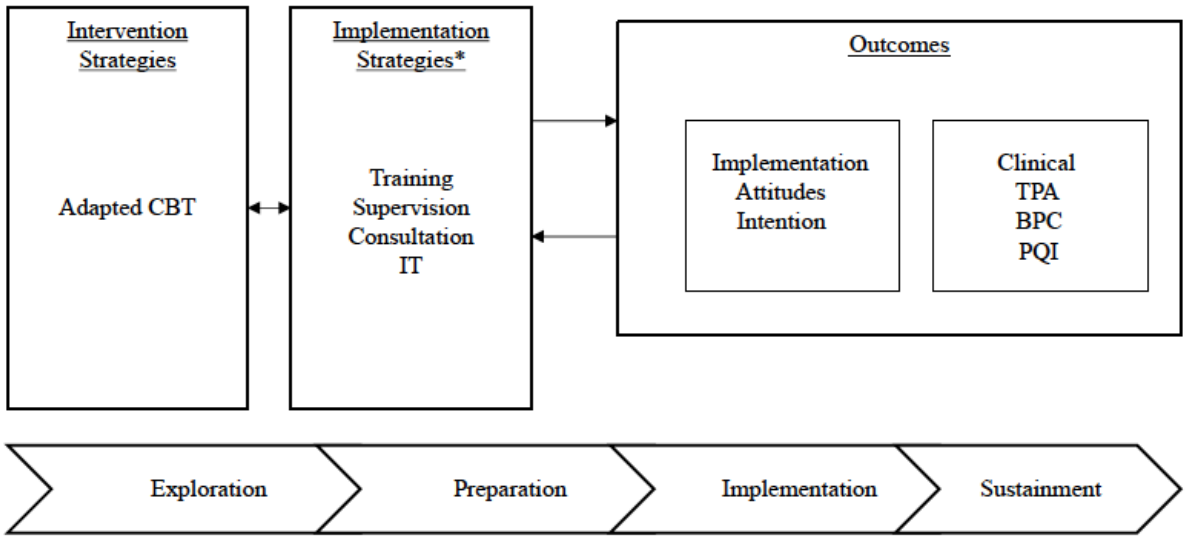

Figure 1. Adaptation of the Conceptual Model of Implementation Research. This model was adapted from Proctor et al., (2009) to better reflect the study aims. CBT = Cognitive Behavioral Therapy; * = examples; TPA = Top Problems Assessment; BPC = Brief Problems Checklist; PQI = Performance and Quality Improvement.

Simultaneous testing of effectiveness and implementation outcomes

With the emergence of implementation science, hybrid studies exploring both intervention implementation and effectiveness outcomes have been developed (Curran, Bauer, Mittman, Pyne, & Stetler, 2012). While traditional research approaches evaluate efficacy, effectiveness, and ultimately implementation, hybrid designs allow for more efficient use of time and resources and inform clinical decision-making and policy efforts (Curran et al., 2012). There are three types of hybrid designs. Hybrid type 1 allows testing of an intervention's clinical effectiveness (primary aim) and to assess the context for understanding implementation processes (secondary aim). The hybrid type 2 design allows for simultaneous testing of clinical and implementation outcomes (co-primary aims). Hybrid type 3 designs seek to understand the effect of implementation (primary aim) while evaluating clinical outcomes during the implementation process (secondary aim). The present studies follow a hybrid type 2 design.

Current Study

The current study leveraged pragmatic data from a CBT Implementation Project emergent from an academic-community partnership among Wolverine Human Services (WHS), the Beck Institute (BI), and Indiana University's Training Research and Implementation in Psychology (TRIP) Lab (Lewis et al., 2019). WHS is an RTF located in Michigan that provides services for youth with severe mental health problems, behavioral and delinquent challenges, truancy, and/or placement failure. Figure 2 presents the timeline of the project, which occurred across four stages: Exploration, Preparation, Implementation, and Sustainment. As part of the Exploration Phase (October 2013-June 2014), WHS indicated that they were interested in implementing CBT after exploring multiple EBP options, which led them to contact the BI for CBT training for all of their staff. Given the complex nature of WHS and the need for CBT

adaptation, the BI incorporated the TRIP lab for implementation science expertise. After creation of the collaborative partnership, representatives from the BI and TRIP lab visited WHS with the goal of completing a mixed-methods (i.e. quantitative and qualitative) needs assessment to uncover barriers and facilitators of CBT implementation and to select strategies to use in each subsequent phase. Lewis, Scott, & Marriott (2018) led this approach to developing a tailored implementation blueprint to guide the implementation and found 76 unique barriers to implementation, including morale and attitudes.

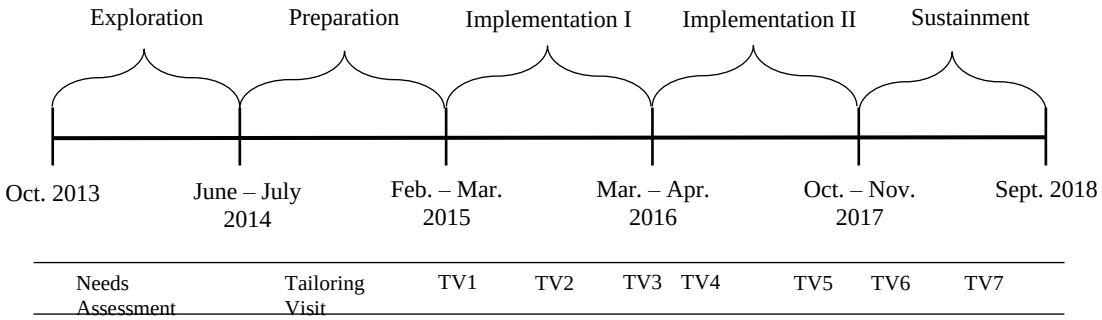

Figure 2. CBT Implementation Study Phases Timeline

During the Preparation Phase (July 2014-February 2015), a modified conjoint analysis was conducted during the tailoring visit in order to prioritize feasibility and importance of implementation barriers (led by stakeholders), resulting in 23 discrete barriers (Lewis, Scott, & Marriott, 2018). Example priority barriers were communication, training, and teamwork. Identified barriers were then matched to evidence-based implementation strategies that were hypothesized to drive change (Powell et al., 2017). Strategies were prioritized based on their feasibility and the degree to which the strategy was likely to impact CBT fidelity, which led to selection of 45 unique strategies. For example, lack of training was a prioritized barrier that would be addressed via expert-led on-site workshops. The strategies were mapped as blueprints to be used throughout different phases of implementation. The blueprints are published

elsewhere (Lewis, Scott, & Marriott, 2018), and are reproduced on Tables 1-3. Example strategies for the Preparation Phase were: restructuring clinical teams, developing and implementation glossary, and instituting implementation teams (i.e., group of on-site individuals working towards active implementation) with biweekly meetings. Barriers were monitored during this phase in order to determine that they had been improved. Prior to commencing the implementation phases, most barriers had been removed and only eight of 76 remained.

Implementation was divided into two phases: (1) Implementation Phase 1 from March 2015-March 2016, and (2) Implementation Phase 2 from April 2016-October 2017. During the first Implementation Phase, several strategies were used, including introducing progress monitoring for youth clinical outcomes, selection of an expert cohort (i.e., Train-the-Trainers strategy), and consultation and supervision. Through the use of progress monitoring, therapists were able to assess and track on a session-by-session basis youth symptomatology and top problems. Three site visits (1-3) were conducted on a biannual basis during this phase to provide support for CBT implementation. At each site visit, the research team would discuss a priori with WHS stakeholders what topics should be covered during training. Each training lasted a week and workshops with active learning strategies were provided by CBT experts to all staff. During these visits, it was noted that CBT needed to be adapted to fit the context. That is, it needed to be transdiagnostic and feasible for all staff to use with youth (vs. only therapists). This adaptation led to the selection of six Core CBT Skills that were age appropriate and with easily memorable acronyms (i.e., active listening, problem-solving (ITCH), mood identification and intervention mapping (SPEED Maps), activity scheduling (CAPES), distress tolerance (TIP), and cognitive restructuring (CBT Chat Forms)). Table 4 describes the critical elements of each skill. At the start of the second Implementation Phase, a voluntary CBT endorsement system was developed

in order to foster CBT use and to serve as an indicator of fidelity. The CBT endorsement system was divided into three levels. Level 1 consisted of principles of behaviorism and the CBT model, level 2 consisted of active listening, problem-solving, mood monitoring and intervention mapping, and level 2 entailed activity scheduling, distress tolerance and cognitive restructuring. Two more site visits (4-5) occurred during this phase, with major focus on the six CBT core skills, endorsement, and preparing for sustainment.

Two final site visits (6-7) occurred during the Sustainment Phase (November 2017-September 2018) to provide support and feedback to staff. At this visit, a key goal was for CBT core skills training to be provided by WHS staff instead of experts and a pathway to CBT certification of therapists was finalized to increase the number of on-site experts/trainers. Given the importance of sustainment to secure the organization's investment in CBT, sustainment was taken into consideration throughout the study by engaging in several strategies such as growing a CBT expert cohort via the endorsement system, continued assessment of barriers and facilitators, formation of implementation teams (that became CBT teams in the sustainment period), endorsement process, new staff orientation to address turnover, and updating job descriptions and program handbooks to detail CBT language.

Table 1. Pre-implementation blueprint, reproduced from Lewis, Scott, & Marriott (2018)

Importance	Goal	Responsible	Feasibility	Impact	Implementation Category	Action Step
C	1, 2, 3	IT	H	3	Develop stakeholder interrelationships	Implementation Team- reserve biweekly meetings
C	1, 3	IT	L	1.5	Support clinicians	Restructure clinical teams
C	3	B	H	2	Train & educate stakeholders	Select training methods that fit preferences of staff
C	1, 2, 3	IT	L	3	Develop stakeholder interrelationships	Recruit, designate, and train for leadership (pick chair/lead)
C	3	B/IT	L	3	Adapt & tailor to context	Fit intervention to clinical practice (link points & levels with CBT and outcome monitoring)
C	1, 3	B/IT			Use evaluative & iterative strategies	Develop and implement tools for quality monitoring (identify program level measures)
*	3	B	H	1	Develop stakeholder interrelationships	Develop implementation glossary
*	3	B	H	1	Develop stakeholder interrelationships	Develop structured referral sheets
	3	B	L	2	Train & educate stakeholders	Prep client materials re: mental health
*	1	IT	L	3	Utilize financial strategies	Shift resources for incentives, support, and to reduce turnover
*	1, 2	B/IT	H	2	Develop stakeholder interrelationships	Conduct local consensus discussions- mix with educational meetings
	1, 2	IT	H	1	Train & educate stakeholders	Conduct educational meetings
	3	IT	L	2	Change infrastructure	Modify context to prompt new behaviors- change note template
*	3	B/IT	L	3	Utilize financial strategies	Access new funding

Note. C = core; * = priority; IT = implementation team; B = Beck; H = high; L = low

Table 2. Implementation blueprint, reproduced from Lewis, Scott, & Marriott (2018)

Importance	Goal	Responsible	Feasibility	Impact	Implementation Category	Action Step
C	1, 2, 3	B	H	3	Train & educate stakeholders/ Provide interactive assistance	Beck/IU Training/ Supervision
C	1, 2, 3	IT	L	2	Develop stakeholder interrelationships	Hold cross-staff clinical meetings
C	1, 3	B/IT	H	2	Adapt & tailor to context	Facilitate, structure, and promote adaptability (Beck to work with IT to modify CBT to fit the sites)
C	2	B	L	3	Train & educate stakeholders	Conduct educational outreach visits
C	3	IT	L	3	Utilize financial strategies	Shift resources (ensure strategy for monitoring outcomes)
C	2	IT	H	1	Develop stakeholder interrelationships	Identify early adopters (have person shadowed, talk in clinical meetings about overcoming barriers)
C	2	B	L	3	Provide interactive assistance	Provide clinical supervision- include IT on calls
C	1, 2	B/IT	L	3	Train & educate stakeholders	Use train-the-trainers strategies
C	2, 3	IT	L	3	Change infrastructure	Increase demand- present data to courts and state level
C	2	IT	H	2	Support clinicians	Change performance evaluations, change professional roles
*	2	B/IT	H	1	Use evaluative & iterative strategies	Develop and institute self-assessment of competency
*	2, 3	IT	H	2	Develop stakeholder interrelationships	Capture and share local knowledge
*	2	IT	H	1	Support clinicians	Remind clinicians
	3	B/IT	L	2	Train & educate stakeholders	Prep CBT client handouts (Beck to provide examples)
	1, 2	B/IT	L	2	Utilize financial strategies	Alter incentives (certification, vacation, salary)

1, 3	B/IT	L	2	Support clinicians	Facilitate relay of clinical data to providers (data parties)
1, 2	IT	L	2	Support clinicians	Modify context to prompt new behaviors
1, 2, 3	IT	L	2	Train & educate stakeholders	Shadow other experts
1, 2, 3	IT	L	2	Use evaluative & iterative strategies	Obtain and use consumer & family feedback (exit interviews and surveys)

Note. C = core; * = priority; IT = implementation team; B = Beck; H = high; L = low

Table 3. Sustainment blueprint, reproduced from Lewis, Scott, & Marriott (2018)

Importance	Goal	Responsible	Feasibility	Impact	Implementation Category	Action Step
C	1, 2, 3	IT	H	3	Develop stakeholder interrelationships	Engage implementation team
C	1, 3	IT	L	2	Develop stakeholder interrelationships	Hold cross-staff clinical meetings
C	3	IT	L	3	Use evaluative & iterative strategies	Develop and implement for quality monitoring- must monitor fidelity through observation regularly and randomly
C	1, 3	IT	H	1	Train & educate stakeholders	Conduct educational meetings- hold regularly for new staff and as refreshers
C	1, 3	IT	L	3	Train & educate stakeholders	Use train-the-trainer strategies- only those certified in CBT
C	1, 2, 3	IT	L	2	Provide interactive assistance	Centralize technical assistance- create standard operating procedure for training and use of CBT at each staff level
	1, 2	IT	L	2	Utilize financial strategies	Alter incentives- provide raise earlier based on competency
	1, 3	IT	L	2	Use evaluative & iterative strategies	Obtain and use consumer feedback w/ PQI data collection
	1, 3	IT	L	2	Train & educate stakeholders	Shadow other experts- elongate period for new staff
	1, 2, 3	IT	L	2	Train & educate stakeholders	Develop learning collaborative

	3	B/IT	L	2	Use evaluative & iterative strategies	Stage implementation scale-up to generate plan across site
	3	B/IT	L	2	Engage consumers	Use mass media- get press release out with data from implementation

Note. C = core; * = priority; IT = implementation team; B = Beck; H = high; L = low

Table 4. Core skills and critical elements, adapted from Lewis et al., (2019)

Core Skill	Critical Elements
ITCH	Provide rationale
	Explain the acronym (i.e. what do the letters stand for?)
	Generate example of a common ITCH at WHS
	Describe when it is best to engage in problem solving (i.e. what SPEED?)
Active Listening	Define Emotion & Thought Empathy
	Provide 3 example reflection sentence stems
	Give 2 examples of thought and feeling empathy
	Explain why empathy is so important in a population of clients like this
	Engage in a 2-minute conversation without providing advice or asking a question
SPEED Maps	Draw SPEEDometer and describe each of the color zones on the map
	Blue = "Cool" 0-25
	Green = "Go" 25-50
	Orange = "Warning" 50-75
	Red = "Danger" 75-100
	Provide rationale for using SPEED Maps
	Describe SPEEDometer metaphor
	Explain the importance of SPEED checks
CAPES	**C**loseness, **A**ccomplishment, **P**hysical Activity, **E**njoyment, **S**leep
	Sleep Routine
	Provide rationale for CAPES
	Generate at least 5 examples of each category that can be done on the unit
	Articulate the importance of scheduling CAPES in detail (what, when, where, who, how often, for how long, barriers)
TIP	Locate SPEED at which TIP is best used
	Provide rationale for TIP skills
	Explain the acronym
	Describe/do one guided activity for each letter/skill domain
CBT Chat Forms	Provide rationale
	Explain the purpose of the Three C's
	Generate a template + appropriate example
	Describe what "counts" as a situation
	Generate at least 2 questions that would help identify a teen's thought, 2 for checking the thoughts, 2 for changing the thought
	Generate a list of at least 10 feeling words
	Describe 3 options for responding to thoughts

Note. ITCH = Problem-solving; SPEED Maps = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT Chat Forms = Cognitive Restructuring; WHS = Wolverine Human Services; Three C's = Catching, Checking, Changing.

The CBT Implementation Project leveraged the best available evidence to inform implementation in an adolescent RTF by: (1) building a tailored implementation approach to

create blueprints across phases, (2) adapting CBT to fit the context and population, and (3) creating a CBT endorsement system to facilitate staff fidelity. The overarching aim of this scientific evaluation was to examine the effect of this tailored approach to integrating adapted CBT in the context of a youth RTF on staff implementation and youth clinical outcomes. Emphasis was specifically placed on assessing how attitudes towards EBPs, intention to use CBT, youth symptomatology, youth problem severity, and number of restraints changed during the implementation process and which implementation phase was associated with these changes. In addition, the project sought to evaluate the relationship between CBT fidelity and youth clinical outcomes (i.e., symptomatology and severity of problems).

General Methods

Study Design and Timeline

The design of this study followed an observational hybrid type 2 effectiveness-implementation design to evaluate both CBT effectiveness and implementation as co-primary outcomes (Curran et al., 2012).

The CBT Implementation Project was a 5-year study, anchored in the phases from the EPIS framework with 8-19 months per phase, with the Implementation Phase broken up over two substantively distinct periods. Figure 2 depicts the implementation phases, site visits, and assessment points of the study. There was a total of nine site visits: one needs-assessment, one tailoring, and seven training visits that occurred approximately every six months.

Sites

The study included four WHS sites: Vassar House (WH), Wolverine Secure Treatment Center (WSTC), Pioneer Work and Learn Center (PWLC), and Wolverine Growth and Recovery Center (WGRC). VH is a non-secure intensive treatment and therapy program. VH houses up to

50 female youth aged 13-17. The program offers weekly individual and group therapy sessions, psychological and psychiatric treatment, medical services, and educational programming. WSTC is a secure program, which includes perimeter fencing, audio and video surveillance, and locked sleeping rooms. WSTC can have up to 100 male or female youth aged 12-21. The program offers individual, group, and family counseling and special programs for substance use, sexual offending, and mental health. PWLC is a non-secure program that can have up to 50 males aged 12-17. The program offers group and individual services, and family therapy, among others. WGRC is a non-secure program that serves up to 36 male youth aged 12-17. The program offers individual and group therapy, as well as sex offender and addiction services.

Participants

The two main participant groups for the studies are youth and staff; both are detailed below.

Youth. Youth who have resided at WHS at some point since the first Implementation Phase were eligible for participation in the studies. Youth at WHS were aged 12-21 and may have several mental health disorders (e.g., depression, anxiety), behavioral/delinquency problems (e.g., sexual, violent), truancy, or placement failures (e.g., foster care). All youth were court ordered to reside at WHS. From March 2015-June 2018, there were over 1000 youth at WHS.

Staff. Staff at WHS were divided into two teams: clinical and operations. Clinical teams consist of therapists, team managers, permanency treatment leaders, permanency planning specialists, clinical managers, and case managers. Therapists are master level staff that provide therapeutic services to youth. Team managers are bachelor level staff that are in charge of management and operations of youth units or programs. Permanency treatment leaders are bachelor level staff that are responsible for providing CBT to youth and families. Permanency

planning specialists are high school level staff that help prepare youth for reintegration by introducing CBT to the families. Clinical managers are master level staff that manage the operations of programs or program areas. Case managers are bachelor level staff that ensure youth needs are met according to best clinical practice. Operations team consists of youth care workers, and safety and support team coordinators (SSTs). Youth care workers are high school level staff that ensure youth safety and security. SSTs are bachelor level staff that provide direction and guidance to youth care workers. Staff who filled out surveys at any of the training site visits and/or participated in the CBT skill endorsement process are part of the study.

Data sources and collection procedures

Data collection was longitudinal and came from three sources detailed below.

Clinical data. Clinical data was collected by therapists on a session-by-session basis. Therapists assessed youth with two measures before every session, the Brief Problem Checklist (BPC; Chorpita et al., 2010) and the Top Problems Assessment (TPA; Weisz et al., 2011), which are described below. The BPC assessed for internalizing and externalizing symptoms and the TPA assessed for the severity of three problems selected by youth. See Appendix A.

Implementation data. Implementation data was collected by the research team at site visits. Several measures provide data for self-reported implementation outcomes, such as attitudes towards EBPs. The assessment schedule for each implementation outcome varied (see Table 5 and Figure 2). Data collection methods varied at each visit (e.g., designated time during training to fill out measures vs. filling out measures during free time), which likely attributed to different response rates at each site visit (i.e., 20%-82%). See Appendix A.

Administrative data. WHS collected outcome data on a quarterly basis for accreditation reporting requirements. This study used data regarding number of physical restraints, number of

youths restrained, number of incidents where youth posed a threat to self or others, and number of staff injuries. The data was provided by site and total scores. WHS also collected administrative data regarding the CBT endorsement system that was maintained by a therapist, which provided information about fidelity (i.e., if and when staff are endorsed for each skill). Youth demographic variables such as age and sex were recorded by WHS and linked to the BPC and TPA data. Staff demographic information such as age and role was provided by WHS and was linked to staff.

Table 5. Study measures and assessment intervals

Domain	Measures and Indicators	Interval(s)
Staff Measures		
Demographics	Administrative records	Baseline
Attitudes	*Evidence-Based Practice Attitudes Scale (EBPAS; Aarons, 2004).* The EBPAS is a 15-item measure that evaluated staff attitudes towards use of evidence-based approaches. It has four subscales: appeal, requirements, openness, and divergence.	Site visits 1, 5-7
Intention	*Intention to Use Cognitive Behavioral Therapy (TPB; Fishbein & Ajzen, 2010).* The TPB is a 3-item self-report scale that measures staff intention to use CBT.	Site visits 2-4, 6-7
Fidelity	Percentage of staff endorsed.	Since March 2017
Youth Measures		
Demographics	Administrative records (age, gender)	Baseline
Symptom severity	*Brief Problems Checklist (BPC; Chorpita et al., 2010).* The BPC is a 12-item self-report measure that evaluates internalizing and externalizing symptomatology.	Session-by-session
Problem severity	*Top Problems Assessment (TPA; Weisz et al., 2011*). The TPA is a 3-item self-report measure that assesses individual top problems and their severity.	Session-by-session
Restraints	Performance and quality indicators (PQI) collected by WHS that contains restraint and incident information.	Quarterly

Chapter 1: Study 1 Introduction

Implementation science is a relatively new area of research that seeks to address the research-to-practice gap. Estimates suggests that it takes approximately 17 years for only 14% of research evidence to reach routine care (Balas & Boren, 2000). Implementation researchers have sought to carefully distinguish implementation outcomes from service and clinical outcomes, as implementation outcomes are thought to be necessary prerequisites for implementation success (Proctor et al., 2009; Proctor et al., 2011). According to Proctor et al. (2011), there are eight implementation outcomes, each of which is thought to be related to a particular implementation phase. This study focuses on two implementation outcomes: acceptability and adoption. Acceptability (measured by attitudes towards Evidence Based Practices (EBPs)) is thought to be important to early-, mid-, and late-implementation, but it is more relevant to early/pre-implementation as it has been shown to predict adoption (Proctor et al., 2011). Adoption (or intention to use Cognitive Behavior Therapy (CBT)) is most relevant for early implementation, yet it's important to evaluated through mid-implementation given varied rates of adoption (Proctor et al., 2011).

Research suggests that acceptability and adoption are interrelated (Proctor et al., 2011; Rogers, 2003). Specifically, attitudes towards EBPs have been associated with increased adoption of an intervention (Aarons et al., 2012; Rogers, 2003). One of the more widely applied social psychology theories, the Theory of Planned Behavior (TPB), has demonstrated robust evidence that attitudes toward a new behavior (or in this case EBP) are predictive of intention to change behavior and intention is a prerequisite for any behavior change (Ajzen, 1991). Intention and adoption have indeed been applied interchangeably and evaluated in the implementation of EBPs in numerous settings (Ajzen, 1991; Williams, Glisson, Hemmelgarn, & Green, 2017).

Many models have been developed in order to help guide, understand, and evaluate implementation efforts (Nilsen, 2015; Tabak, Khoong, Chambers, & Brownson, 2012). The Exploration, Preparation, Implementation and Sustainment (EPIS) framework for implementation was selected for this study as it aligns with the organization of the activities in the clinical demonstration project and it offers four implementation phases across which to evaluate the impact of strategies on outcomes of interest (both clinical and implementation) (Aarons et al., 2004).

One of the goals of demarcating implementation phases is to address specific implementation outcomes to enhance implementation success. Implementation strategies are techniques used to increase implementation of a practice and each one is intended to target specific implementation outcomes (Proctor, Powell, & McMillen, 2013). The temporality of implementation strategies and improvement on the implementation outcomes that they address is crucial as some outcomes are dependent on others. For example, training is intended to change knowledge and attitudes, which are needed to engender adoption of a new practice (Herschell, Kolko, Baumann, & Davis, 2010). In turn, consultation and supervision are strategies indented to develop skill (Beidas, Edmunds, Marcus, & Kendall, 2012).

One key approach to identifying and integrating a series of implementation strategies for each phase is to build an implementation blueprint. An implementation blueprint may serve as a guide for the implementation effort, providing step by step guidance about what strategies to use at what stage in the process (Powell et al., 2012). Lewis, Scott, & Marriott (2018) developed blueprints for each implementation phase for the parent project of this study (see Tables 1-3) by first conducting a needs assessment of barriers and facilitators to implementing CBT at WHS and

then conducting a conjoint analysis to help match strategies to identified barriers. A total of 14 strategies were selected for pre-implementation, 19 for implementation, and 12 for sustainment.

Research on the impact of implementing EBPs in residential treatment facilities (RTFs) has been scarce. One national survey conducted by James et al. (2015) found that, overall, staff at residential centers had positive attitudes towards EBPs. However, no study to date has explored how attitudes or intention change throughout the course of implementation in this setting (Ringle, James, Ross, & Thompson, 2017). The current study attempted to increase understanding of how implementation outcomes change over the course of a blueprint-guided implementation of CBT in an RTF. The current study aim was to evaluate the effect of implementation phases on two key implementation outcomes (i.e., attitudes towards EBPs, intention to use CBT). It was hypothesized that (**H1**) attitudes towards EBPs will increase over time, and that (**H2**) intention to use CBT will increase over time.

Study 1 Method

Procedures

This study evaluated pragmatic data from a CBT Implementation Project that was a clinical demonstration as part of an academic-community partnership. The setting of the implementation was an RTF, Wolverine Human Services (WHS). The project spanned five years and was encompassed in five implementation phases: Exploration, Preparation, Implementation Phase 1, Implementation Phase 2, and Sustainment, guided by the EPIS Framework (See Figures 1-2). Each implementation phase used different implementation strategies (See Tables 1-3). One implementation strategy that was used was offering training over the course of implementation. Data for this study was collected during those training visits.

Participants

Staff who opted to participate in at least one evaluation of implementation outcomes over the course of any site visit were included in this study. A variety of staff attended the site visits, including youth care workers, team managers, and therapists. Given the variability of the assessment schedule between the EBPAS and the TPB measures, two datasets were used for this study. A total of 161 staff participated in evaluations in which attitudes toward EBPs was conducted, and a total of 175 staff participated in surveys in which intention to use CBT was assessed. Staff demographics are detailed below.

Measures

See Table 5 for additional information about the measures and assessment intervals.

Demographic information (staff). Administrative data was used to characterize staff in terms of their age, the site at which they worked, and their role.

Evidence-Based Practice Attitudes Scale (EBPAS; Aarons, 2004). The EBPAS is a 15-item questionnaire that measures provider/staff attitudes towards use of evidence-based approaches. It is measured on a 5-point Likert scale that ranges from 0 "not at all" to 4 "to a very great extent". The EBPAS has a total score, as well as four subscales: (1) intuitive *appeal* of innovation, (2) *requirements* to provide a particular service by the organization or funding, (3) *openness* to change, and (4) *divergence* or discrepancy between current and new practices. Higher scores indicate more favorable attitudes, except for the divergence scale.

Intention to Use Cognitive Behavioral Therapy (TPB; Fishbein & Ajzen, 2010). The Theory of Planned Behavior (TPB) Survey was developed according to the TPB Questionnaire construction guide to assess staff intention to use CBT. The scale includes 3 items and asks staff to indicate how much they agree with statements such as "To what extent do you expect to be able to incorporate the concepts and techniques from the training into your daily work

activities?" on a scale from 1 "Strongly Disagree" to 7 "Strongly Agree". Higher scores indicate better intention to use CBT.

Data screening and missing data

Variables were evaluated for missing data, distributions, and extreme values by use of descriptive statistics and plots. Multiple imputation was used to address missing data in the staff demographic covariates. Markov Chain Monte Carlo was used to generate five datasets in the SPSS statistical software (IBM Corp., 2017).

Analytic plan

Descriptive statistics (e.g., means, range) were calculated using SPSS version 25 (IBM Corp., 2017). Longitudinal mixed-effects models were used to examine the relationship between implementation outcomes (i.e., attitudes and intention) and time as measured by implementation phase. This type of model allowed estimation of change on repeated measures despite unbalanced data with non-monotone missing values (e.g., new staff joining the project at the fourth site visit). Implementation outcomes were regressed on an effect of phase. Staff covariates (i.e., age, role, and site) were added into the model as main effects. Analysis were conducted using SPSS version 25 (IBM Corp., 2017).

A separate model was used for each of the implementation outcomes (i.e., EBPAS total, the four EBPAS subscales, and the TPB) and each followed the steps detailed next. First, a null or unconditional model was fit, which provided an estimate of variance (within and between) and allowed the calculation of the intraclass correlation coefficient that helped determine the usefulness of the analytic approach. In the second model, a fixed effect of time was added to evaluate the change of the implementation outcome by phase. Next, models incorporating covariates (e.g., age) were estimated. Fit statistics were used to compare models, including log

likelihood, AIC, BIC, and AICC. Assumptions of the models (i.e., normal distribution of residuals and equal variance of residuals) were evaluated using residual plots of studentized residuals.

Study 1 Results

Participants

For the attitudes (i.e., EBPAS) evaluation, the average age for staff at the beginning of the CBT implementation study was 32. Staff were split between non-secure (53.42%) and secure (46.58%) sites. Most staff were part of the operations (e.g., youth care worker, permanency specialist) staff (64.47%) and the rest were part of the clinical (e.g., therapist, team manager) staff (35.53%).

For the intention to use (i.e., TPB) evaluations, the average age for staff at the beginning of the CBT implementation study was 31.87. Staff were evenly split between non-secure (61.14%) and secure (38.86%) sties. Most staff were part of the operations staff (61.71%) and the rest were part of the clinical staff (38.29%).

Data Description – EBPAS and TPB

Descriptive statistics were run for the EBPAS and TPB. For the EBPAS, the total score and its subscales were explored. Mean, standard deviation, and N for each scale at each phase over time are detailed in Table 6 and Table 7.

Table 6. Descriptive statistics for the EBPAS by phase over time

Implementation Phase	Training Visit	EBPASt	EBPASr	EBPASa	EBPASo	EBPASd
		M (SD)				
Preparation	1	2.90 (0.54)	2.90 (0.85)	2.91 (0.80)	3.07 (0.65)	1.29 (0.79)
Implementation 2	5	2.94 (0.55)	3.08 (0.89)	2.98 (0.91)	3.03 (0.73)	1.35 (0.75)
Sustainment	6	2.89 (0.47)	2.99 (0.72)	2.99 (0.63)	3.13 (0.76)	1.55 (0.88)
	7	2.83 (0.52)	2.94 (0.97)	2.95 (0.82)	3.08 (0.64)*	1.64 (0.93)*

Note. EBPAS t = EBPAS total; EBPASr = EBPAS requirements subscale; EBPASa = EBPAS appeal subscale; EBPASo = EBPAS openness subscale; EBPASd = EBPAS divergence subscale; * = One less participant than the first visit.

Table 7. Descriptive statistics for the TPB by phase over time

Implementation Phase	Training Visit	*M*	*SD*	*N*
Preparation	2	6.08	1.04	30
Implementation 1	3	5.78	1.03	63
	4	5.89	1.25	19
Implementation 2	5	8.52	1.44	38
Sustainment	6	5.98	1.26	44
	7	6.01	1.02	62

Note. *M* = mean; *SD* = Standard Deviation; *N* = Sample size

Linear Mixed Models

Need for multilevel modeling. Exploratory analyses were conducted in order to understand the overall relationship between the outcomes of interest and time, to determine if the relationship varied by staff. Figure 3 details the overall relationship between EBPAS, EBPAS requirement, EBPAS appeal, EBPAS openness, EBPAS divergence, and TPB across time. The blue line in the figure indicates that the EBPAS total and TPB increase with time, and the EBPAS subscales decrease with time, although the scale for the y-axis is small (i.e., likely no change). Figure 4 details how the relationship between the outcomes and time is more complex, as it

suggests varying intercepts and slopes across different staff. Visual inspection indicates that a multilevel approach could be appropriate for this data.

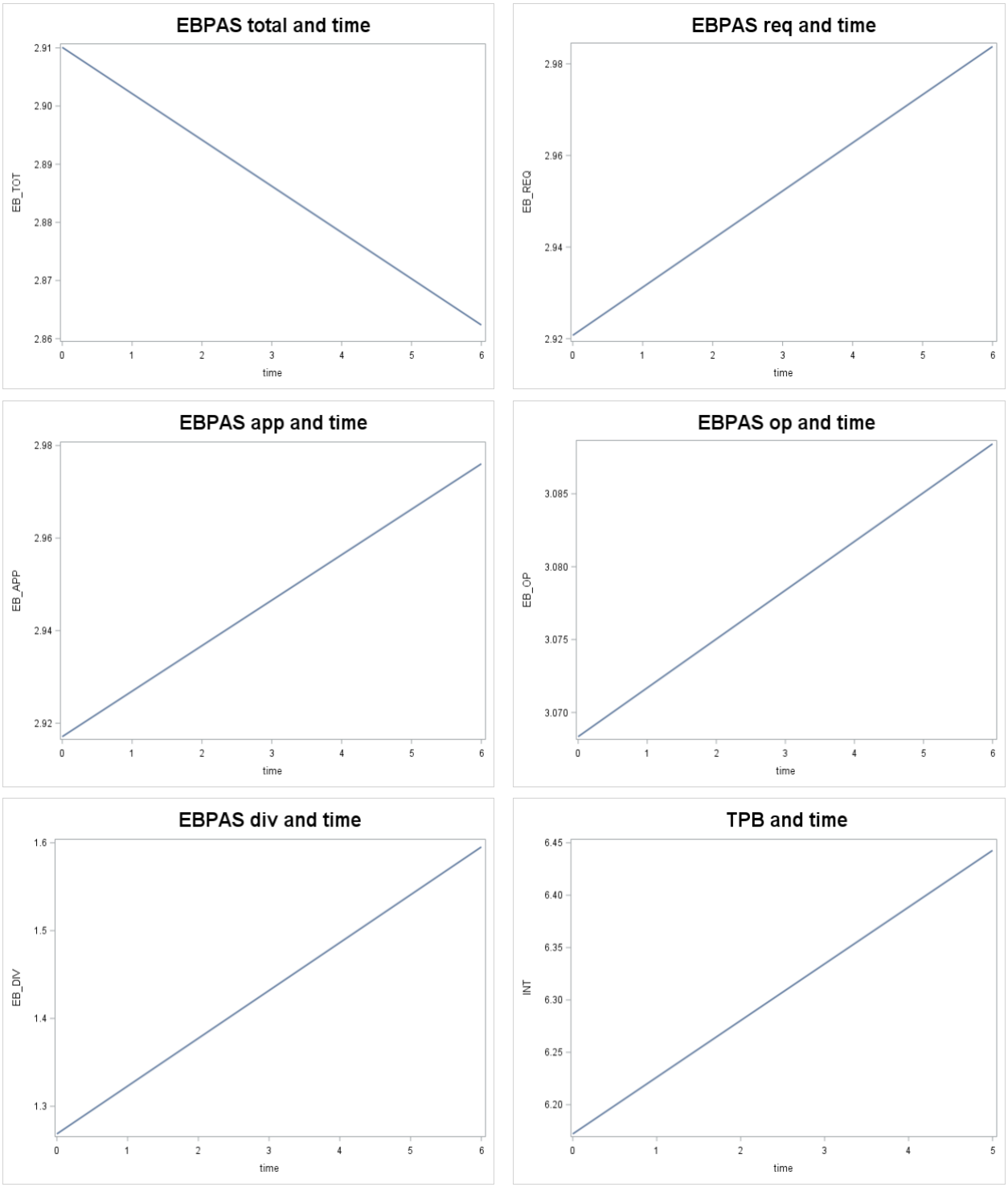

Figure 3. Average relationship between outcomes and time

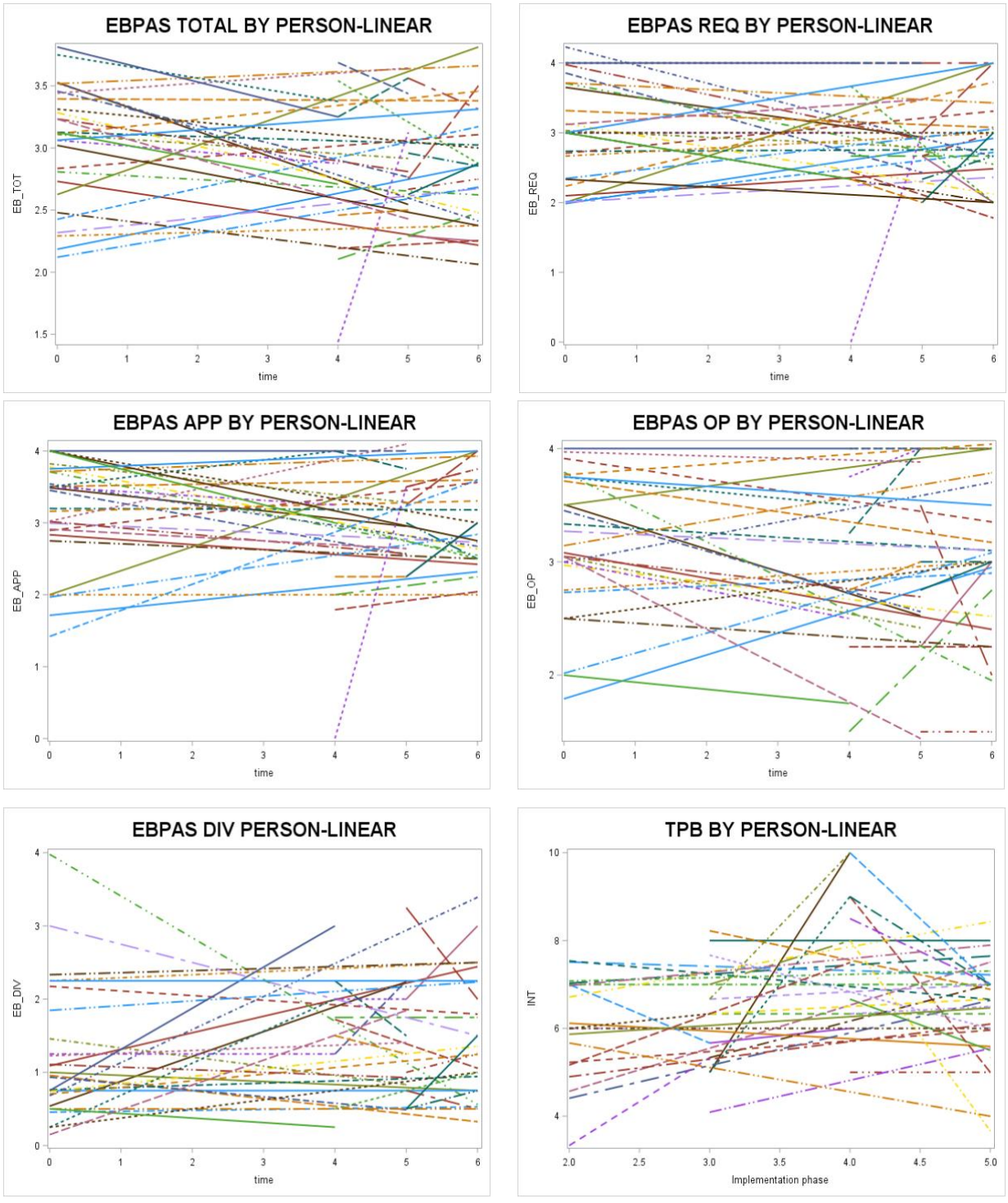

Figure 4. Person-linear relationship between outcomes and time

Additionally, the ICC for each outcome was calculated in order to determine if multilevel modeling was warranted. The within-individual and between-individual variance from the baseline model was used to calculate the ICC. The ICC for the EBPAS total score was 3.57%, EBPAS

subscales were approximately 0%, and TPB total score was 8.86%. These numbers indicate that it might not be necessary to account for nesting of the variables and simpler analytical techniques could be used. However, given that the dataset for this study consists of non-monotone missing data, mixed models are still deemed as the best approach that can handle that type of missingness (Ibrahim & Molenberghs, 2009).

Model results – EBPAS total. Table 8 presents the results for the EBPAS total score. Model set 1 indicates that the EBPAS total score average value was 2.88, between moderate and great. Given that the random effect of the intercept was not contributing to the model, it was removed from future models for parsimony. Model set 2 adds the effect of implementation phase, which was not statistically significant. Model set 3 incorporates the effects of staff covariates. Age and site were not statistically significant, however, staff that are part of the clinical team produced an EBPAS total score 0.15 higher than staff in the operations team role. Model fit indices are lowest for model set 2.

*Table 8***.** EBPAS total model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**2.88* (0.03)**	**2.90* (0.06)**	**2.89* (0.07)**
Phase 0		-0.05 (0.08)	-0.06 (0.08)
Phase 1		0.04 (0.11)	0.04 (0.11)
Age			-0.00 (0.00)
Site			-0.08 (0.07)
Role			**0.15* (0.07)**
	Random Effects		
Level 1			
Residual	**0.27* (0.03)**	**0.27* (0.03)**	**0.26* (0.04)**
Level 2			
Intercept	0.01 (1.00)		
	Model Fit		
-2Log	350.96	356.34	367.05

AIC	352.96	358.34	369.05
AICC	352.98	358.35	369.07
BIC	361.81	361.75	372.45

Note. Phase 0 = Sustainment Phase, Phase 1 = Implementation Phase 2; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Model results – EBPAS requirements. Table 9 presents the results for the EBPAS requirements subscale. Model set 1 indicates that the average value for the EBPAS requirements subscale was 2.96, or to a great extent. Model set 2 adds the effect of implementation phase, which was not statistically significant. Model set 3 incorporates the effects of staff covariates. Age, site, and role were not statistically significant. Model fit indices are lowest for model set 2, therefore the model without covariates is the best fitting model.

Table 9. EBPAS requirements subscale model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**2.96*(0.06)**	**2.90*(0.09)**	**2.97* (0.13)**
Phase 0		0.05 (0.12)	0.03 (0.13)
Phase 1		0.17 (0.18)	0.16 (0.18)
Age			-0.00 (0.01)
Site			-0.14 (0.12)
Role			0.03 (0.13)
	Random Effects		
Level 1			
Residual	**0.74* (0.07)**	**0.74* (0.07)**	**0.75* (0.07)**
Level 2			
Intercept	0.00 (0.00)		
	Model Fit		
-2Log	581.60	584.61	596.13
AIC	583.60	586.61	598.13
AICC	583.62	586.63	598.15
BIC	592.45	590.03	601.53

Note. Phase 0 = Sustainment Phase, Phase 1 = Implementation Phase 2; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Model results – EBPAS appeal. Table 10 presents the results for the EBPAS appeal subscale. Model set 1 indicated that the average value for the EBPAS appeal subscale was 2.95, or to a great extent. Model set 2 added the effect of implementation phase, which was not statistically significant. Model set 3 incorporated the effect of staff covariates. Age, site, and role were not statistically significant. Model fit indices are lowest for model set 2, revealing that the model without covariates is the best fitting model.

Table 10. EBPAS appeal subscale model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**2.95* (0.05)**	**2.91* (0.09)**	**2.99* (0.11)**
Phase 0		0.06 (0.11)	0.02 (0.12)
Phase 1		0.07 (0.16)	0.05 (0.16)
Age			-0.00 (0.01)
Site			-0.19 (0.11)
Role			0.08 (0.11)
	Random Effects		
Level 1			
Residual	**0.62* (0.06)**	**0.63* (0.06)**	**0.62* (0.06)**
Level 2			
Intercept	0.00 (0.00)		
	Model Fit		
-2Log	539.03	543.17	556.15
AIC	541.03	545.17	558.15
AICC	541.05	545.19	558.17
BIC	549.87	548.58	561.54

Note. Phase 0 = Sustainment Phase, Phase 1 = Implementation Phase 2; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Model results – EBPAS openness. Table 11 presents the results for the EBPAS openness subscale. Model set 1 indicated that the average value for the EBPAS openness subscale was 3.08, or to a great extent. Model set 2 added the effect of implementation phase, which was not

statistically significant. Model set 3 incorporated the effect of staff covariates. Age, site, and role were not statistically significant. Model fit indices were lowest for model set 2, meaning that the model without covariates was the best fitting model.

Table 11. EBPAS openness subscale model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**3.08* (0.05)**	**3.07* (0.07)**	**3.16* (0.10)**
Phase 0		0.03 (0.10)	-0.00 (0.10)
Phase 1		-0.04 (0.14)	-0.06 (0.14)
Age			-0.01 (0.01)
Site			-0.11 (0.09)
Role			-0.05 (0.10)
	Random Effects		
Level 1			
Residual	**0.46* (0.04)**	**0.47* (0.04)**	**0.47* (0.04)**
Level 2			
Intercept	0.00 (0.00)		
	Model Fit		
-2Log	473.16	477.93	490.11
AIC	477.16	479.93	492.13
AICC	477.18	479.95	496.51
BIC	483.58	483.34	495.51

Note. Phase 0 = Sustainment Phase, Phase 1 = Implementation Phase 2; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Model results – EBPAS divergence. Table 12 presents the results for the EBPAS divergence subscale. Model set 1 indicated that the average EBPAS divergence score was 1.45 out of 4. Model set 2 added the effect of implementation phase. Results indicated that EBPAS divergence scores in the Sustainment Phase, as compared to the Preparation Phase, increased by 0.32 points. Model set 3 adds the effect of staff covariates. Age and site were not statistically significant, however, staff that were part of the clinical team produced an EBPAS divergence score

0.56 lower than staff in the operations team role. Model fit indices were lowest for model set 3, indicating that the model with covariates was the best fit.

Table 12. EBPAS divergence subscale model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**1.45* (0.06)**	**1.29* (0.09)**	**1.56* (0.12)**
Phase 0		**0.32* (0.12)**	**0.29* (0.12)**
Phase 1		0.06 (0.17)	0.02 (0.16)
Age			-0.00 (0.01)
Site			-0.11 (0.11)
Role			**-0.56* (0.11)**
	Random Effects		
Level 1			
Residual	**0.72* (0.07)**	**0.71* (0.07)**	**0.64* (0.06)**
Level 2			
Intercept	0.00 (0.00)		
	Model Fit		
-2Log	573.55	570.66	561.23
AIC	575.55	572.66	563.23
AICC	575.47	572.68	563.25
BIC	578.97	576.07	566.23

Note. Phase 0 = Sustainment Phase, Phase 1 = Implementation 2 Phase; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Model results – TPB total. Table 13 presents the model results for the TPB total score. Model Set 1 was the null model, which indicated that the average TPB score was 6.29, meaning that there was strong agreement. Model Set 2 evaluated the effect of implementation phase. Results indicated that there was a fixed effect of phase. TPB scores in the Implementation Phase 2, as compared to the Preparation Phase, increased by 1.57 points. Model set 3 added the effect of staff covariates (i.e., age, site, and role), which were not statistically significant. Model fit indices were

lowest for model set 2, indicating that the model without the covariates might be the better fit for the data.

Table 13. TPB model results

Parameter	Model set 1	Model set 2	Model set 3
	Unconditional	Time	Covariates
	Fixed Effects		
Intercept	**6.29* (0.09)**	**6.08* (0.24)**	**6.09* (0.28)**
Phase 0		-0.09 (0.27)	-0.05 (0.27)
Phase 1		**1.57* (0.29)**	**1.57* (0.30)**
Phase 2		-0.26 (0.29)	-0.22 (0.29)
Age			0.02 (0.01)
Site			-0.19 (0.18)
Role			0.08 (0.20)
	Random Effects		
Level 1			
Residual	**2.16* (0.19)**	**1.69* (0.15)**	**1.67* (0.15)**
Level 2			
Intercept	0.21 (1.00)		
	Model Fit		
-2Log	977.22	906.92	914.26
AIC	979.22	908.92	916.26
AICC	979.24	908.94	916.27
BIC	982.82	912.51	919.83

Note. Phase 0 = Sustainment Phase; Phase 1 = Implementation Phase 2; Phase 2 = Preparation Phase; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Study 1 Discussion

The goal of the present study was to evaluate how implementation outcomes (i.e., TPB, EBPAS, and EBPAS subscales) changed over the course of a blueprint-guided implementation process. Results from the study revealed that divergent attitudes towards EBPs seemed to be higher during the Sustainment Phase. Phase was not relevant for overall attitudes, appeal towards EBPs, requirement of EBPs, or openness towards EBPs. In addition, being part of the clinical

team seemed to be indicative of better overall attitudes towards EBPs and decreased divergence toward EBPs. Moreover, intention to use CBT scores improved by the Implementation Phase 2. These results partially support the original hypotheses that implementation outcomes would improve over time.

One of the hypotheses of this study was that intention to use CBT would increase over the course of implementation. As expected, intention did increase, but only by the second Implementation Phase. This seems to be consistent with the work by Proctor et al., (2011), which suggests that each implementation outcome is thought to be related to different implementation phases, and that, specifically, intention to use CBT, an indicator of adoption, is thought to correspond to early- to mid-implementation. The second Implementation Phase was when the CBT endorsement system was introduced to staff and perhaps that could serve as an explanation for the increase in intention to use CBT at this time in the process. That is, the endorsement system allowed a formal process to enact the skills learned during training.

The other hypothesis of this study was that attitudes towards EBPs would improve over the course of implementation. This was not the case, as divergence (i.e., alignment of new practice with current practice) towards EBPs worsened over the sustainment period. Proctor et al., (2011) detail that attitudes towards EBPs will be more salient earlier in implementation yet mention the importance of ongoing evaluation until the sustainment period. Therefore, the finding from this study highlights the importance of evaluating attitudes later in the implementation process as they can worsen and risk sustainment. The total score of other subscales did not improve over the course of implementation. However, this could have been due to having high scores at the beginning of training, therefore not allowing for much improvement over time. This finding is consistent with a previous study that evaluated attitudes towards EBPs

in a national survey of residential settings and found overall positive attitudes (James et al., 2015).

In addition, being part of the clinical team was important for improvements in overall attitudes toward EBPs and for divergence of EBPs. Previous literature has identified that having more clinical experience is related to more favorable attitudes towards EBPs (Stroobants, Vanderfaeillie, Andries, & Van Holen, 2016). Even though it is encouraging that clinical teams had positive views towards EBPs, RTFs might benefit from directly targeting attitudes towards EBPs with staff not in a clinical role. This is important as operations staff have more frequent direct contact with youth and have shown to be able to deliver treatments, such as CBT, comparable to therapists (Montgomery, Kunik, Wilson, Stanley, & Weiss, 2010). An RTF is a unique setting in which teams are already built in, allowing sharing of provision of services, or task shifting, as an important option to enhance delivery of care (Hoeft, Fortney, Patel, & Unützer, 2018).

Limitations

This study contains several limitations. First, the measurement schedule for the EBPAS and TPB varied by training visit. Thus, measurements were not available for each site visit. More measurement points would aid in understanding the full relationship between implementation outcomes and phase. Second, the approach to the assessment process varied such that earlier in implementation there was time set aside for participants to complete the measures and in later training visits participants filled out measures on their personal time. Thus, not all staff that participated in the training visits filled out the measures. Third, there was no comparison group that would allow us to understand how attitudes and intention change regardless of a training visit (i.e., services as usual). Fourth, even though we attempted to use monthly staff turnover as a

covariate, we were unsuccessful due to lack of variability. Perhaps the use of more measurement points or individual rates of turnover (i.e., did the staff that participate terminate employment at some point during the study) would be more fruitful.

Even though this study adds to the literature by attempting to understand how implementation outcomes change over the various implementation phases, more research is warranted. Future studies should assess more implementation outcomes throughout all implementation phases at regular intervals and attempt to incorporate repeated assessments with the same sample. In addition, studies should attempt to understand the temporal relationship between TPB and EBPAS and what implementation strategies target change for each outcome. Understanding when implementation outcomes are most malleable and maximize positive change on the implementation process is important information that could lead to increasing implementation efficiency.

Conclusions

To our knowledge, this is the first study to examine how attitudes towards EBPs and intention to use CBT change over time in a youth RTF. Results demonstrated that improvement occurred for the TPB in the second Implementation Phase and worsened for the EBPAS divergence subscale in the Sustainment Phase. Findings from this study address a gap in the literature about understanding how implementation outcomes change over the course of the implementation process. Implementation efforts might benefit from targeting intention to use and attitudes towards EBPs during crucial implementation periods.

Chapter 2: Study 2 Introduction

Residential Treatment Facilities (RTFs) are in need of addressing the mental health needs of youth in their care given the elevated levels of mental health disorders. Adaptation of Evidence-Based Practices (EBPs), such as Cognitive Behavior Therapy (CBT), might be an important step in improving mental health services in RTFs. Mental health problems in youth RTFs are observed at high base rates and tend to manifest in comorbid disorders with severe symptoms. Estimates suggest that up to 80% of youth in RTFs have at least one mental health disorder and up to 60% have three or more diagnoses (Schufelt & Cocozza, 2006; Underwood & Washington, 2016). The most common mental health problems in RTFs are anxiety disorders, mood disorders, disruptive disorders, and substance use disorders (Shufelt & Cocozza, 2006). Most RTFs are not currently equipped to adequately care for such disorders, instead relying on other options such as physical restraints. Such methods in turn may lead to increased physical and mental risks, including death (Mohr, Petti, & Mohr, 2003).

Research on mental health treatment for youth has yielded positive results for a wide-array of psychological disorders, yet there is still a clear need to enhance the reach or availability of CBT to youth clients with high severity symptoms and comorbidities (Weisz et al., 2017). CBT has been the most widely studied approach for youth, and has produced positive outcomes for multiple disorders, such as depression, anxiety, and externalizing disorders (Battagliese et al., 2015; James, James, Cowdrey, Soler, & Choke, 2015; Zhou et al., 2015). James et al. (2017) identified CBT as one of the primary EBPs used in RTFs. However, the results from James et al. (2017)'s study highlight concerns about the poor implementation of EBPs in RTFs settings due to the following: (1) they only trained therapists leaving direct care staff without skills, (2) a majority of RTFs were not assessing for treatment fidelity (i.e., was CBT delivered with

fidelity?), and (3) reported low frequency of ongoing trainings calling into question the sustainability of initial efforts. CBT stands out as a good fit for youth in RTFs due to it being skills-based, present-focused, and short-term. In addition, studies support CBT for the wide presentation of disorders youth in RTFs present with. However, there is also a misfit between CBT and RTFs given the severity and comorbidity of disorders in youth and amount of training needed to implement as intended, among others. Therefore, it is important to adapt CBT to meet RTFs needs (i.e., transdiagnostic, able to be used by all staff). A previous study highlighted that RTFs present unique barriers to implementation, such as staff turnover and capacity for training staff, that require adaptation to current CBT protocols (James et al., 2017).

Most of the support for CBT has come from efficacy studies, which prioritize internal validity over external validity (Curran et al., 2012). A concern that stems from this is that the effects of CBT are lost when attempting to incorporate the practice into a routine care setting (Sburlati, Schniering, Lyneham, & Rapee, 2011). Adaptation of EBPs is a common strategy used to enhance success of implementation wherein a service is modified to address the different contextual needs of a specific setting (Lundgren et al., 2011). A recent review of EBP adaptations examined over 100 studies and found that the majority of studies demonstrated symptom improvements, yet most failed to report effects over and above the original protocol (Wiltsey Stirman, Gamarra, Bartlett, Calloway, & Gutner, 2017a). However, the studies rarely evaluated adaptation in their intended context which highlights the importance of evaluating the effects of adaptation and implementation of EBPs in routine care settings.

A key challenge in evaluating the effects of CBT in community-based environments with complex clients is the need to evaluate symptom outcomes. A core way to evaluate the effectiveness of CBT is to use established assessment tools throughout treatment, also known as

progress monitoring (Scott & Lewis, 2015). Few RTFs are set up with infrastructure to facilitate data collection, therefore implementation science efforts are needed to both facilitate adaptation of and use of CBT. In addition, it is important for implementation efforts to understand how outcomes change over different phases of implementation, yet to our knowledge previous work has not focused on this aspect. This study attempted to aid in the understanding of how clinical outcomes, such as internalizing symptoms, change over the course of implementation in a youth RTF. The current study aim was to assess the effect of implementation phases on clinical outcomes (e.g., youth internalizing and externalizing symptoms, severity of top problems, number of restraints). It was hypothesized that (**H1**) youth symptom severity would decrease more rapidly after each implementation phase (i.e., slope will be steeper after each Implementation Phase 1, Implementation Phase 2, and Sustainment), that (**H2**) severity of youth top problems (i.e. problems identified as most important to youth), would decrease more rapidly after each implementation phase, and that (**H3**) youth restraints would decrease more rapidly over time.

Study 2 Method

Procedure

This study evaluated pragmatic data from a CBT Implementation Project as part of an academic-community partnership. The setting of the implementation was an RTF, Wolverine Human Services (WHS). The project spanned five years and was encompassed in five implementation phases: Exploration, Preparation, Implementation Phase 1, Implementation Phase 2, and Sustainment, guided by the EPIS Framework (See Figures 1-2). Each implementation phase used different implementation strategies (See Tables 1-3).

Adaptation of CBT

Six core CBT skills were identified: (1) Active listening, (2) ITCH (i.e., problem solving), (3) SPEED Maps (i.e., mood identification and intervention mapping), (4) CAPES (i.e., activity scheduling), (5) TIP (i.e., distress tolerance), and (6) CBT Chat Forms (i.e., cognitive restructuring). Staff were trained on how to use these six skills with youth at WHS and therapists were encouraged to use the skills during their individual therapy sessions with youth. See Table 4 for details about the core skills.

Participants

Participants of this study were youth (n = 1134) that resided at WHS and attended at least one therapy appointment since the implementation of progress monitoring using the Brief Problems Checklist (BPC) and Top Problems Assessment (TPA) (i.e., from March 2015 to June 2018). Only a sub-sample (n = 372) of these youth provided demographic data which was used to evaluate covariates (i.e., age, sex, referral source, race, site, and length of stay) based on the availability of data provided by WHS.

Measures

See Table 5 for an overview of measures and assessment intervals.

Demographic information (youth). Youth demographics were collected by WHS staff and extracted from their health records and include age, race/ethnicity, gender, referral source, and length of stay.

Brief Problems Checklist (BPC; Chorpita et al., 2010). The BPC is a 12-item self-report measure that assesses youth's internalizing and externalizing symptoms, as well as total symptomatology. The BPC is administered by therapists and each youth rates each item as 0 "Not true", 1 "Somewhat true", and 2 "Very true". Each subscale ranges from 0-12, and the total score ranges from 0-24, with higher scores indicating increased symptom levels. Scores for the

total score and two subscales were summed to get scores for each clinical session. Example items include “I worry a lot” and “I threaten to hurt people”. The BPC has strong psychometric evidence (e.g., internal consistency, test-retest reliability) and is able to predict symptom change across treatment. In this study, the BPC was measured on a weekly basis at the beginning of each therapy session, starting in March 2015 when progress monitoring was introduced.

Top Problems Assessment (TPA; Weisz et al., 2011). The TPA is an individualized 3-item measure administered by therapists at the beginning of each session that allows the youth to identify the three most pressing problems before the start of treatment. After identifying the top three problems, youth can rate the severity on a scale from 0 (“not at all”) to 10 (“very, very much”), with higher scores indicating that it is more of a problem. Scores for the total scale are averaged for each clinical session Therapists are encouraged to indicate the frequency, duration, intensity, and impairment (FIDI) for each problem. The TPA has sound psychometric evidence (e.g., test-retest reliability, sensitivity to change).

Performance and quality indicators (PQI). The PQI is aggregate administrative data that was collected by WHS on a quarterly basis for accreditation purposes. Quarterly sums for each site were presented to the research staff for each indicator. This study used the following PQI data: number of physical restraints, number of youths restrained, number of incidents where youth posed a threat to self or others, and number of staff injuries. A higher number in each of these variables indicates higher frequency of these indicators. Physical restraints are defined as a holding technique used by one or multiple staff that involve the use of physical force to restrict movement of a youth (Pollastri, Lieberman, Boldt, & Ablon, 2016). Restraints at WHS have typically been used to control violent or disruptive youth behaviors.

Time. Session number was used as the indicator of time.

Implementation phase. This study was encompassed by three implementation phases: Implementation Phase 1, Implementation Phase 2, and Sustainment. Phase was treated as a categorical variable, with Implementation Phase 1 serving as the reference category.

Covariates. The following demographic information was used as covariates in a sub-sample of youth (n = 372): age at baseline in years, length of stay in days, race (white, nonwhite), sex (male, female), referral source (juvenile justice, non-juvenile justice), and site (secure, non-secure).

Data screening and missing data

Variables were evaluated for missing data, distributions, and extreme values by use of descriptive statistics and plots. Missing values for outcomes and covariates were low (≤5%), therefore no imputation method was required as suggested by the literature (Schafer, 1999).

Analytic plan

Descriptive statistics (e.g., means, range) were calculated using SPSS version 25 (IBM Corp., 2017). Longitudinal mixed-effects models were used to examine the relationship between clinical outcomes (e.g., symptomatology) and time, as measured by session number and implementation phase. Clinical outcomes were regressed on an effect of time (session number). To compare the trend by implementation phase intervals, the interaction between phase and time was included in the model. In addition, separate models were run with a sub-sample to evaluate youth covariates thought to be related to youth symptomatology and severity of problems (i.e., age, sex, race, length of stay, site, and referral source) as main effects. Analyses were conducted using PROC MIXED in SAS 9.4 (SAS Institute, 2017).

A separate model was used for each of the clinical outcomes (i.e., BPC total, BPC internalizing, BPC externalizing, and TPA total) and each followed the steps detailed next. First,

a null or unconditional model was fit, which provided an estimate of variance (within and between) and allowed the calculation of the intraclass correlation coefficient that determined the usefulness of the analytic approach. In the second model, a fixed effect of time was added to evaluate the change of the clinical outcome by time. The third model added a random effect of time to assess if the clinical outcome rate of change varies between subjects. A fourth model explored an interaction effect between time and phase, which allowed to test the primary hypotheses of the study.

Next, models incorporating covariates (e.g., gender) were estimated with the sub-sample after the best-fitting model for the full sample was re-run to see if effects were replicated. Fit statistics were used to compare models, including log likelihood, AIC, BIC, and AICC with the criteria being that a smaller value indicates a better fitting model. Assumptions of the models (i.e., normal distribution of residuals and equal variance of residuals) were evaluated using residual plots of studentized residuals.

A simple regression model was used to evaluate the relationship of time (i.e., quarter) and the PQI outcomes of interest. The Shapiro-Wilk test was used to determine normality for the dependent variables. Correlations were used to determine the relationship between variables and the adequacy of including independent variables (i.e., time, phase, and their interaction) in the model. Residuals were plotted to evaluate for normality. SPSS version 25 was used to run these analysis (IBM Corp., 2017).

Study 2 Results

Participants

There were 1134 youth included in this study. The average number of sessions for these youth was 16.97 (SD = 13.15). A total of 536 (47.3%) youth were part of the Implementation

Phase 1, 438 were part of Implementation Phase 2 (38.6%), and 160 of the Sustainment Phase (14.1%).

Demographic information was only available for a sub-sample of youth (*N* = 372). The sub-sample was predominantly male (66.7%), and Caucasian (46.2%). The site with more youth was WSTC-Secure (37.4%) and most youth were referred to WHS through the juvenile justice system (86.0%). The average age at baseline for youth was 15.94 (SD = 1.30) with an average length of stay of 262 days (SD = 127.79) and an average of 22 therapy sessions (SD = 14.34). Table 14 provides more demographic information for youth.

Table 14. Descriptive statistics for youth

Variable	Frequency	Percent
Site		
PWLC	92	24.7
VH	65	17.5
WGRC	71	19.1
WSTC	139	37.4
Missing	5	1.3
Race		
African American	144	38.7
Arabic	3	0.8
Bi-racial	33	8.9
Caucasian	172	46.2
Hispanic	11	3.0
Native American	9	2.4
Sex		
Female	124	33.3
Male	248	66.7
Referral source		
Juvenile Justice	326	87.63
Non-juvenile justice	46	12.37

Note. PWLC, VH, WGRC = non-secure sites; WSTC = secure site.

Data Description – BPC and TPA

Descriptive statistics were run for the BPC and the TPA. For the BPC, the total score and its subscales (i.e., internalizing and externalizing symptoms) were explored across the three implementation phases that were part of this study: Implementation Phase 1, Implementation Phase 2, and Sustainment Phase. Mean, standard deviation, and youth *N* for each scale at each phase over time are detailed in Table 15. Weisz et al., (2012) provides the norms from a youth outpatient clinical sample: BPC total score (M = 5.68, SD = 4.14), BPC internalizing score (M = 2.79, SD = 2.62), BPC externalizing score (M = 2.90, SD = 2.40), and TPA total score (M = 4.96, SD = 2.96).

Table 15. Descriptive statistics for the BPC and TPA by phase over time

Session/ Variable	Value	1	2	3	4	5	6	7	8	9	10	15	20	25	30
Implementation Phase 1															
BPCtot	M	8.31*	7.42	6.62	6.54	5.86	5.94	6.06	5.76	5.26	5.01	4.20	4.21	4.21	4.94
	SD	5.31	5.46	5.32	5.52	5.26	4.97	5.47	5.31	5.14	4.96	4.42	4.43	4.98	5.18
	N	526	484	453	410	401	376	332	319	305	273	163	104	58	33
BPCint	M	4.33	3.63	3.30	3.23	2.91	2.89	3.14	3.15	2.77	2.70	2.37	2.21	1.93	2.52
	SD	3.42	2.28	3.10	3.26	3.10	2.96	3.16	3.21	3.00	3.08	2.83	2.78	2.57	3.36
	N	526	484	455	410	401	378	333	319	305	273	163	104	58	33
BPCext	M	3.98*	3.79	3.35	3.31	2.95	3.04	2.92	2.60	2.49	2.32	1.83	2.00	2.28	2.42
	SD	2.85	2.98	3.03	3.06	2.90	2.85	2.91	2.72	2.77	2.52	2.29	2.58	3.09	2.72
	N	526	484	453	410	401	376	342	320	307	276	163	104	58	33
TPA	M	5.78	4.64	4.30	4.17	3.87	3.91	3.90	3.55	3.46	3.22	3.26	3.13	2.71	3.11
	SD	2.66	2.80	2.77	2.84	2.77	2.79	2.80	2.62	2.64	2.53	2.43	2.65	2.55	2.46
	N	483	455	424	412	407	374	339	315	300	266	159	103	57	33
Implementation Phase 2															
BPCtot	M	9.17^	8.33	7.62	7.25	6.82	6.69	6.70	6.57	6.25	5.69	5.74	4.96	5.72	5.03
	SD	5.14	5.40	5.26	5.38	5.01	5.07	5.02	4.78	4.97	4.74	4.82	4.37	4.77	4.70
	N	434	413	395	360	359	343	304	291	282	259	192	136	99	69
BPCint	M	4.50	4.11	3.90	3.79	3.57	3.48	3.47	3.34	3.01	2.94	3.19	2.63	2.67	2.72
	SD	3.46	3.47	3.52	3.56	3.40	3.27	3.35	3.13	2.98	2.96	3.18	2.73	2.79	2.93
	N	434	413	395	360	359	343	304	291	283	260	192	136	99	69
BPCext	M	4.66^	4.22	3.72	3.46	3.25	3.22	3.19	3.20	3.24	2.75	2.56	3.32	3.05	2.31
	SD	2.93	3.11	2.85	3.01	2.72	2.85	2.82	2.85	2.88	2.63	2.57	2.65	3.01	2.56
	N	434	414	345	363	359	345	314	293	282	260	192	137	99	70
TPA	M	6.14^	5.47	5.00	4.77	4.64	4.56	4.61	4.46	4.29	4.27	3.90	3.76	4.15	3.71
	SD	2.38	2.55	4.77	2.64	2.67	2.62	2.54	2.69	2.64	2.74	2.65	2.45	2.53	2.36
	N	391	378	369	344	335	323	295	278	266	247	180	131	97	73

							Sustainment Phase							
BPCtot	M	8.06	7.10	6.49	6.49	6.04	5.79	5.82	4.46	5.22	5.10	4.85	3.71	4.46	2.00
	SD	5.53	5.20	5.29	5.37	4.96	4.82	5.00	4.50	4.57	4.84	4.53	3.78	4.03	--
	N	156	149	135	131	119	115	109	100	94	81	47	24	13	1
BPCint	M	3.97	3.55	3.20	3.23	2.93	2.70	2.75	2.16	2.43	2.56	2.28	1.71	2.38	1.00
	SD	3.43	3.26	3.08	3.25	3.00	2.81	2.77	2.48	2.47	2.84	2.37	1.99	2.50	--
	N	156	149	135	131	119	115	109	100	94	81	47	24	13	1
BPCext	M	4.09	3.55	3.29	3.26	3.08	3.10	3.08	2.30	2.77	2.51	2.57	2.00	2.08	1.00
	SD	3.08	2.96	3.05	3.15	3.03	3.06	3.13	2.76	3.12	3.01	3.30	2.54	2.50	--
	N	156	149	135	131	120	115	110	100	95	82	47	24	13	1
TPA	M	5.47	4.45	4.35	4.00	3.81	3.75	3.81	3.18	3.24	2.98	2.87	2.67	1.77	0.33
	SD	2.40	2.41	2.47	2.46	2.40	2.49	2.73	2.34	2.27	2.21	2.36	2.13	2.25	--
	N	155	147	147	130	119	115	110	102	96	84	47	24	13	1

Note. BPCtot = Brief Problems Checklist total score; BPCint = Brief Problems Checklist internalizing subscale, BPCext = Brief Problems Checklist externalizing subscale; TPA = Top Problems Assessment; * = statistically significantly different from Implementation Phase 2; ^ = statistically significantly different from the Sustainment Phase

Data Description - PQI

Descriptive analyses were also run for the PQI data. Table 16 provides the total frequency of number of restraints, number of clients restrained, number of client incidents, and number of staff injuries at WHS over each quarter.

Table 16. PQI data by quarter and phase

Quarter	Phase	Restraints	Clients restrained	Client incidents	Staff injuries
1	1	219	82	17	14
2	1	206	75	9	10
3	1	127	59	6	9
4	1	234	73	10	6
5	1	353	81	7	16
6	1	324	88	6	6
7	2	408	98	43	9
8	2	423	127	44	13
9	2	262	88	21	15
10	3	298	89	37	6
11	3	292	76	27	10
12	3	310	92	36	15
13	3	318	94	50	15
14	4	376	104	64	12
15	4	317	105	92	10
16	4	309	98	39	6
17	4	269	76	35	10
18	4	331	96	45	9
19	4	530	107	71	15
20	4	332	99	59	11
21	5	261	93	35	17

Correlations among PQI outcomes of interest were explored and assessed for multicollinearity (see Table 17). There were statistically significant results for the following relationships: quarter and phase, quarter and number of clients restrained, quarter and incidents, phase and clients restrained, phase and incidents, total restraints and clients retained, total restraints and incidents, and number of clients restrained and incidents.

Table 17. Correlation of PQI variables

	Quarter	Phase	Total restraints	Clients restrained	Incidents	Staff injuries
Quarter	1	**0.97****	0.43	**0.47***	**0.71****	0.19
Phase		1	0.35	**0.46***	**0.76****	0.15
Total restraints			1	**.79****	**0.60****	0.22
Clients restrained				1	**0.72****	0.23
Incidents					1	.15
Staff injuries						1

Note. ** = $p < 0.01$; * < 0.05.

Linear Mixed Models – BPC and TPA data

Need for multilevel modeling. Exploratory analyses were conducted to understand the relationship between the outcomes of interest and time to see whether the relationship varied between youth. Figure 5 details the overall relationships of BPC, BPC internalizing, BPC externalizing, and TPA with time. The blue line indicates that each outcome of interest decreases over time (i.e., as treatment progresses). However, Figure 6 presents the complexity of this linear relationship between outcomes and time, as youth have various intercepts and slopes across youth when graphed individually. These visualizations of the data suggest that a multilevel approach should be attempted.

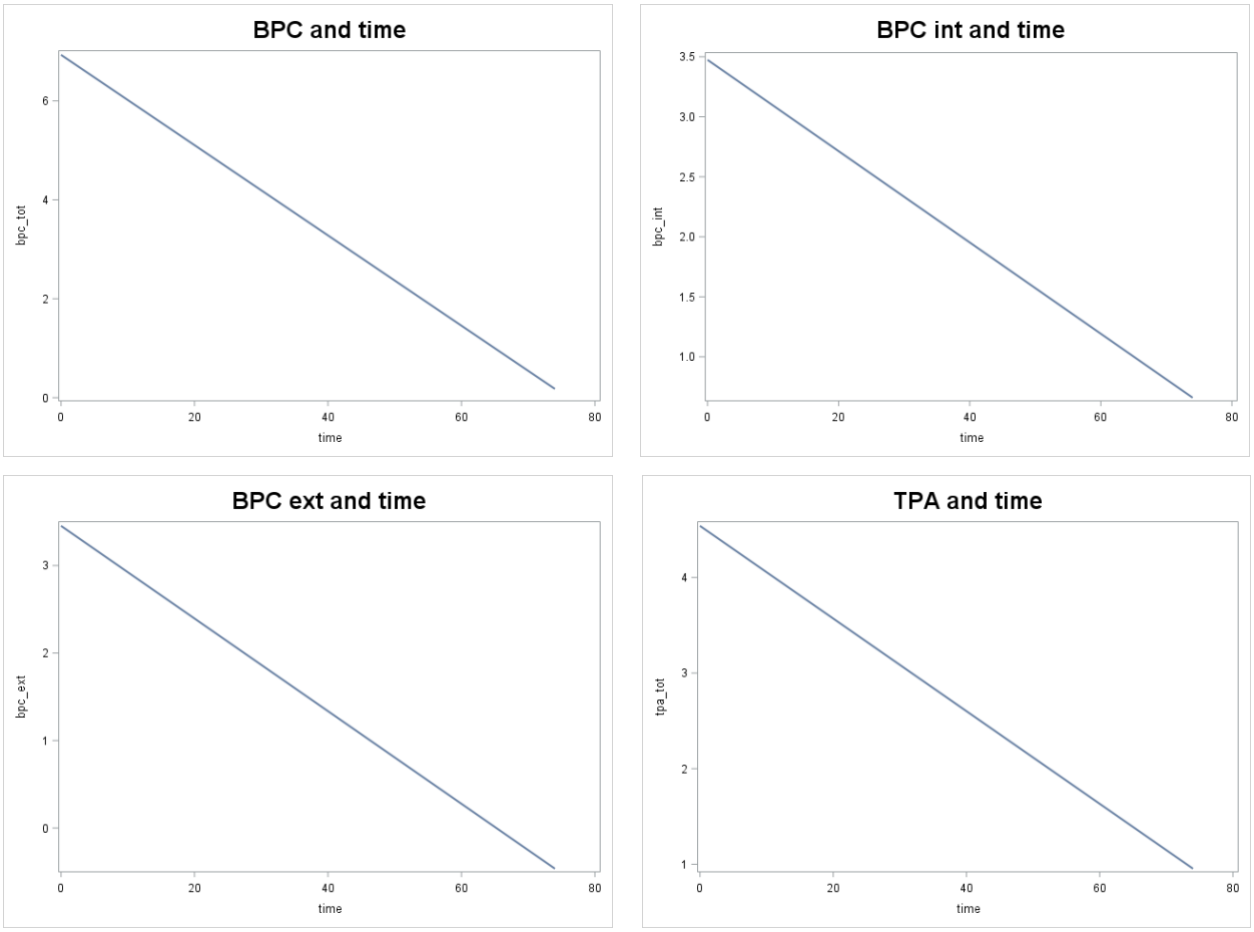

Figure 5. Average relationship between outcomes and time

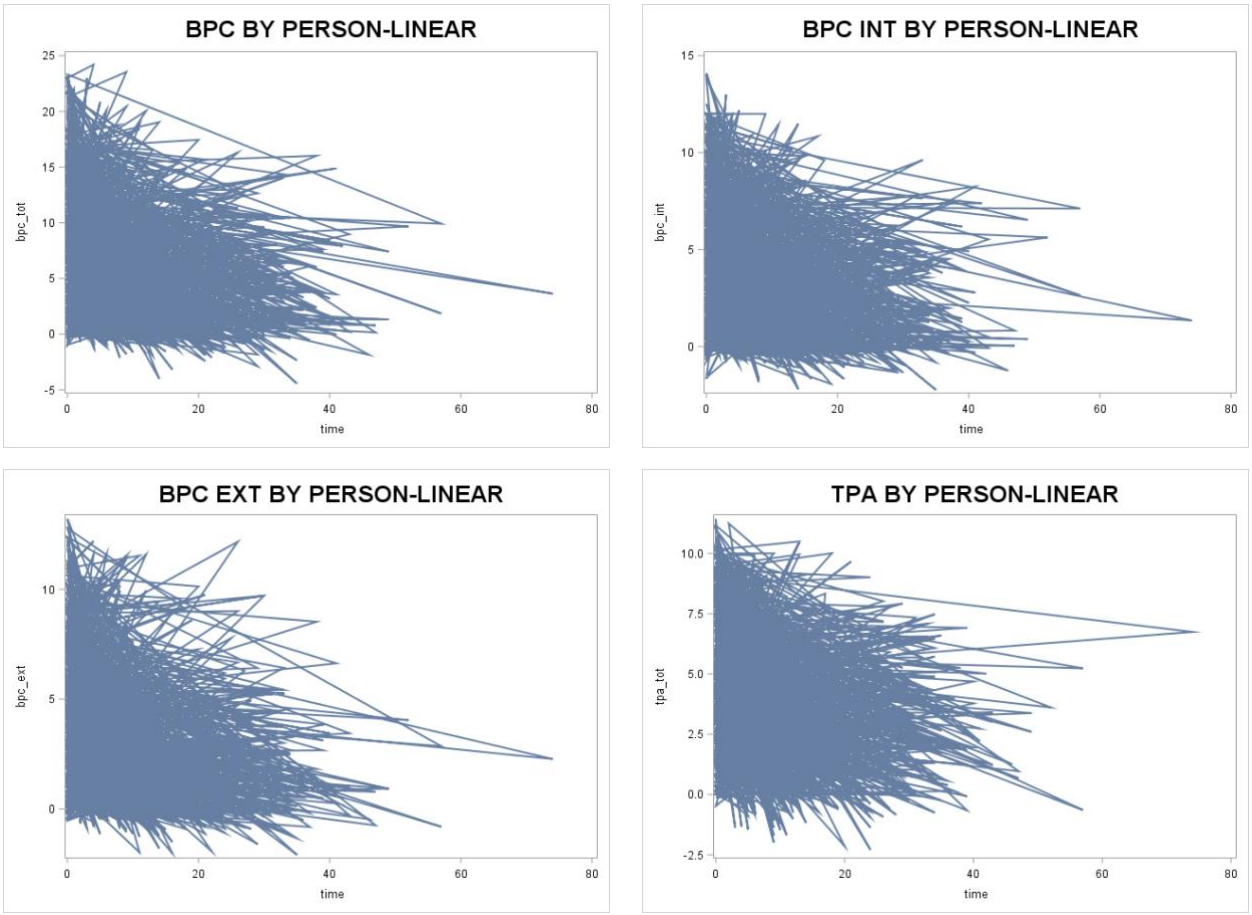

Figure 6. Person-linear relationship between outcomes and time

In addition, the intraclass correlation (ICC) for each outcome was calculated in order to determine the appropriateness of multilevel modeling. The within-individual and between-individual variance from an unconditional model (i.e., no predictors) was used to calculate the ICC. The ICC was calculated as the ratio of between variance by total variance and then multiplied by 100. The ICC for the BPC total score was 59.93%, BPC internalizing was 61.02%, and TPA was 50.69%, which is the amount of variance accounted for by between-individual variance. Given that the ICC were high, it was deemed that a multilevel approach was indeed warranted for this data.

Model results – BPC total. Table 18 presents the model results for the BPC total score. Model set 1 was the null model, which produced a statistically significant fixed effect of the intercept. That is, the average value of the BPC total was 6.38. Model set 2 added a fixed effect of time (i.e., session) which produced a statistically significant fixed effect of the intercept, meaning that the average score of the BPC total at the beginning of treatment (time = 0) was 7.33, which is above clinical levels. In addition, the fixed effect for time was statistically significant such that for every unit increase in time, BPC total scores decreased by 0.14 points, revealing improvements in overall symptomatology after each session. Model set 3 added a random effect of time. Results indicate a statistically significant fixed effect of the intercept, meaning that at the beginning of treatment, the average score for BPC total was 7.60, and for every unit increase in time, BPC total scores decreased by 0.21 points. All random effects were statistically significant indicating that there was variation in both the intercept (i.e., baseline BPC total values) and the slope (i.e., trajectory of change), in addition to having a negative intercept-slope covariance (-0.47). The negative intercept-slope covariance indicates that individuals with lower intercepts have steeper slopes and individuals with higher intercepts have shallow slopes.

Model set 4 was a model that incorporated the implementation phases as predictors of the BPC total. The fixed effect of the intercept was statistically significant, therefore the average value for the BPC total was 7.39. Moreover, the fixed effect of time was statistically significant, and for every unit increase of time, BPC total declined by 0.23 points. The effect of phase and the interaction between time and phase were not statistically significant. Model set 5 added number of sessions as a covariate given the variation in frequency between youth. The fixed effect of the intercept was statistically significant, producing an average value of 8.12 for the BPC total. For every unit increase in time, BPC total declined by 0.24 points. The effect of phase and the

interaction between time and phase were not statistically significant. The effect of number of sessions was statistically significant, indicating that for every unit increase in number of sessions, the BPC total increased by 0.05 points. Regarding model fit, lower indices (i.e., AIC, AICC, and BIC) offered better fit, therefore Model set 5 seems to be the best fit for the data.

Demographic information was available for a sub-sample (n = 372) of the youth. Therefore, models were re-run with the following covariates: age, length of stay, race, sex, referral source, and site that were matched to the outcomes. Table 19 provides information on the BPC total models with covariates. Model set 1 reproduced Model set 5 from the original analysis. The effects and direction of effects remained the same. Model set 2 included the youth covariates, which indicated that both age and sex were statistically significant covariates. Specifically, for every unit increase of age, BPC total decreased by 0.47 points. In addition, being male, as compared to female, reduced BPC total scores by 1.71 points. Model set 3 reproduced Model 2 with parsimony (i.e., removed non-statistically significant covariates) which reflected a better model fit.

Table 18. Model results for BPC total

Parameter	Model set 1	Model set 2	Model set 3	Model set 4	Model set 5
Model Description	Unconditional	Fixed Time	Random Time	Fixed Phase	Number of Sessions
			Fixed Effects		
Intercept	**6.38* (0.13)**	**7.33* (0.13)**	**7.60* (0.14)**	**7.39* (0.23)**	**8.12* (0.25)**
Session		**-0.14* (0.00)**	**-0.21* (0.01)**	**-0.23* (0.01)**	**-0.24* (0.01)**
Phase 1				0.70 (0.31)	0.49 (0.31)
Phase 2				0.32 (0.44)	-0.05 (0.44)
Session *Phase 1				0.03 (0.02)	0.03 (0.02)
Session *Phase 2				0.02 (0.03)	0.02 (0.03)
Number of sessions					**0.05* (0.01)**
			Random Effects		
Level 1					

Residual	**11.26* (0.14)**	**10.13* (0.12)**	**8.59* (0.11)**	**8.59* (0.11)**	**8.60* (0.11)**
Level 2					
Intercept	**16.84* (0.78)**	**16.85* (0.78)**	**20.78* (0.98)**	**20.71* (0.97)**	**20.83* (0.99)**
Time			**0.05* (0.00)**	**0.05* (0.00)**	**0.05* (0.00)**
Intercept/ time			**-0.47* (0.05)**	**-0.48* (0.05)**	**-0.52* (0.05)**
Model Fit					
-2Log	80602.7	79154.3	77914.7	77911.2	77890.0
AIC	80606.7	79158.3	77922.7	77919.2	77898.0
AICC	80606.7	79158.3	77922.7	77919.2	77898.0
BIC	80616.7	79168.4	77942.8	77939.3	77918.1

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Table 19. Model results for BPC total with covariates

Parameter	Model set 1	Model set 2	Model set 3
	Baseline	Covariates	Parsimonious
Fixed Effects			
Intercept	**8.10* (0.98)**	**8.68* (1.05)**	**9.36* (0.99)**
Session	**-0.11* (0.07)**	**-0.11* (0.07)**	**-0.12* (0.07)**
Phase 1	0.51 (1.05)	0.49 (1.02)	1.02 (1.02)
Phase 2	-0.97 (1.38)	-0.77 (1.35)	-0.98 (1.34)
Session*Phase 1	-0.10 (0.07)	-0.10 (0.07)	-0.09 (0.07)
Session*Phase 2	-0.09 (0.09)	-0.08 (0.09)	-0.07 (0.09)
Number of sessions	**0.07* (0.02)**	**0.05* (0.02)**	**0.06* (0.02)**
Age		**-0.47* (0.17)**	**-0.40* (0.17)**
Length of stay		0.00 (0.00)	
Race		0.13 (0.43)	
Sex		**-1.71* (0.45)**	**-1.85* (0.45)**
Referral source		1.14 (0.63)	
Site		0.57 (0.47)	
Random Effects			
Level 1			
Residual	**9.48* (0.19**	**9.47* (0.19)**	**9.47* (0.19)**
Level 2			
Intercept	**19.95* (1.77)**	**18.59* (1.69)**	**18.36* (1.65)**
Time	**0.04* (0.01)**	**0.04* (0.01)**	**0.04* (0.01)**
Intercept/time	**-0.57* (0.08)**	**-0.55* (0.08)**	**-0.54* (0.08)**
Model Fit			
-2Log	28667.4	28648.7	28646.4
AIC	28675.4	28657.7	28654.4
AICC	28675.4	28567.7	28654.4

BIC	28690.5	28672.8	28669.5

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Model results – BPC internalizing. Table 20 contains information about the model results for the BPC internalizing subscale. Model set 1 was the null model, which produced a statistically significant fixed effect of the intercept. In Model set 2 a fixed effect of time was added. The fixed effect of the intercept was statistically significant, meaning that the average score for the BPC internalizing at the beginning of treatment was 3.68, which is above clinical levels. In addition, the fixed effect of time was statistically significant, the BPC internalizing score reduced by 0.07 points for every unit increase in time. In Model set 3 a random effect of time was added. Given that the fixed effect for time was statistically significant, the BPC internalizing reduced by 0.10 points for every unit increase in time. The random effects in this model were statistically significant and the intercept-slope covariance was negative.

Model set 4 incorporates the implementation stages as predictors of BPC internalizing. The fixed effect of the intercept was statistically significant. The fixed effect of time was also statistically significant, meaning that for every unit increase in time, BPC internalizing decreased by 0.10 points. Both implementation phases and the interaction between phase and time were non-statistically significant. In Model set 5, number of sessions is added as a covariate. The fixed effect of intercept was statistically significant. The fixed effect of time was statistically significant, and for every unit increase in time, BPC internalizing decreased 0.11 points. Phase and the interaction between phase and time were not statistically significant. The effect of number of sessions was statistically significant, indicating that the BPC internalizing increased 0.3 points for every

additional session. Model set 5 had the lowest values for the AIC, AICC, and BIC, indicating better fit across all models.

All BPC internalizing models were re-run to account for youth covariates in a sub-sample of youth (n = 372). Table 21 provides information for these models. Model set 1 reproduced results from model set 5 in the original analysis (i.e., statistically significant decrease in BPC internalizing for every unit in time and increase of BPC internalizing for every unit increase in number of sessions). Model set 2 found that males, as compared to females, experienced 1.82 points less in BPC internalizing symptoms. In addition, youth referred from the juvenile justice system, in comparison to those not referred to by the juvenile justice system, experienced 1.01 points more in BPC internalizing symptoms. Model set 3 is a more parsimonious version of Model set 2 that only includes the statistically significant covariates (i.e., sex and referral source).

Table 20. Model results for BPC internalizing

Parameter	Model set 1	Model set 2	Model set 3	Model set 4	Model set 5
Model Description	Unconditional	Fixed Time	Random Time	Fixed time	Number of sessions
			Fixed Effects		
Intercept	**3.23* (0.98)**	**3.68* (0.08)**	**3.81* (0.09)**	**3.71* (0.13)**	**4.14* (0.15)**
Session		**-0.07* (0.00)**	**-0.10* (0.01)**	**-0.10* (0.01)**	**-0.11* (0.01)**
Phase 1				0.33 (0.19)	0.21 (0.19)
Phase 2				-0.23 (0.27)	-0.08 (0.27)
Session *Phase 1				0.00 (0.01)	0.00 (0.01)
Session *Phase 2				-0.01 (0.02)	-0.01 (0.02)
Number of sessions					**0.03* (0.01)**
			Random Effects		
Level 1					
Residual	**4.05* (0.05)**	**3.79* (0.05)**	**3.25* (0.04)**	**3.25* (0.04)**	**3.25* (0.04)**
Level 2					
Intercept	**6.34* (0.29)**	**6.40* (0.30)**	**8.18* (0.38)**	**9.16* (0.38)**	**8.18* (0.38)**
Time			**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.04)**

Intercept/ time			**-0.19* (0.02)**	**-0.19* (0.02)**	**-0.20* (0.02)**
			Model Fit		
-2Log	65619.2	64707.3	63557.4	63563.9	63546.2
AIC	65623.2	64711.3	63565.4	63571.9	63554.2
AICC	65623.2	64711.3	63565.4	63571.9	63554.3
BIC	65633.3	64721.3	63585.5	63592.0	63574.4

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Table 21. Model results for BPC internalizing with covariates

Parameter	Model set 1	Model set 2	Model set 3
	Baseline	Covariates	Parsimonious
	Fixed Effects		
Intercept	**4.69* (0.63)**	**5.79* (0.65)**	**5.55* (0.63)**
Session	**-0.07* (0.04)**	**-0.08* (0.04)**	**-0.08* (0.04)**
Phase 1	-0.18 (0.67)	-0.13 (0.64)	-0.04 (0.64)
Phase 2	-1.33 (0.89)	-0.95 (0.85)	-0.84 (0.85)
Session*Phase 1	-0.03 (0.04)	-0.03 (0.04)	-0.03 (0.04)
Session*Phase 2	-0.02 (0.05)	-0.01 (0.05)	-0.01 (0.05)
Number of sessions	**0.04* (0.01)**	**0.04* (0.01)**	**0.04* (0.01)**
Age		-0.15 (0.11)	
Length of stay		-0.00 (0.00)	
Race		-0.25 (0.26)	
Sex		**-1.82* (0.28)**	**-1.83* (0.27)**
Referral source		**1.01* (0.39)**	**0.95* (0.38)**
Site		-0.16 (0.29)	
	Random Effects		
Level 1			
Residual	**3.56* (0.07)**	**3.56* (0.07)**	**3.56* (0.07)**
Level 2			
Intercept	**8.45* (0.74)**	**7.38* (0.66)**	**7.49* (0.66)**
Time	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**
Intercept/time	**-0.22* (0.03)**	**-0.21* (0.03)**	**-0.22* (0.03)**
	Model Fit		
-2Log	23443.1	23404.2	23292.2
AIC	23451.1	23412.2	23400.2
AICC	23451.1	23412.2	23400.2
BIC	23466.2	23427.3	23415.3

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Model results – BPC externalizing. Table 22 presents information about the model results for the BPC externalizing subscale. Model set 1 produced the null model. The fixed effect of the intercept was statistically significant, meaning that the average value of BPC externalizing was 3.15. Next, Model set 2 added the fixed effect of time, which was statistically significant. The average BPC externalizing value for youth at the beginning of treatment was 3.64, which was above clinical norms. In addition, the fixed effect of time was statistically significant, meaning that BPC externalizing decreased by 0.07 points after every session. In Model set 3, the random effect of time was included. The fixed effect of the intercept was statistically significant, and the fixed effect of time was also statistically significant, meaning that for every unit increase in time, BPC externalizing decreased 0.11 points. All random effects were statistically significant with the intercept-slope covariance being negative.

Model set 4 added the effect of phase and the interaction between phase and time. The fixed effect of the intercept was statistically significant. The fixed effect of time was also statistically significant, meaning that for each unit increase in time, BPC externalizing decreased by 0.13 points. The fixed effect of phase was statistically significant. Specifically, youth at WHS during the Implementation Phase 2 had 0.35 points more on the BPC externalizing compared to those in the Implementation Phase 1. In addition, the interaction effect between time and phase was statistically significant. In particular, the slope was shallower by 0.3 points for youth at WHS during the Implementation Phase 2, as compared to Implementation Phase 1. Figure 7 presents a visual of the interaction effect. Model set 5 adds the effect of number of sessions. The fixed effect of the intercept was statistically significant. The fixed effect of time was also statistically significant. The fixed effect of phase was no longer statistically significant, yet the interaction effect between time and phase remained. In addition, for every additional session,

youth had 0.2 more points in the BPC externalizing. The fit statistics for Model set 5 reproduce the lowest values for the AIC, AICC, and BIC, indicating that this model was the best fit for the data.

The models were re-run with a sub-sample (n = 372) to account for covariates and results can be found on Table 23. Not all findings were replicated in this sub-sample, compared to the full sample, as the phase and interaction effects were not statistically significant. However, the effect of time and number of sessions remained in the same direction as in the full sample. In Model set 2, two covariates were statistically significant. In specific, for one unit increase in age, youth experienced 0.33 less points in the BPC externalizing. In addition, youth at secure sites, compared to non-secure sites, had elevated BPC externalizing scores. Model set 3 presents a parsimonious model in which non-statistically significant covariates were removed.

Table 22. Model results for BPC externalizing

Parameter	Model set 1	Model set 2	Model set 3	Model set 4	Model set 5
Model Description	Unconditional	Fixed Time	Random Time	Fixed time	Number of sessions
			Fixed Effects		
Intercept	**3.15* (0.07)**	**3.64* (0.07)**	**3.79* (0.08)**	**3.61* (0.12)**	**4.00* (0.14)**
Session		**-0.07* (0.00)**	**-0.11* (0.01)**	**-0.13* (0.01)**	**-0.13* (0.01)**
Phase 1				**0.35* (0.17)**	0.26 (0.17)
Phase 2				-0.09 (0.24)	0.03 (0.90)
Session *Phase 1				**0.03* (0.01)**	**0.03* (0.01)**
Session *Phase 2				0.03 (0.02)	0.03 (0.02)
Number of sessions					**0.02* (0.01)**
			Random Effects		
Level 1 Residual	**3.69* (0.04)**	**3.39* (0.04)**	**2.90* (0.04)**	**2.89* (0.04)**	**2.90* (0.04)**
Level 2 Intercept	**5.13* (0.24)**	**5.07* (0.24)**	**6.26* (0.30)**	**6.26* (0.30)**	**6.29* (0.30)**

Time			**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/ time			**-0.15* (0.02)**	**-0.15* (0.02)**	**-0.16* (0.02)**
Model Fit					
-2Log	64567.5	63377.2	62222.7	62220.4	62210.2
AIC	64571.5	63381.2	62230.7	62228.4	62218.2
AICC	64571.5	63381.2	62230.7	62228.4	62218.2
BIC	64581.6	63391.2	62250.9	62248.5	62238.3

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Table 23. Model results for BPC externalizing with covariates

Parameter	Model set 1	Model set 2	Model set 3
	Baseline	Covariates	Parsimonious
Fixed Effects			
Intercept	**3.43* (0.56)**	**2.84* (0.60)**	**3.15* (0.56)**
Session	**-0.04* (0.04)**	**-0.03* (0.04)**	**-0.04* (0.04)**
Phase 1	0.67 (0.60)	0.62 (0.59)	0.58 (0.04)
Phase 2	0.35 (0.79)	0.19 (0.78)	0.24 (0.77)
Session*Phase 1	-0.07 (0.04)	-0.07 (0.04)	-0.07 (0.04)
Session*Phase 2	-0.07 (0.05)	-0.06 (0.05)	-0.06 (0.05)
Number of sessions	**0.03* (0.01)**	0.02 (0.01)	**0.02* (0.01)**
Age		**-0.33* (0.10)**	**-0.33* (0.10)**
Length of stay		0.00 (0.00)	
Race		0.43 (0.25)	
Sex		0.14 (0.26)	
Referral		0.17 (0.37)	
Site		**0.77* (0.27)**	**0.84* (0.25)**
Random Effects			
Level 1			
Residual	**3.21* (0.07)**	**3.21* (0.07)**	**3.21* (0.07)**
Level 2			
Intercept	**6.48* (0.58)**	**6.09* (0.56)**	**6.03* (0.55)**
Time	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/time	**-0.19* (0.03)**	**-0.18* (0.03)**	**-0.18* (0.03)**
Model Fit			
-2Log	23057.4	23052.1	23042.5
AIC	23065.4	23060.1	23050.5
AICC	23065.4	23060.1	23050.5
BIC	23080.5	23075.2	23065.6

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

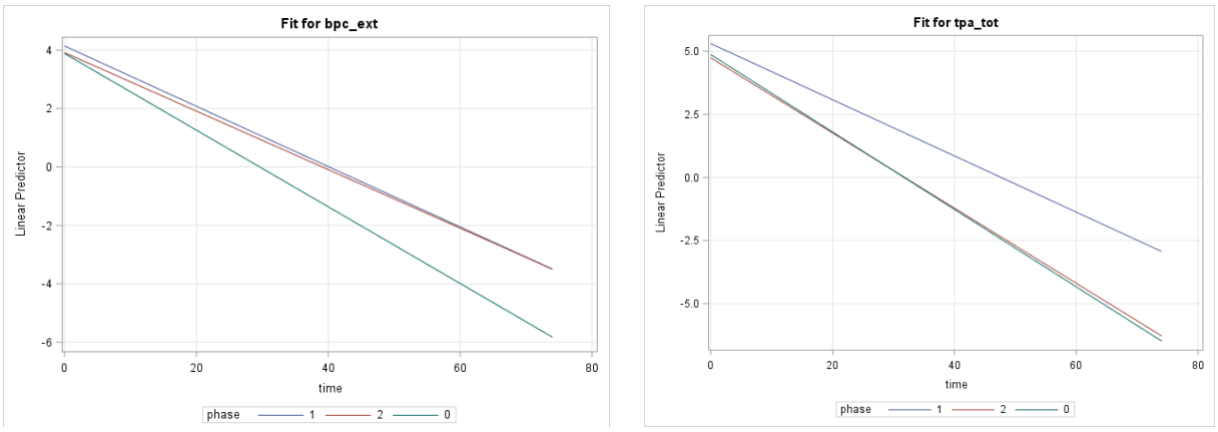

Figure 7. Interaction effects for the BPC externalizing and TPA total

Model results – TPA total. Table 24 contains the results for the models for the TPA total. Model set 1 is the null model. The fixed effect of the intercept was statistically significant, and it reported the average value of the TPA total score, 4.23. In Model set 2, the fixed effect of time was added, indicating that the average for the TPA total at the beginning of treatment was 4.67, slightly under clinical levels. The fixed effect of time was statistically significant and for every unit increase in time, the TPA decreased by 0.08 points. In Model set 3, the random effect of time was included. The fixed effect of the intercept was statistically significant. The fixed effect of time was also statistically significant. The random effect of time and of the intercept were statistically significant, while the intercept-slope covariance was negative.

In Model set 4, the fixed effect of phase and the interaction between phase and time were added. The fixed effect of the intercept was statistically significant. The fixed effect of time was also statistically significant, indicating that the TPA scores decreased by 0.15 points for every unit increase in time. In addition, the fixed effect of phase was statistically significant. That is, compared to Implementation Phase 1, youth at WHS during the Implementation Phase 2 had 0.44 higher points on the TPA total score. In addition, the interaction effect between time and phase

was statistically significant. Specifically, the slope was 0.04 points shallower for youth at WHS during Implementation Phase 2 versus Implementation Phase 1 (see Figure 7). Lastly, in Model set 5 the effect of number of sessions was added as a covariate. The fixed effect of the intercept, fixed effect of time, phase, interaction, and random effects were statistically significant. The model fit statistics revealed that Model set 5 is likely the best fit due to the AIC, AICC, and BIC being the lowest.

Models were re-run in a sub-sample (n = 372) to the evaluate the effect of youth covariates (see Table 25). The findings mirrored those of the full sample. In addition, referral source was found to be statistically significant. That is, those youth not referred by juvenile justice, compared to those referred by juvenile justice, had 0.92 more points in their TPA total score. Model set 3 is a more parsimonious model (i.e., removed non-statistically significant covariates) with slightly better model fit.

Table 24. Model results for TPA total

Parameter	Model set 1	Model set 2	Model set 3	Model set 4	Model set 5
Model Description	Unconditional	Fixed Time	Random Time	Fixed time	Number of sessions
			Fixed Effects		
Intercept	**4.23* (0.06)**	**4.67* (0.07)**	**5.00* (0.07)**	**4.86* (0.10)**	**5.11* (0.12)**
Session		**-0.08* (0.00)**	**-0.13* (0.01)**	**-0.15* (0.01)**	**-0.16* (0.01)**
Phase 1				**0.44* (0.15)**	**0.36* (0.16)**
Phase 2				-0.13 (0.21)	-0.04 (0.22)
Session *Phase 1				**0.04* (0.01)**	**0.04* (0.01)**
Session *Phase 2				0.00 (0.02)	0.00 (0.02)
Number of sessions					**0.02* (0.00)**
			Random Effects		
Level 1 Residual	**3.84* (0.05)**	**3.50* (0.04)**	**2.97* (0.04)**	**2.96* (0.04)**	**2.97* (0.04)**
Level 2					

Intercept	**3.92* (0.19)**	**3.93* (0.19)**	**4.73* (0.24)**	**4.69* (0.24)**	**4.80* (0.25)**
Time			**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/ time			**-0.11* (0.02)**	**-0.12* (0.02)**	**-0.13* (0.02)**
Model Fit					
-2Log	62606.0	61406.8	60229.9	60208.7	60204.9
AIC	62610.0	61410.8	60237.9	60216.7	60212.9
AICC	62610.0	61410.8	60237.9	60216.7	60212.9
BIC	62620.0	61420.9	60258.0	60236.8	60233.1

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Table 25. Model results for TPA total with covariates

Parameter	Model set 1	Model set 2	Model set 3
	Baseline	Covariates	Parsimonious
Fixed Effects			
Intercept	**4.69* (0.46)**	**4.60* (0.51)**	**4.47* (0.46)**
Session	**-0.07* (0.04)**	**-0.07* (0.04)**	**-0.07* (0.04)**
Phase 1	0.58 (0.49)	0.62 (0.49)	0.69 (0.49)
Phase 2	0.20 (0.64)	0.45 (0.65)	0.39 (0.64)
Session*Phase 1	-0.03 (0.04)	-0.03 (0.04)	-0.04 (0.04)
Session*Phase 2	-0.07 (0.05)	-0.07 (0.05)	-0.08 (0.05)
Number of sessions	**0.03* (0.01)**	**0.03* (0.01)**	**0.03* (0.01)**
Age		-0.11 (0.09)	
Length of stay		-0.00 (0.00)	
Race		0.05 (0.22)	
Sex		-0.30 (0.24)	
Referral source		**0.86* (0.33)**	**0.92* (0.32)**
Site		0.20 (0.25)	
Random Effects			
Level 1			
Residual	**3.04* (0.06)**	**3.04* (0.06)**	**3.04* (0.06)**
Level 2			
Intercept	**3.73* (0.37)**	**3.71* (0.38)**	**3.76* (0.38)**
Time	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**
Intercept/time	**-0.08* (0.02)**	**-0.09* (0.02)**	**-0.09* (0.02)**
Model Fit			
-2Log	21259.9	21265.3	21252.5
AIC	21267.9	21273.3	21260.5
AICC	21267.9	21273.3	21260.5
BIC	21283.0	21288.4	21275.6

Note. Phase 0 = Implementation 1 (reference); Phase 1 = Implementation 2; Phase 2 = Sustainment; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria. Standard errors are in parenthesis. * $p < 0.05$

Regression – PQI data

Simple regression models were fitted to understand the relation between time and PQI outcomes. Given the high correlation between quarter and phase, we excluded phase and the interaction between quarter and phase in the model. Time (i.e., quarter) was a statistically significant predictor of number of clients restrained and youth incidents (see Table 26). For number of clients restrained, 22% of the variation can be explained by time. In addition, 50% of the variation in number of incidents can be explained by time. Residuals for both were evaluated visually by inspecting a normal probabiblity plot and they seemed to follow an approximately normal distribution.

Table 26. Simple regression models

Variable	*B*	*Standard Error*	*t-statistic*	*p-value*	R_2
DV = Restraints					
Intercept	251.07	33.08	7.59	**<.001**	
Quarter	5.84	2.83	2.06	0.05	0.18
DV = Clients restrained					
Intercept	78.12	6.05	12.91	**<.001**	
Quarter	1.12	.482	2.33	**0.03**	0.22
DV = Incidents					
Intercept	6.70	7.61	1.32	.39	
Quarter	2.65	0.61	4.37	**<.001**	0.50
DV = Staff injuries					
Intercept	9.97	1.63	6.13	**<.001**	
Quarter	0.11	0.13	0.82	0.42	0.03

Note. DV = Dependent Variable

Study 2 Discussion

The goal of the present study was to evaluate the effect of implementation phases on youth clinical outcomes (i.e., symptomatology, severity, and PQI). Results from the study suggest that youth symptomatology and severity of symptoms decreased over time. In addition, the relationship was moderated by implementation phase for externalizing symptoms and severity of top problems (i.e., slope was steeper for Implementation Phase 1 vs. Implementation Phase 2), but not for total symptomatology and internalizing symptoms. For total symptomatology, age and sex were important covariates with males and older youth portraying lower symptoms. Meanwhile, sex and referral source were important for internalizing symptoms (i.e., older youth exhibited less symptoms and youth referred from the juvenile justice system had higher symptoms), age and site for externalizing symptoms (i.e., older youth had lower symptoms and youth at secure sites had higher symptoms), and referral source for severity of symptoms (i.e., youth referred by the juvenile justice system had higher symptoms). Although the models explored in this study had strong fit statistics and explained some of the variance in the random effcts, there are still variance in youth outcomes that is unexplained. Furthermore, the number of clients restrained and number of youth incidents increased over time while number of restraints and number of staff injuries did not change with time. These findings are not supportive of the original hypotheses which stated that each outcome would decrease more rapidly after each implementation phase.

Findings of this study are consistent with those that describe a decrease of symptoms following CBT for both internalizing and externalizing symptomatology (Zhou et al., 2015). These findings are encouraging because there is concern about CBT's applicability for high severity comorbid cases in complex settings. Therefore, this study provides initial support for

transdiagnotic and team-based CBT effectiveness at a youth RTF. However, given that there was no comparison group and fidelity measurment was not added until Implementation Phase 2, it could be that there was no CBT integrated into the setting yet. An alternative explanation could be that progress monitoring, instead of CBT, served as the intervention that led to symptom simprovements or that their previous treatment as usual was efficacious to begin with (Scott & Lewis, 2015).

Although youth clinical symptoms (i.e., the BPC and TPA) decreased over time, implementation phases did not moderate the effect found for BPC total score and BPC internalizing. Additionally, the growth rate for Implementation Phase 1 was more steep than for Implementation Phase 2 for BPC externalizing and severity of top problems. This could mean that staff use of CBT skills could be drifting after the first Implementation Phase. To our knowledge, there is no study that evaluates the moderation effect of implementation phases on clinical outcomes, thus, we are unable to compare these findings to the current literature. There are a few factors that could have influenced these results. First, early implementation could have produced better growth rates given the recency of the training, gained knowledge, and increased support (Wiltsey Stirman et al., 2012). In addition, implementation phases were not equal in length (i.e., Exploration = 9 months, Preparation = 8 months; Implementation 1 = 13 months; Implementation 2 = 18 months, Sustainment = 11 months) and they could have been demarcated incorrectly (e.g., Implementation 2 started with the introduction of the endorsement system), which could potentially impact the moderation effect. Longer phases might present difficulties due to allowing more time for potential drift of skills, for example.

Age, gender, site, and referral source seemed to be important predictors for the clinical outcomes. The findings regarding referral systems seem to be consistent with literature

suggesting that juvenile justice youth experience higher levels of mental health problems than their counterparts (Adolescence, 2011; Schufelt & Cocozza, 2006). Age and gender have also been associated with anxiety and depressive disorders (i.e., internalzing symptoms), although a meta-analysis found no relationship (Nilsen, Eisemann, & Kvernmo, 2013). Given that youth at RTFs are primarily older males, these findings are encouraging (Hockengerry et al., 2016).

The number of clients restrained and youth incidents, on average, increased over time. This finding is surprising given the strong focus of the CBT implementation project on designing the adaptation of CBT to address crisis situations that would otherwise result in restraints or incidents. Specifically, principles of behaviorism, SPEED maps, and TIP were designed to prevent or be used in these scenarios (e.g., use of reinforcement instead of punishment, use of TIP for high levels of distress). In addition, previous listerature found that number of restraints decreased after implementing an intervention, although it was not CBT (Pollastri et al., 2016). There are some contextual factors that could help explain this finding. For example, WHS had recently added programs prior to CBT implementation, including expansion of services for girls, which led to a higher number of clients residing at WHS. The PQI data did not account for changes in the population (i.e., there is no report of how many youth resided at WHS during each quarter) and could help explain the increased number of clients restrained and number of incidents of youth injuries. Another alternative explanation is that operations staff continued to be trained in use of restraints. Therefore, it might be that they needed more implementation support to use CBT skills instead of restraints.

Even though this study adds to the literature, more research is needed to understand the effect of CBT implementation on clinical outcomes in an RTF given the limilations of this study. Nonetheless, this study details how treatment was effective in improving clinical outcomes

although unrelated to time since initial implementation. The administrative outcomes demonstrated deterioration over time. It might be that RTFs need to consider alternative data systems to understand improvements. For example, WHS used to have a youth point system that gave points for positive behaviors and took away points for negative behaviors. This system was changed to a reinforcement system that only focused on rewarding positive behaviors. Specifically, future research should disentangle specific CBT skills and implementation strategies that might have improved CBT use and clinical outcomes, particularly in an RTF setting. Future work should allow for randomization and comparisons between treatment as usual and CBT, as well as consider more important youth covariates.

Limitations

This study contains several limitations. First, this study lacks a comparison group. Even though there was a decrease in symptomatology after CBT implementation, we were unable to compare this effect with what would have been WHS's treatment as usual before the implementation of CBT. Therefore, we are unable to rule out improvement due to other factors such as youth being taken from their typical environment into WHS where they receive services and support. Second, given the design of this study, we were unable to isolate the impact of specific implementation strategies. That is, we are able to document which implementation strategies occurred within an implementation phase, but we are unable to isolate the effect of individual strategies. Therefore, a tracking system for strategies might have yielded more crucial information better able to inform implementation efforts (Boyd, Powell, Endicott, & Lewis, 2018). In addition, the data collection was pragmatic, and efforts did not allow for the collection of important data such as demographic covariates for all youth and diagnostic information. The PQI data was limited as there was no way of standardizing the data due to the lack of quantity of

youth at WHS at any given quarter. This limited analyses as youth could not be compared across sites, which might have influenced the increased number of youth restrained and number of incidents.

Conclusion

To our knowledge, this is the first study to examine the effect of implementation on clinical outcomes in a youth RTF. Results demonstrated effectiveness of transdiagnostic CBT for youth in RTFs. Findings from this study address crucial gaps in the literature regarding EBPs for RTFs and encourage CBT implementation efforts in RTF settings. The adapted version of CBT used at WHS could be applicable to other RTFs in search of a team-based approach to transdiagnostic care.

Chapter 3: Study 3 Introduction

Implementing Evidence Based Practices (EBPs), such as Cognitive Behavior Therapy (CBT), in Residential Treatment Facilities (RTFs) has been challenging. A recent study found that even though several RTFs had attempted to bring EBPs into their setting, very few measured ongoing fidelity to the intervention post initial training and those who did reported low levels of fidelity (James et al., 2017). Treatment fidelity is defined as the degree to which an intervention has been implemented as intended (Borrelli, 2011). Accordingly, fidelity is conceptualized as a key implementation outcome (Proctor et al., 2009, 2011). Fidelity data can serve multiple other purposes, such as an indicator of quality control and a prompt for provider feedback (Breitenstein et al., 2010; Mcleod, Southam-Gerow, Tully, Rodríguez, & Smith, 2013). In addition, assessing fidelity is crucial in order to determine if changes in outcomes are in fact due to the intervention (Carroll et al., 2007).

Ensuring the measurement of fidelity in implementation studies has been a challenge, partially due to the intensive resources that are needed to conduct the gold standard procedures (e.g., observational coding conducted by independent observers; Beidas, Cross, & Dorsey, 2014; Rodriguez-Quintana & Lewis, 2018). Given these administration challenges, researchers and practitioners have explored alternative fidelity monitoring approaches. A recent national survey of RTFs assessed the use of fidelity methods (i.e., fidelity scale provided by the EBP developer, fidelity scale created by RTF, session recordings, addressed in supervision, or other) and found low self-reported levels of fidelity and fidelity monitoring (James et al., 2017). That is, most common was the finding that even though an RTF has attempted to incorporate an EBP, it is rarely monitored for quality. An alternative way to measuring fidelity might be of importance in an RTF setting.

Recently, implementation researchers have proposed an alternative solution to this issue by promoting the use of behavioral rehearsal (BR) as an analog tool for measuring fidelity, which is found to be better than self-report in terms of its accuracy and far less burdensome on stakeholders given reduced time evaluating direct care (Beidas et al., 2014; Cross, Matthieu, Cerel, & Knox, 2007). Cross et al., (2007) define BR as a standardized role-play between the trainee and another person, which is a very commonly used approach in medical training. BR is thought to incite active learning processes leading to both experience and reflection through practice (Beidas et al., 2014). Studies have also found that BR can help enhance therapist skills (Bearman, Schneiderman, & Zoloth, 2017; Cross et al., 2011; Dorsey et al., 2017). Despite these advantages, to our knowledge, BR has never before been used in RTFs.

Even if therapists in RTFs might be delivering CBT with fidelity, front line staff are rarely offered training despite the disproportionately high amount of time they spend with youth, as compared to therapists (James et al., 2017). However, studies have found that paraprofessionals (i.e., providers without postgraduate training in a mental health field) can be effective in delivering CBT (Montgomery et al., 2010). Therefore, Wolverine Human Services (WHS) opted to train all of their staff (e.g., youth care workers) on an adapted version of CBT that consisted of six Core Skills. Yet, there is little to no research illustrating whether and to what extent all staff in RTFs can be trained to deliver CBT with fidelity and how this varies throughout the implementation process. Key questions regarding the level of CBT fidelity required in an RTF in order to decrease youth internalizing and externalizing symptomatology remains unknown. This study will explore fidelity-outcome associations, for therapists and staff (including youth care workers) to address this dearth of knowledge. The current study aims to assess the impact of CBT Core Skill therapist and staff fidelity on two sets of clinical outcomes. I

hypothesize that (**H1)** youth symptomatology will decrease more rapidly with higher levels of staff and therapist fidelity to each CBT Core Skill, and that (**H2**) youth top problems will decrease more rapidly with higher levels of staff and therapist fidelity to each CBT Core Skill.

Study 3 Method

Adaptation of CBT

Six core CBT skills were identified: (1) Active listening, (2) ITCH (i.e., problem-solving), (3) SPEED Maps (i.e., mood identification and intervention mapping), (4) CAPES (i.e., activity scheduling), (5) TIP (i.e., distress tolerance), and (6) CBT Chat Forms (i.e., cognitive restructuring). Staff were trained on how to use these six skills with youth at WHS and therapists were encouraged to use the skills during their individual therapy sessions with youth. See Table 4 for details about the core skills.

Participants

A total of 453 youth who attended at least one treatment appointment with a therapist after the start of Implementation Phase 2 (i.e., the introduction of the fidelity monitoring system) were included in the study. Fidelity data was gathered from a total of 19 therapists across four sites who provided treatment to youth and 156 staff working at WHS who got endorsed in at least one of the six Core CBT skills (e.g. active listening, ITCH).

Measures

See Table 5 for an overview of measures and assessment intervals.

Fidelity. As part of the clinical demonstration project, a CBT skill endorsement system was created with six different core skills. The endorsement system was used to evaluate staff CBT skillset. The first level is covered knowledge of the principles of behaviorism and the CBT model. To be endorsed at level 1, staff must score 100% on a 10-item, multiple choice vignette-

based test on principles of behaviorism plus one open-ended question about the CBT model. The second and third levels cover knowledge and competency delivering the six core CBT skills. The second level includes (a) active listening, (b) problem solving, and (c) mood monitoring and intervention mapping. The third level consists of (d) activity scheduling, (e) distress tolerance, and (f) cognitive restructuring. To become endorsed at level 2 and 3, staff must have passed an oral examination of the critical elements of each core skill and demonstrate ability to competently deliver the skill in a behavioral role play (Beidas et al., 2016). The competency scale is adapted from item 10 "Application of CBT Techniques" of the Cognitive Therapy Rating Scale (CTS; Young & Beck, 1980), the gold standard CBT competency scale. This item is rated on a 0-6 scale that ranges from poor to excellent; staff must receive a 4 or higher to become endorsed in a given skill. In this study, fidelity was evaluated in two ways. First, the percentage of staff endorsed at each skill and level by month. Second, therapist fidelity, as measured by being endorsed (i.e., yes or no), for each skill and level at each session date.

Brief Problems Checklist (BPC; Chorpita et al., 2010). The BPC is a 12-item self-report measure that assesses youth's internalizing and externalizing symptoms, as well as total symptomatology. The BPC is administered by therapists and each youth rates each item as 0 "Not true", 1 "Somewhat true", and 2 "Very true". Each subscale ranges from 0-12, and the total score ranges from 0-24, with higher scores indicating increased symptom levels. Scores for the total score and two subscales were summed to get scores for each clinical session. Example items include "I worry a lot" and "I threaten to hurt people". The BPC has strong psychometric evidence (e.g., internal consistency, test-retest reliability) and is able to predict symptom change across treatment. In this study, the BPC was measured on a weekly basis at the beginning of each therapy session, starting in March 2015 when progress monitoring was introduced.

Top Problems Assessment (TPA; Weisz et al., 2011). The TPA is an individualized 3-item measure administered by therapists at the beginning of each session that allows the youth to identify the three most pressing problems before the start of treatment. After identifying the top three problems, youth can rate the severity on a scale from 0 ("not at all") to 10 ("very, very much"), with higher scores indicating that it is more of a problem. Scores for the total scale are averaged for each clinical session Therapists are encouraged to indicate the frequency, duration, intensity, and impairment (FIDI) for each problem. The TPA has sound psychometric evidence (e.g., test-retest reliability, sensitivity to change).

Time. Session number was used as the indicator of time.

Implementation Phase. This study was encompassed by two implementation phases: Implementation Phase 2 and Sustainment. Phase was treated as a categorical variable with Implementation Phase 2 serving as the reference category.

Data screening and missing data

Variables were evaluated for missing data, distributions, and extreme values by use of descriptive statistics and plots.

Analytic plan

Initial descriptive statistics (e.g., means, range) were calculated using SPSS version 25 (IBM Corp., 2017). Longitudinal mixed-effects models were used to examine the relationship between CBT fidelity and clinical outcomes (e.g., symptomatology). Clinical outcomes were regressed on an effect of CBT staff monthly fidelity and therapist fidelity for each skill and level. Analysis were conducted using PROC MIXED in SAS 9.4 (SAS Institute, 2017).

A separate model was used for each of the dependent variables (i.e., clinical outcomes) and each followed the steps detailed next. First, a baseline model was fit based on Chapter 2 (i.e.,

fixed effect of time, random effect of time, fixed effect of phase, interaction between time and phase, and total number of sessions). This model provided an estimate of variance (within and between youth) and allowed the calculation of the intraclass correlation coefficient that helped determine the usefulness of the analytic approach. In the second model, a fixed effect for each of the therapist fidelity of six core skills (e.g., active listening, ITCH) were added into the model. The third model incorporated the fixed effect of monthly fidelity for each of the six core skills across WHS staff. A fourth and fifth model were fit to evaluate the fixed effect of endorsement levels. The first model included level 2 and level 3 therapist fidelity and the second model included level 2 and level 3 variables for monthly staff fidelity. Models two through five included an interaction term between each skill or level and implementation phase, one interaction for each skill/level and time (i.e., session), and a three-way interaction between phase, time, and each core skill/level. Fit statistics were used to compare models, including log likelihood, AIC, BIC, and AICC. Assumptions of the models (i.e., normal distribution of residuals and equal variance of residuals) were evaluated using residual plots of studentized residuals.

Study 3 Results

Participants

There were 453 youth that participated in the study. Youth resided at one of four sites: WSTC (*n* = 174, 38.4%), VH (*n* = 71, 15.7%), PWLC (*n* = 113, 24.5%), or WGRS (*n* = 88, 19.4%), and some had no site identifier (*n* = 7, 1.5%). The average number of sessions was 19.72 (SD = 13.39).

Fidelity data was gathered from 156 WHS staff that went up for endorsement on at least one CBT Core Skill. The average age at the beginning of the project was 32.42 (SD = 9.85). Staff

were endorsed for an average of 3.14 (SD = 1.74) skills by the end of the project. Most staff worked at the non-secure sites (53.7%) and were part of the operations team (69.1%).

Data Description – BPC and TPA

Descriptive statistics were run for the BPC and the TPA. For the BPC, the total score and its subscales were explored. Mean, standard deviation, and n for each scale at each phase over time are detailed in Table 27. Weisz et al., (2012) provides the norms from a youth outpatient clinical sample: BPC total score (M = 5.68, SD = 4.14), BPC internalizing score (M = 2.79, SD = 2.62), BPC externalizing score (M = 2.90, SD = 2.40), and TPA total score (M = 4.96, SD = 2.96).

Table 27. Descriptive statistics for the BPC and TPA by phase over time

Session/ Variable	Value	1	2	3	4	5	6	7	8	9	10	15	20	25	30
Implementation Phase 2															
BPCtot	M	9.45	8.09	7.08	6.62	6.35	6.26	6.22	6.16	5.62	5.05	5.22	3.88	5.31	5.08
	SD	5.19	5.49	4.96	4.94	4.82	5.07	4.86	4.74	4.64	4.40	4.69	3.79	4.67	4.98
	N	169	163	158	143	149	147	131	126	127	124	105	84	65	48
BPCint	M	4.75	4.02	3.59	3.46	3.30	3.23	3.04	2.98	2.69	2.63	2.67	2.01	2.20	2.69
	SD	3.51	3.60	3.42	3.36	3.28	3.28	3.30	3.15	2.95	2.80	2.81	2.44	2.46	3.07
	N	169	163	158	143	149	147	131	126	127	125	105	84	65	48
BPCext	M	4.70	4.07	3.49	3.15	3.05	3.03	3.18	3.17	2.94	2.43	2.55	1.87	3.11	2.41
	SD	2.89	3.06	2.75	2.85	2.75	2.80	2.69	2.90	2.72	2.41	2.71	2.44	3.19	2.77
	N	169	163	158	143	149	147	131	126	127	125	105	84	65	49
TPA	M	6.23	5.28	4.61	4.26	4.22	4.19	4.38	4.21	4.02	4.09	3.69	3.44	4.03	3.90
	SD	2.16	2.37	2.43	2.43	2.62	2.34	2.33	2.57	2.44	2.61	2.53	2.16	2.43	2.69
	N	162	154	148	137	140	137	122	117	115	113	92	78	63	51
Sustainment Phase															
BPCtot	M	8.15	7.19	6.55	6.35	5.85	5.79	5.75	4.46	5.20	4.97	4.83	3.70	4.46	2.00
	SD	5.52	5.19	5.31	5.16	4.70	4.82	5.05	4.50	4.33	4.59	4.58	3.87	4.03	-
	N	152	146	133	130	117	115	106	100	89	76	46	23	13	1
BPCint	M	3.99	3.57	3.24	3.16	2.81	2.70	2.67	2.16	2.45	2.54	2.28	1.78	2.38	1.00
	SD	3.43	3.24	3.08	3.16	2.86	2.81	2.75	2.48	2.39	2.79	2.39	2.00	2.50	-
	N	152	146	133	130	117	115	106	100	89	76	46	23	13	1
BPCext	M	4.16	3.62	3.31	3.19	3.02	3.10	3.10	2.30	2.72	2.40	2.54	1.91	2.08	1.00
	SD	3.09	2.94	3.06	3.07	2.94	3.06	3.16	2.76	3.04	2.82	3.33	2.56	2.50	-
	N	152	146	133	130	118	115	107	100	90	77	46	23	13	1
TPA	M	5.44	4.41	4.34	3.98	3.78	3.75	3.84	3.18	3.13	2.98	2.83	2.70	1.77	0.33
	SD	2.41	2.39	2.47	2.46	2.40	2.49	2.74	2.34	2.20	2.16	2.36	2.17	2.25	-
	N	151	145	134	129	118	115	108	102	91	79	46	23	13	1

Note. BPCtot = BPC total; BPCint = BPC internalizing subscale; BPCext = BPC externalizing subscale; TPA = Top Problem Assessment

Data description – Fidelity

Descriptive analyses were also run for the therapist and staff fidelity data. Table 28 provides the total number of youth that had sessions with therapists endorsed for each skill and level for each the Implementation Phase 2, and Table 29 for the Sustainment Phase. Table 30 provides the percentage of staff endorsement for each skill and each level over time (i.e., monthly).

Table 28. Therapist fidelity during the Implementation Phase 2 (N and percentage)

Session/ Variable	1	2	3	4	5	6	7
AL							
Yes	119 (70.41)	118 (71.52)	115 (71.88)	110 (75.34)	113 (75.84)	111 (75.51)	102 (75.56)
No	39 (23.08)	36 (21.82)	34 (21.25)	27 (18.49)	27 (18.12)	28 (19.05)	26 (19.26)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
ITCH							
Yes	114 (67.46)	112 (67.88)	108 (67.50)	101 (69.18)	104 (69.80)	104 (70.75)	95 (70.37)
No	44 (26.04)	42 (25.45)	41 (25.63)	36 (24.66)	36 (24.16)	35 (23.81)	33 (24.44)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
SPEED							
Yes	95 (56.21)	97 (58.79)	96 (60.00)	88 (60.27)	88 (59.06)	86 (58.50)	79 (58.52)
No	63 (37.28)	57 (34.55)	53 (33.13)	49 (33.56)	52 (34.90)	53 (36.05)	49 (36.30)
Miss.	11 (6.51)	11 (6.67	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
CAPES							
Yes	105 (62.13)	100 (60.61)	97 (60.63)	89 (60.96)	91 (61.07)	92 (62.59)	82 (60.74)
No	53 (31.36)	54 (32.73)	52 (32.50)	48 (32.89)	49 (32.89)	47 (31.97)	46 (34.07)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	8 (5.19)
TIP							
Yes	71 (42.01)	78 (47.27)	79 (49.38)	73 (50.00)	75 (50.34)	72 (48.98)	70 (51.85)
No	87 (51.48)	76 (46.06)	70 (3.75)	64 (43.84)	65 (43.62)	67 (45.58)	58 (42.96)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)

CBT							
Yes	46 (27.22)	44 (26.67)	46 (28.75)	44 (30.14)	47 (31.54)	42 (28.57)	42 (31.11)
No	112 (66.27)	110 (66.67)	103 (64.38)	93 (63.70)	93 (62.42)	97 (65.99)	86 (63.70)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
Level2							
Yes	95 (56.21)	97 (58.79)	96 (60.00)	88 (60.27)	88 (59.06)	86 (58.50)	79 (58.52)
No	63 (37.28)	57 (34.55)	53 (33.13)	49 (33.56)	52 (34.90)	53 (36.05)	49 (36.30)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
Level3							
Yes	42 (24.85)	42 (25.45)	45 (28.13)	44 (30.14)	47 (31.54)	40 (27.21)	41 (30.37)
No	116 (68.64)	112 (67.88)	104 (65.00)	93 (63.70)	93 (62.42)	99 (67.35)	87 (64.44)
Miss.	11 (6.51)	11 (6.67)	11 (6.88)	9 (6.16)	9 (6.04)	8 (5.44)	7 (5.19)
Session/ Variable	8	9	10	15	20	25	30
AL							
Yes	91 (71.65)	94 (72.87)	87 (68.50)	72 (67.92)	62 (71.26)	53 (79.10)	42 (82.35)
No	28 (22.05)	28 (21.71)	32 (25.20)	26 (24.53)	17 (19.54)	10 (14.93)	5 (9.80)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
ITCH							
Yes	86 (67.72)	88 (68.22)	84 (66.14)	72 (67.92)	61 (70.11)	52 (77.61)	42 (82.35)
No	33 (25.98)	34 (26.36)	35 (27.56)	26 (24.53)	18 (20.69)	11 (16.42)	5 (9.80)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
SPEED							
Yes	72 (56.69)	76 (58.91)	71 (55.91)	66 (62.26)	51 (58.62)	48 (71.64)	40 (78.43)
No	47 (37.01)	46 (35.66)	48 (37.80)	32 (30.19)	28 (32.18)	15 (22.39)	7 (13.73)
Miss.	8 (6.30)	7(5.34)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
CAPES							
Yes	71 (55.91)	74 (57.36)	68 (53.54)	62 (58.49)	56 (64.37)	42 (62.69)	36 (70.59)
No	48 (37.80)	48 (37.21)	51 (40.16)	36 (33.96)	23 (26.44)	21 (31.34)	11 (21.57)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
TIP							
Yes	59 (46.46)	62 (48.06)	59 (46.46	53 (50.00)	43 (49.43)	39 (58.21)	36 (70.59)
No	60 (47.24)	60 (46.51)	60 (47.24)	45 (42.45)	36 (41.38)	24 (35.82)	11 (21.57)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)

CBT							
Yes	33 (25.98)	37 (28.68)	33 (25.98)	34 (32.08)	30 (34.48)	24 (35.82)	24 (47.06)
No	86 (67.72)	85 (65.89)	86 (67.72)	64 (60.38)	49 (56.32)	39 (58.21)	23 (45.10)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
Level2							
Yes	72 (56.69)	76 (58.91)	71 (55.91)	66 (62.26)	51 (58.62)	48 (71.64)	40 (78.43)
No	47 (37.01)	46 (35.66)	48 (37.80)	32 (30.19)	28 (32.18)	15 (22.39)	7 (13.73)
Miss.	8 (630)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)
Level3							
Yes	33 (25.98)	36 (27.91)	33 (25.98)	34 (32.08)	30 (34.48)	24 (35.82)	24 (47.06)
No	86 (67.72)	86 (66.67)	86 (67.72)	64 (60.38)	49 (56.32)	39 (58.21)	23 (45.10)
Miss.	8 (6.30)	7 (5.43)	8 (6.30)	8 (7.55)	8 (9.20)	4 (5.97)	4 (7.84)

Note. AL = Active Listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; Miss. = Missing

Table 29. Therapist monthly fidelity during the Sustainment Phase

Session/ Variable	1	2	3	4	5	6	7
AL							
Yes	141 (92.76)	137 (93.20)	125 (92.59)	120 (92.31)	109 (92.37)	107 (92.24)	99 (91.67)
No	7 (4.61)	6 (4.08)	6 (4.44)	6 (4.62)	5 (4.24)	5 (4.31)	5 (4.63)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
ITCH							
Yes	133 (87.50)	129 (87.76)	118 (87.41)	113 (86.92)	102 (86.44)	100 (86.21)	92 (85.19)
No	15 (9.87)	14 (9.52)	13 (9.63)	13 (10.00)	12 (10.17)	12 (10.34)	12 (11.11)
Miss.	4 (2.63)	4 (2.27)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
SPEED							
Yes	138 (90.79)	135 (91.84)	125 (92.59)	120 (92.31)	109 (92.37)	108 (93.10)	100 (92.59)
No	10 (6.58)	8 (5.44)	6 (4.44)	6 (4.62)	5 (4.24)	4 (3.45)	4 (3.70)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)

CAPES							
Yes	98 (64.47)	97 (65.99)	89 (65.93)	85 (65.38)	81 (68.64)	81 (69.83)	75 (69.44)
No	50 (32.89)	46 (31.29)	42 (31.11)	41 (31.54)	33 (27.97)	31 (26.72)	29 (26.85)
Miss.	4 (2.63)	4 (2.96)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
TIP							
Yes	120 (78.95)	119 (80.95)	111 (82.22)	107 (82.31)	98 (83.05)	96 (82.76)	90 (83.33)
No	28 (18.42)	24 (16.33)	20 (14.81)	19 (14.62)	16 (13.56)	16 (13.79)	14 (12.96)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08	4 (3.39)	4 (3.45)	4 (3.70)
CBT							
Yes	95 (62.50)	95 (64.63)	88 (65.19)	85 (65.38)	81 (68.64)	81 (69.83)	75 (69.44)
No	53 (34.87)	48 (32.65)	43 (31.85)	41 (31.54)	33 (27.97)	31 (26.72)	29 (26.85)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
Level2							
Yes	131 (86.18)	127 (86.39)	117 (86.67)	112 (86.15)	102 (86.44)	100 (86.21)	92 (85.19)
No	17 (11.18)	16 (10.88)	14 (10.37)	14 (10.77)	12 (10.17)	12 (10.34)	12 (11.11)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
Level3							
Yes	95 (62.50)	95 (64.63)	88 (65.19)	85 (65.38)	81 (68.64)	81 (69.83)	75 (69.44)
No	53 (34.87)	48 (32.65)	43 (31.85)	41 (31.54)	33 (27.97)	31 (26.72)	29 (26.85)
Miss.	4 (2.63)	4 (2.72)	4 (2.96)	4 (3.08)	4 (3.39)	4 (3.45)	4 (3.70)
Session/ Variable	8	9	10	15	20	25	30
AL							
Yes	94 (91.26)	84 (91.30)	71 (89.87)	44 (93.62)	22 (88.00)	10 (76.92)	1 (100.00)
No	5 (4.85)	4 (4.35)	4 (5.06)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
ITCH							
Yes	88 (85.44)	77 (83.70)	66 (83.54)	38 (80.85)	17 (68.00)	6 (46.15)	1 (100.00)
No	11 (10.68)	11 (11.96)	9 (11.39)	6 (12.77)	5 (20.00)	4 (30.77)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)

SPEED							
Yes	95 (92.23)	86 (93.48)	75 (94.94)	44 (93.62)	22 (88.00)	10 (76.92)	1 (100.00)
No	4 (3.88)	2 (2.17)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
CAPES							
Yes	72 (69.90)	72 (66.30)	52 (65.82)	29 (61.70)	10 (40.00)	3 (23.08)	0 (0.00)
No	27 (26.21)	27 (29.35)	23 (29.11)	15 (31.91)	12 (48.00)	7 (53.85)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
TIP							
Yes	86 (83.50)	75 (81.52)	65 (82.28)	38 (80.85)	17 (68.00)	6 (46.15)	1 (100.00)
No	13 (12.62)	13 (14.13)	10 (12.66)	6 (12.77)	5 (20.00)	4 (30.77)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
CBT							
Yes	72 (69.90)	61 (66.30)	52 (65.82)	29 (61.70)	10 (40.00)	3 (23.08)	0 (0.00)
No	27 (26.21)	27 (29.35)	23 (29.11)	15 (31.91)	12 (48.00)	7 (53.85)	1 (100.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
Level2							
Yes	88 (85.44)	77 (83.70)	66 (83.54)	38 (80.85)	17 (68.00)	6 (46.15)	1 (100.00)
No	11 (10.68)	11 (11.96)	9 (11.39)	6 (12.77)	5 (20.00)	4 (30.77)	0 (0.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)
Level3							
Yes	72 (69.90)	61 (66.30)	52 (65.82)	29 (61.70)	10 (40.00)	3 (23.08)	0 (0.00)
No	27 (26.21)	27 (29.35)	23 (29.11)	15 (31.91)	12 (48.00)	7 (53.85)	1 (100.00)
Miss.	4 (3.88)	4 (4.35)	4 (5.06)	3 (6.38)	3 (12.00)	3 (23.08)	0 (0.00)

Note. AL = Active Listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; Miss. = Missing

Table 30. Overall monthly fidelity (%)

Date	Phase	AL	ITCH	SPEED	CAPES	TIP	CBT	Level 2	Level 3
Mar-17	4	6.30	6.11	5.73	5.73	4.01	2.10	1.78	0.57
Apr-17	4	6.20	6.01	5.62	5.43	3.68	2.33	1.74	0.65

May-17	4	6.40	5.84	5.46	5.27	3.58	2.64	1.69	0.75
Jun-17	4	6.00	5.63	5.07	4.88	3.19	2.44	1.56	0.69
Jul-17	4	6.49	5.92	5.15	4.96	3.24	2.67	1.59	0.76
Aug-17	4	6.81	5.56	5.73	4.66	3.58	3.05	1.49	0.90
Sep-17	4	8.82	6.25	6.43	4.78	3.68	3.13	1.72	0.92
Oct-17	4	12.48	8.44	8.62	6.42	4.95	3.67	2.45	1.16
Nov-17	5	13.74	9.58	9.58	6.69	5.24	4.16	2.77	1.33
Dec-17	5	16.45	11.78	10.84	6.92	5.98	4.49	3.18	1.43
Jan-18	5	20.97	16.85	16.10	6.55	5.81	4.49	4.99	1.44
Feb-18	5	20.79	16.85	16.85	6.37	5.62	4.31	4.87	1.37
Mar-18	5	21.41	17.40	17.59	6.69	6.12	4.59	5.04	1.47
Apr-18	5	21.14	17.33	17.52	6.67	5.90	4.38	5.02	1.40
May-18	5	21.97	18.50	17.92	6.74	5.97	4.62	5.20	1.48
Jun-18	5	21.11	17.85	18.04	6.53	6.14	4.61	5.18	1.47

Note. AL = Active Listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; Phase 4 = Implementation Phase 2; Phase 5 = Sustainment Phase.

Linear Mixed Models – BPC and TPA data

Need for multilevel modeling. Exploratory analyses were conducted in order to understand the overall relationship between the outcomes of interest and time to determine if the relationship varied by youth. Figure 8 details the overall relationship between BPC, BPC internalizing, BPC externalizing, and TPA across time. The blue line in the figure indicated that, each outcome decreases over time on average. Figure 9 details how this relationship is more complex, as varying intercepts and slopes are graphed across different youth. Visual inspection indicated that a multilevel approach would be appropriate for this data.

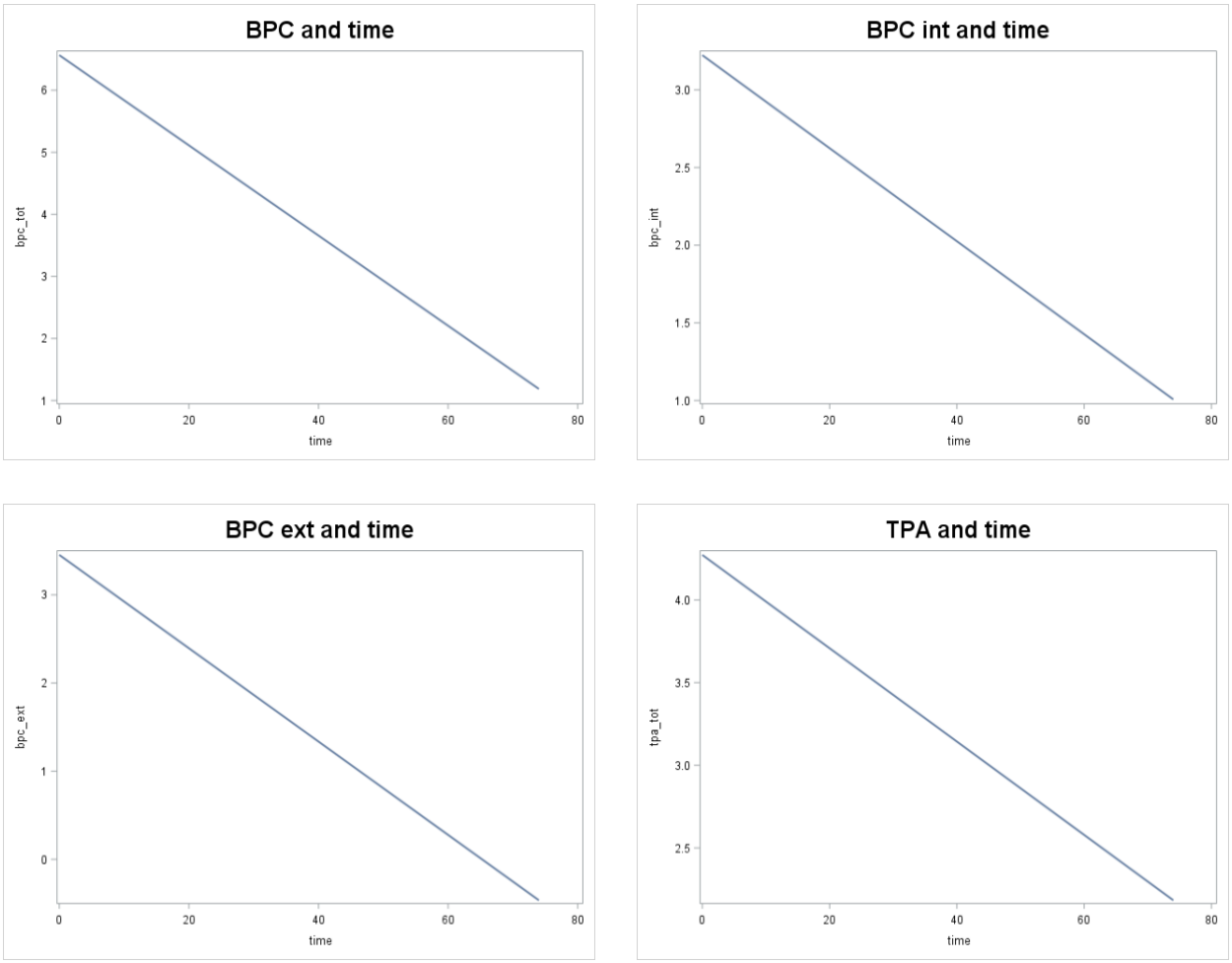

Figure 8. Average relationship between outcomes and time

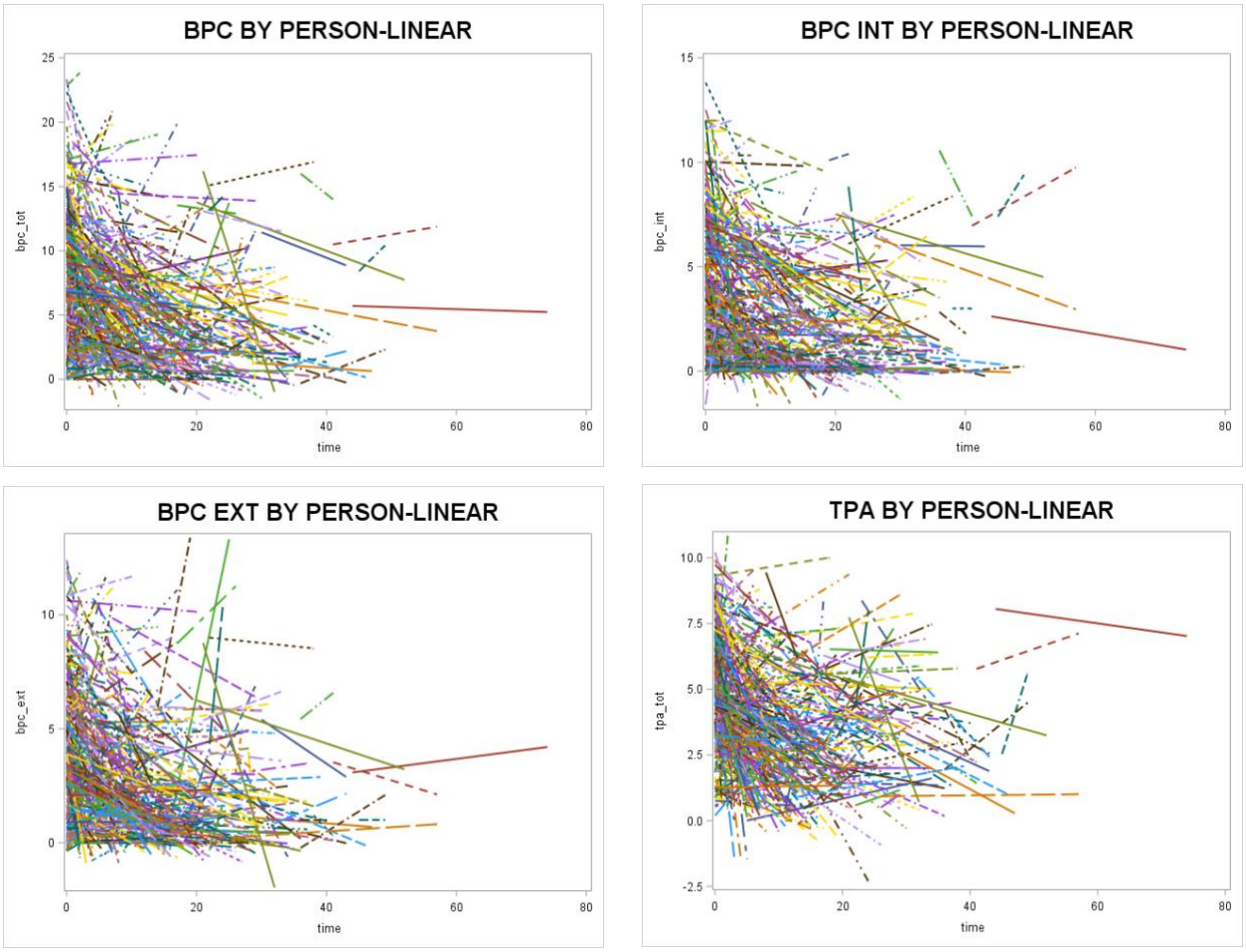

Figure 9. Person-linear relationship between outcomes and time

Additionally, the ICC for each outcome was calculated in order to determine if multilevel modeling was appropriate for the data. The within-individual and between-individual variance from the baseline model was used to calculate the ICC. The ICC for the BPC total score was 72.20%, BPC internalizing was 75.22%, BPC externalizing was 69.98%, and TPA was 56.66%. These percentages represent the amount of variance accounted for by between-individual variance; therefore, a multilevel approach is indeed warranted.

Model results – BPC total. Tables 31 and 32 present the results for the BPC total score models. Model Set 1 was the baseline model. Model 2 and Model 4 explore the relationship between each skill and level, respectively, over time. Model 3 and Model 5 explore whether the effects of skill and level over time vary by implementation phase. For therapist skill fidelity, being endorsed in CBT led to more rapid improvement in BPC total scores. In addition, not being endorsed in SPEED was associated with more rapid improvements during the Sustainment Phase (vs. Implementation Phase 2; See Figure 10). For staff skill monthly fidelity, lower levels of endorsement on SPEED led to more rapid improvement in BPC total scores. Similarly, lower levels of endorsement on TIP led to more rapid reduction of symptoms over time during the Sustainment Phase (vs. Implementation Phase 2; See Figure 11). In contrary, higher levels of endorsement on CBT let to more rapid change in the Sustainment Phase but not the Implementation Phase 2 (See Figure 12). For therapist level fidelity, not being endorsed in Level 3 led to more rapid improvement. For staff level fidelity, lower level of endorsement on Level 2 led to more rapid improvement, while higher levels of endorsement in Level 3 led more rapid improvements. Both effects were only present during the Sustainment Phase and not Implementation Phase 2 (see Figures 13-14).

Table 31. Model results for BPC total and skill fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist skill	Therapist skill	Monthly skill	Monthly skill
		Fixed Effects			
Intercept	**7.99* (0.33)**	**6.87* (0.63)**	**6.57* (0.65)**	**8.29* (0.37)**	**8.44* (0.38)**
Session	**-0.18* (0.02)**	**-0.15* (0.04)**	**-0.13* (0.04)**	**-0.28* (0.02)**	**-0.19* (0.02)**
Phase	0.19 (0.53)	0.74 (0.57)	3.45 (2.37)	**2.06* (0.84)**	-2.84 (2.82)
Session*Phase	-0.04 (0.03)	-0.05 (0.04)	-0.10 (1.63)	**-0.83* (0.13)**	-0.88 (0.46)
Number of sessions	**0.06* (0.02)**	**0.07* (0.04)**	**0.07* (0.02)**	**0.07* (0.02)**	**0.08* (0.02)**
Active Listening		-0.49 (0.61)	-0.63 (0.72)	-0.40 (0.22)	-0.64 (0.02)
AL*Phase			2.43 (1.76)		-1.69 (0.97)
AL*Session		0.03 (0.05)	0.01 (0.05)	-0.02 (0.01)	0.01 (0.04)
AL*Session*Phase			-0.22 (0.19)		-0.11 (0.09)
ITCH		-0.21 (0.67)	-1.42 (0.79)	0.43 (0.30)	0.50 (1.78)
ITCH*Phase			**3.76* (1.72)**		-1.47 (1.95)
ITCH*Session		0.04 (0.05)	0.12 (0.06)	0.00 (0.03)	**0.09* (0.09)**
ITCH*Session*Phase			-0.02 (0.27)		0.23 (0.15)
SPEED		-0.29 (0.50)	0.54 (0.60)	-0.29 (0.29)	0.99 (1.54)
SPEED*Phase			**-4.00* (1.59)**		-0.75 (1.62)
SPEED*Session		-0.01 (0.04)	-0.07 (0.04)	**0.11* (0.04)**	-0.06 (0.08)
SPEED*Session*Phase			**0.53* (0.24)**		-0.04 (0.25)
CAPES		1.03 (0.60)	1.87 (0.70)	**-1.01* (0.46)**	-0.83 (1.84)
CAPES*Phase			**-5.43* (2.16)**		2.41 (2.47)
CAPES*Session		-0.04 (0.03)	-0.08 (0.03)	0.06 (0.04)	-0.04 (0.09)
CAPES*Session*Phase			0.10 (1.62)		-0.08 (0.25)
TIP		0.70 (0.43)	0.58 (0.48)	**2.01* (0.62)**	0.71 (2.06)
TIP*Phase			0.65 (1.28)		-1.34 (2.50)
TIP*Session		-0.02 (0.03)	-0.00 (0.03)	**-0.21* (0.06)**	**-0.01* (0.11)**
TIP*Session*Phase			-0.33 (0.25)		**0.95* (0.39)**
CBT chat forms		**1.45* (0.41)**	1.86 (0.43)	-0.46 (0.57)	-0.27 (0.65)
CBT*Phase			**-3.93* (1.85)**		0.10 (2.27)
CBT*Session		**-0.07* (0.02)**	-0.09 (0.02)	0.05 (0.03)	**0.05* (0.03)**

CBT*Session*Phase			-0.08 (1.62)		**-1.31* (0.48)**
			Random Effects		
Level 1					
Residual	**8.03* (0.17)**	**8.22* (0.18)**	**8.21* (0.18)**	**7.94* (0.17)**	**7.89* (0.17)**
Level 2					
Intercept	**20.85* (1.73)**	**20.88* (1.82)**	**20.71* (0.10)**	**21.15* (1.77)**	**20.97* (1.76)**
Time	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**
Intercept/time	**-0.61* (0.09)**	**-0.62* (0.10)**	**-0.59* (0.10)**	**-0.60* (0.09)**	**-0.59* (0.10)**
			Model Fit		
-2Log	27154.9	25649.3	25618.7	27121.9	27086.0
AIC	27162.9	25657.3	25626.7	27129.9	27094.0
AICC	27162.9	25657.3	25626.7	27129.9	27094.0
BIC	27179.4	25673.5	25643.0	27146.3	27110.5

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Table 32. Model results for BPC total and level fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist level	Therapist level	Monthly level	Monthly level
			Fixed Effects		
Intercept	**7.99* (0.33)**	**8.31* (0.41)**	**8.44* (0.42)**	**9.06* (0.45)**	**9.44* (0.53)**
Session	**-0.18* (0.02)**	**-0.21* (0.03)**	**-0.21* 0.03)**	**-0.25* (0.03)**	**-0.26* (0.03)**
Phase	0.19 (0.53)	0.52 (0.55)	-1.12 (1.09)	**2.26* (0.80)**	-3.99 (3.08)
Session*Phase	-0.04 (0.03)	-0.05 (0.04)	0.02 (0.08)	**-0.20* (0.06)**	**-0.67* (0.32)**
Number of sessions	**0.06* (0.02)**	**0.07* (0.02)**	**0.07* (0.02)**	**0.06* (0.02)**	**0.07* (0.02)**
Level 2		0.21 (0.38)	0.08 (0.41)	**-0.45* (0.18)**	**-0.65* (0.48)**
Level 2*Phase			1.26 (1.15)		-0.30 (0.53)
Level2*Session		-0.00 (0.02)	0.01 (0.02)	**0.03* (0.02)**	**0.02* (0.02)**

Level2*Session*Phase			-0.15 (0.10)		**0.36* (0.07)**
Level 3		**-0.96* (0.33)**	-1.16 (0.37)	-1.36 (0.89)	-1.53 (1.10)
Level 3*Phase			0.96 (0.87)		**8.57* (3.66)**
Level3*Session		**0.06* (0.02)**	**0.06* (0.02)**	**0.11* (0.05)**	0.15 (0.05)
Level3*Session*Phase			0.09 (0.07)		**-1.11* (0.41)**
Random Effects					
Level 1					
Residual	**8.03* (0.17)**	**8.22* (0.18)**	**8.22* (0.18)**	**8.00* (0.17)**	**7.97* (0.17)**
Level 2					
Intercept	**20.85* (1.73)**	**20.85* (1.80)**	**20.86* (1.81)**	**21.22* (1.77)**	**20.92* (1.75)**
Time	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**
Intercept/time	**-0.61* (0.09)**	**-0.63* (0.10)**	**-0.61* (0.10)**	**-0.61* (0.09)**	**-0.59* (0.09)**
Model Fit					
-2Log	27154.9	25638.7	25635.0	27141.8	27112.8
AIC	27162.9	25646.7	25643.0	27149.8	27120.8
AICC	27162.9	25646.7	25643.0	27149.8	27120.8
BIC	27179.4	25663.0	25659.2	27166.3	27137.3

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

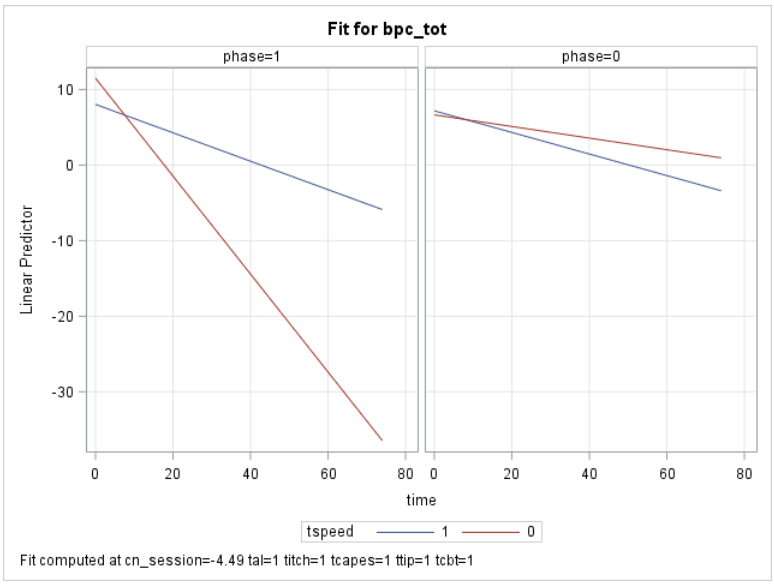

Figure 10. Interaction between SPEED, Session, and Phase for BPC total

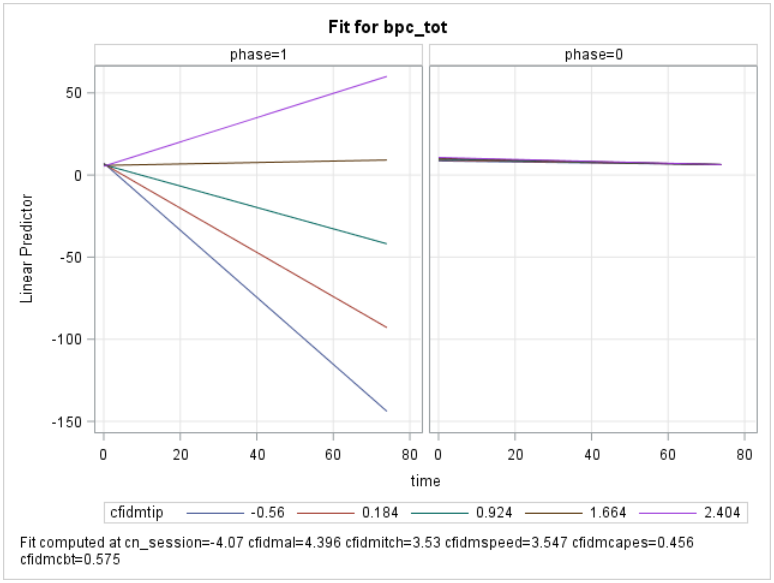

Figure 11. Interaction between TIP, Session, and Phase for BPC total

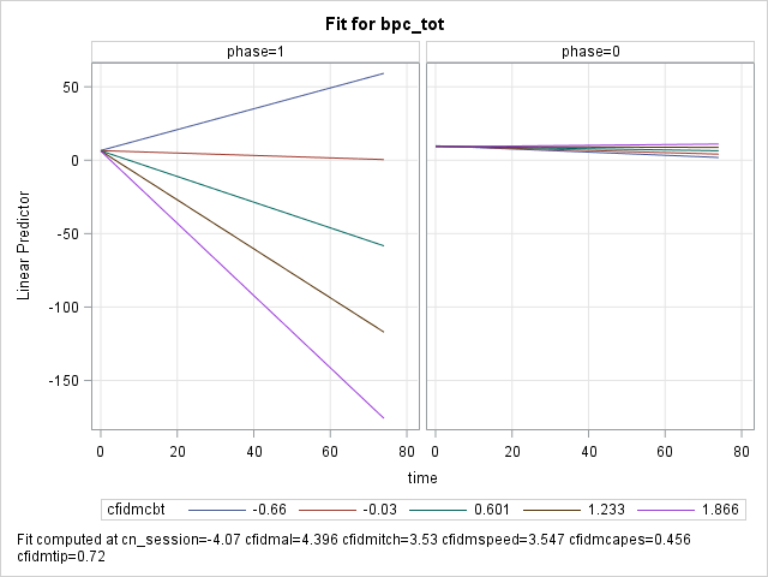

Figure 12. Interaction between CBT, Session, and Phase for BPC total

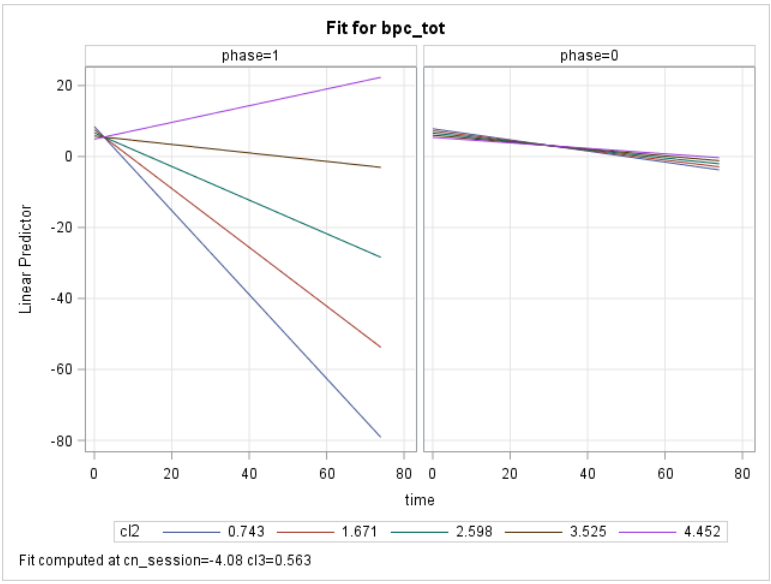

Figure 13. Interaction between Level 2, Session, and Phase for BPC total

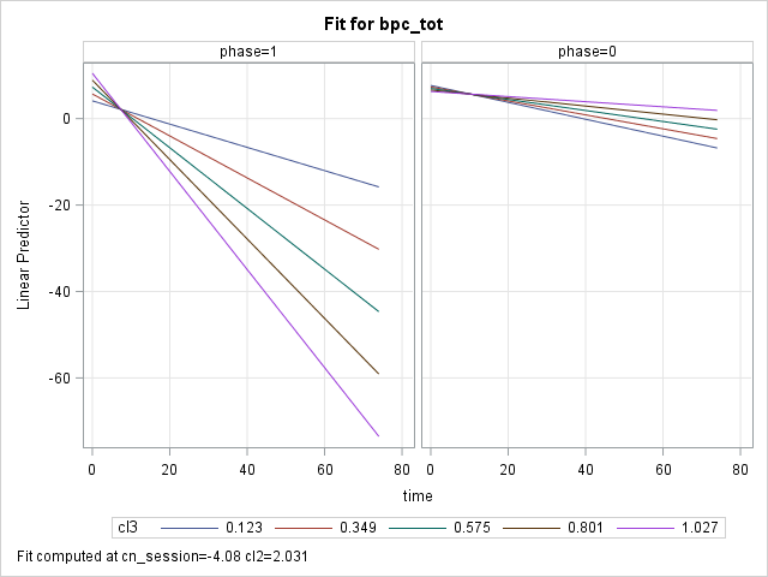

Figure 14. Interaction between Level 3, Session, and Phase for BPC total

Model results – BPC internalizing. Tables 33 and 34 presents the results for the BPC internalizing subscale score models. For therapist skill fidelity, not being endorsed in SPEED led to more rapid improvements. However, for both CAPES and CBT, being endorsed led to more rapid improvement. For staff skill fidelity, lower levels of endorsement in SPEED led to steeper improvement in BOC internalizing. Similarly, lower levels of endorsement on TIP led to steeper reduction of symptoms over time during the Sustainment Phase (vs. Implementation Phase 2; See Figure 15). In contrary, higher levels of endorsement on CBT let to more rapid change in the Sustainment Phase but not the Implementation Phase 2 (See Figure 16). For therapist level fidelity, not being endorsed in Level 3 led to more rapid improvement. For staff level fidelity, lower values of Level 2 endorsement led to more rapid change, while higher endorsement of Level 3 led to more rapid improvement. Both effects were only present during the Sustainment Phase and not Implementation Phase 2 (See Figures 17-18).

Table 33. Model results for BPC internalizing and skill fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model set 5
Model Description	Baseline	Therapist skill	Therapist skill	Monthly skill	Monthly skill
		Fixed Effects			
Intercept	**4.04* (0.21)**	**3.23* (0.38)**	**3.13* (0.40)**	**4.10* (0.23)**	**4.20* (0.24)**
Session	**-0.09* (0.01)**	**-0.07* (0.02)**	**-0.06* (0.02)**	**-0.09* (0.01)**	**-0.09* (0.01)**
Phase	0.18 (0.33)	0.53 (0.35)	1.75 (1.43)	**1.33* (0.51)**	-1.39 (1.68)
Session*Phase	-0.03 (0.02)	**-0.05* (0.02)**	-0.32 (0.97)	**-0.39* (0.08)**	**-0.55* (0.27)**
Number of sessions	**0.04* (0.01)**	**0.05* (0.01)**	**0.05* (0.01)**	**0.04* (0.01)**	**0.05* (0.01)**
Active Listening		-0.20 (0.36)	-0.22 (0.43)	-0.17 (0.13)	-0.58 (0.42)
AL*Phase			0.40 (1.05)		0.97 (0.57)
AL*Session		0.00 (0.03)	-0.01 (0.03)	-0.01 (0.01)	0.00 (0.02)
AL*Session*Phase			0.01 (0.12)		-0.03 (0.06)
ITCH		-0.13 (0.40)	-0.71 (0.47)	0.26 (0.18)	1.03 (1.06)
ITCH*Phase			1.83 (1.04)		-1.60 (1.16)
ITCH*Session		-0.00 (0.03)	0.04 (0.03)	-0.00 (0.02)	**0.04* (0.06)**
ITCH*Session*Phase			0.05 (0.16)		0.15 (0.09)
SPEED		-0.53 (0.30)	-0.18 (0.36)	-0.22 (0.17)	0.33 (0.92)
SPEED*Phase			-1.22 (0.95)		-0.15 (0.96)
SPEED*Session		**0.05* (0.02)**	0.02 (0.02)	**0.05* (0.02)**	-0.03 (0.05)
SPEED*Session*Phase			0.18 (0.14)		-0.06 (0.09)
CAPES		**0.98* (0.36)**	1.39 (0.42)	-0.42 (0.27)	-1.03 (1.10)
CAPES*Phase			**-2.98* (1.30)**		1.88 (1.47)
CAPES*Session		**-0.04* (0.02)**	-0.06 (0.02)	0.03 (0.02)	-0.02 (0.06)
CAPES*Session*Phase			0.26 (0.97)		-0.05 (0.15)
TIP		**0.53* (0.26)**	**0.42* (0.29)**	**1.06 (0.37)**	0.63 (1.23)
TIP*Phase			0.82 (0.78)		-0.55 (1.49)
TIP*Session		-0.01 (0.02)	0.00 (0.02)	**-0.10 (0.03)**	**0.01* (0.07)**
TIP*Session*Phase			-0.21 (0.15)		**0.56* (0.23)**
CBT chat forms		**0.90* (0.24)**	1.06 (0.26)	-0.50 (0.34)	-0.48 (0.38)
CBT*Phase			-1.94 (1.10)		0.08 (1.35)

CBT*Session		**-0.04* (0.01)**	-0.05 (0.01)	**0.04 (0.02)**	**0.05* (0.02)**
CBT*Session*Phase			0.15 (0.96)		**-0.81* (0.29)**
Random Effects					
Level 1					
Residual	**2.82* (0.06)**	**2.91* (0.06)**	**2.90* (0.06)**	**2.80* (0.06)**	**2.79* (0.06)**
Level 2					
Intercept	**8.56* (0.68)**	**8.40* (0.70)**	**8.37* (0.70)**	**8.70* (0.70)**	**8.60* (0.69)**
Time	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/time	**-0.25* (0.03)**	**-0.26* (0.04)**	**-0.26* (0.04)**	**-0.25* (0.03)**	**-0.24* (0.03)**
Model Fit					
-2Log	21780.9	20612.9	20601.5	21785.5	21764.1
AIC	21788.9	20620.9	20609.5	21793.5	21772.1
AICC	21788.9	20620.9	20609.5	21793.5	31772.1
BIC	21805.4	20637.2	20625.8	21809.9	21788.6

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Table 34. Model results for BPC internalizing and level fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist level	Therapist level	Monthly level	Monthly level
Fixed Effects					
Intercept	**4.04* (0.21)**	**4.33* (0.26)**	**4.42* (0.26)**	**4.65* (0.28)**	**4.69* (0.32)**
Session	**-0.09* (0.01)**	**-0.12* (0.02)**	**-0.13* (0.02)**	**-0.12* (0.01)**	**-0.12* (0.02)**
Phase	0.18 (0.33)	0.33 (0.35)	-0.82 (0.68)	**1.38* (0.49)**	-3.10 (1.83)
Session*Phase	-0.03 (0.02)	-0.04 (0.02)	0.02 (0.05)	**-0.10* (0.03)**	-0.25 (0.19)
Number of sessions	**0.04* (0.01)**	**0.05 (0.02)**	**0.05* (0.01)**	**0.04* (0.01)**	**0.04* (0.01)**
Level 2		-0.08 (0.23)	-0.18 (0.25)	**-0.25* (0.11)**	-0.02 (0.28)
Level 2*Phase			0.92 (0.70)		-0.56 (0.32)

Level 2*Session		0.02 (0.01)	0.03 (0.01)	0.01 (0.01)	**-0.01* (0.01)**
Level 2*Session*Phase			-0.09 (0.06)		**0.20* (0.04)**
Level 3		-0.39 (0.20)	-0.50 (0.23)	-0.85 (0.53)	-1.55 (0.66)
Level 3*Phase			0.60 (0.53)		**6.76* (2.17)**
Level 3*Session		**0.03* (0.01)**	**0.03* (0.01)**	**0.06* (0.03)**	**0.10* (0.03)**
Level 3*Session*Phase			0.04 (0.04)		**-0.68* (0.24)**
Random Effects					
Level 1					
Residual	**2.82* (0.06)**	**2.90* (0.06)**	**2.90* (0.06)**	**2.81* (0.06)**	**2.80* (0.06)**
Level 2					
Intercept	**8.56* (0.68)**	**8.55* (0.71)**	**8.56* (0.71)**	**8.69* (0.69)**	**8.65* (0.69)**
Time	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/time	**-0.25* (0.03)**	**-0.27* (0.04)**	**-0.27* (0.04)**	**-0.25* (0.03)**	**-0.24* (0.03)**
Model Fit					
-2Log	21780.9	20604.1	20604.8	21779.4	21760.2
AIC	21788.9	20612.1	20612.8	21787.4	21768.2
AICC	21788.9	20612.1	20612.8	21787.4	21768.2
BIC	21805.4	20628.4	20629.1	21803.9	21784.7

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

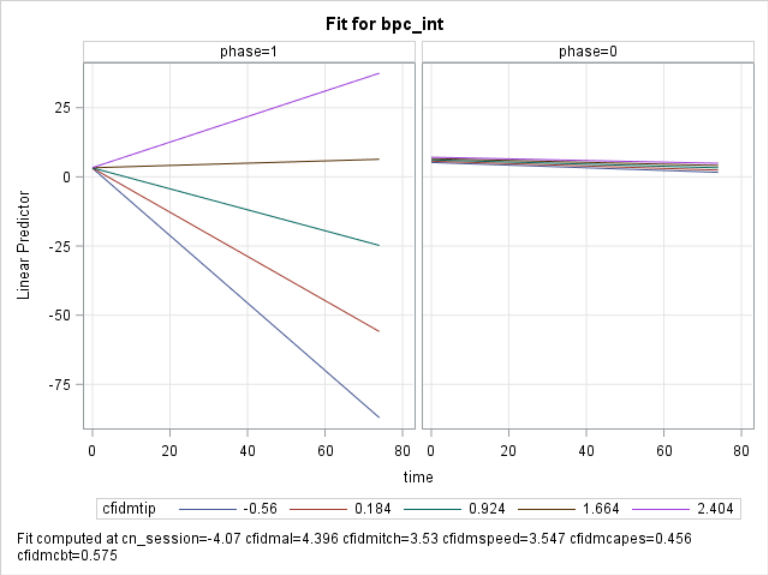

Figure 15. Interaction between TIP, Session, and Phase for BPC internalizing

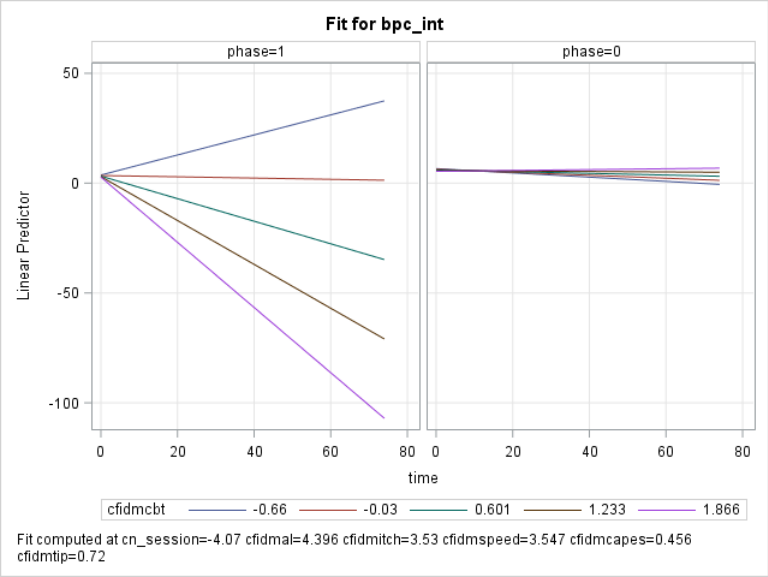

Figure 16. Interaction between CBT, Session, and Phase for BPC internalizing

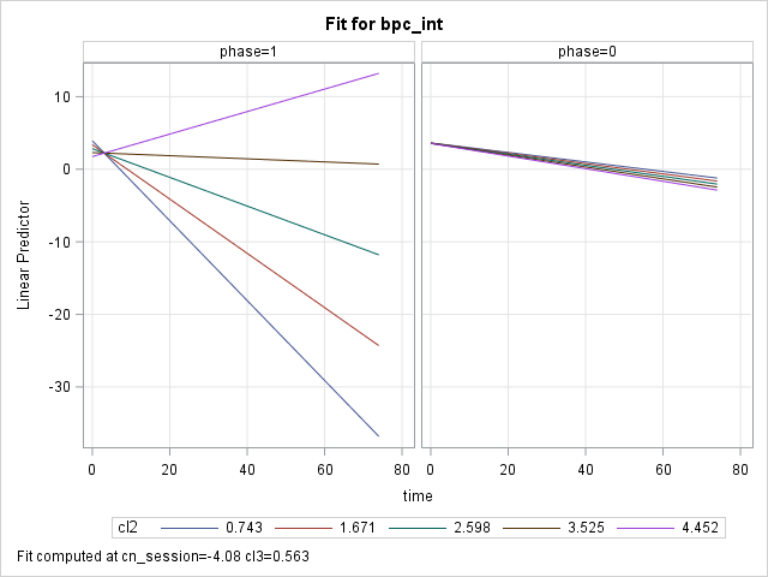

Figure 17. Interaction between Level 2, Session, and Phase for BPC internalizing

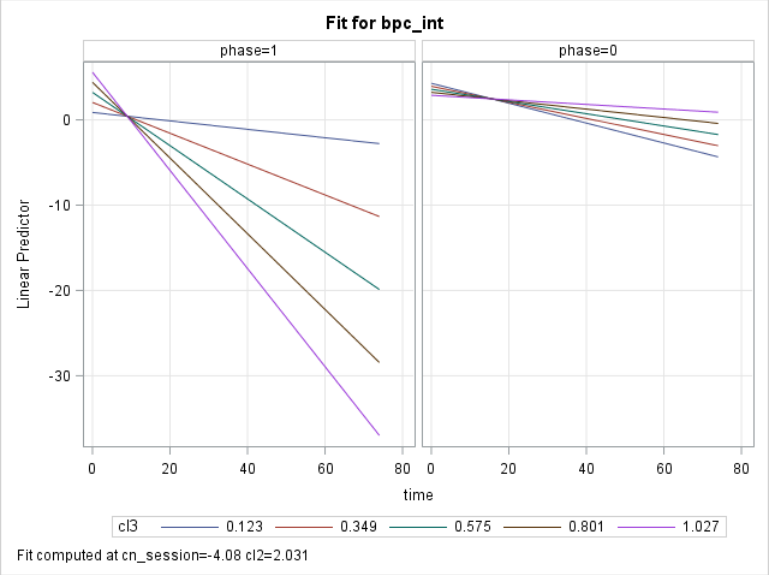

Figure 18. Interaction between Level 3, Session, and Phase for BPC internalizing

Model results – BPC externalizing. Tables 35 and 36 presents the results for the BPC externalizing score models. For therapist skill fidelity, being endorsed in CBT led to more rapid improvement. Active listening led to worsened outcomes during the Sustainment Phase when therapists were not endorsed (See Figure 19). Being endorsed in SPEED led to more rapid change

in symptoms during Sustainment (see Figure 20). For staff skill fidelity, lower levels of endorsement in SPEED led to steeper improvement in outcomes. In contrary, higher levels of endorsement in TIP led to more rapid change in outcomes. For therapist level fidelity, not being endorsed in Level 3 led to more rapid improvement. For staff level fidelity, lower levels of Level 2 endorsement led to higher improvements during the Sustainment Phase but not the Implementation 2 Phase (See Figure 21).

Table 35. Model results for BPC externalizing and skill fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist skill	Therapist skill	Monthly skill	Monthly skill
			Fixed Effects		
Intercept	**3.96* (0.19)**	**3.62* (0.38)**	**3.43* (0.39)**	**4.18* (0.22)**	**4.22* (0.22)**
Session	**-0.09* (0.01)**	**-0.07* (0.02)**	**-0.06* (0.02)**	-0.09 (0.01)	-0.09 (0.01)
Phase	0.06 (0.30)	0.32 (0.33)	1.79 (1.42)	0.83 (0.49)	-1.40 (1.70)
Session*Phase	-0.01 (0.02)	-0.01 (0.02)	0.22 (0.99)	**-0.44* (0.08)**	-0.35 (0.28)
Number of sessions	**0.02* (0.02)**	**0.03* (0.01)**	**0.03* (0.01)**	**0.03* (0.01)**	**0.03* (0.28)**
Active Listening		-0.25 (0.36)	-0.26 (0.43)	-0.25 (0.13)	-0.30 (0.43)
AL*Phase			1.93 (1.05)		0.70 (0.58)
AL*Session		0.02 (0.03)	0.02 (0.03)	-0.00 (0.01)	0.01 (0.02)
AL*Session*Phase			**-0.23* (0.12)**		-0.07 (0.06)
ITCH		-0.14 (0.40)	-0.77 (0.47)	0.19 (0.18)	-0.55 (1.08)
ITCH*Phase			1.98 (1.02)		0.15 (1.18)
ITCH*Session		0.04 (0.03)	0.09 (0.03)	-0.00 (0.02)	0.04 (0.09)
ITCH*Session*Phase			-0.08 (0.16)		0.08 (0.09)
SPEED		0.21 (0.30)	0.69 (0.36)	-0.07 (0.17)	0.59 (0.94)
SPEED*Phase			**-2.72* (0.95)**		-0.53 (0.98)
SPEED*Session		**-0.05* (0.02)**	-0.09 (0.02)	**0.06* (0.02)**	-0.03 (0.05)
SPEED*Session*Phase			**0.34* (0.14)**		0.01 (0.09)
CAPES		0.12 (0.36)	0.52 (0.42)	**-0.59* (0.28)**	0.20 (1.11)
CAPES*Phase			-2.50 (1.30)		0.55 (1.49)
CAPES*Session		-0.00 (0.02)	-0.02 (0.02)	0.03 (0.02)	-0.02 (0.06)
CAPES*Session*Phase			-0.14 (0.98)		-0.05 (0.15)
TIP		0.12 (0.26)	0.11 (0.29)	**1.00* (0.37)**	0.18 (1.25)
TIP*Phase			-0.10 (0.77)		-0.90 (1.51)
TIP*Session		-0.01 (0.02)	-0.00 (0.02)	**-0.11* (0.04)**	-0.02 (0.07)
TIP*Session*Phase			-0.11 (0.15)		0.40 (0.24)
CBT chat forms		**0.59* (0.24)**	0.85 (0.26)	0.03 (0.35)	0.19 (0.39)
CBT*Phase			-2.05 (1.11)		0.09 (1.37)

CBT*Session		**-0.03* (0.01)**	-0.04 (0.01)	0.01 (0.02)	0.00 (0.02)
CBT*Session*Phase			-0.22 (0.98)		-0.48 (0.29)
Random Effects					
Level 1					
Residual	**2.96* (0.06)**	**2.99* (0.07)**	**2.99* (0.07)**	**2.94* (0.06)**	**2.92* (0.06)**
Level 2					
Intercept	**6.90* (0.59)**	**7.12* (0.63)**	**7.15* (0.63)**	**6.89* (0.59)**	**6.91* (0.59)**
Time	**0.02* (0.06)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/time	**-0.20* (0.03)**	**-0.21* (0.03)**	**-0.20* (0.03)**	**-0.19* (0.03)**	**-0.19* (0.03)**
Model Fit					
-2Log	22095.1	20871.4	20856.0	22089.1	22078.1
AIC	22103.1	20879.4	20864.0	22097.1	22086.1
AICC	22103.1	20879.4	20864.0	22097.1	22086.1
BIC	22119.6	20895.7	20880.3	22113.5	22102.6

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Table 36. Model results for BPC externalizing and level fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist level	Therapist level	Monthly level	Monthly level
Fixed Effects					
Intercept	**3.96* (0.19)**	**4.05* (0.24)**	**4.09* (0.25)**	**4.42* (0.26)**	**4.75* (0.31)**
Session	**-0.09* (0.01)**	**-0.08* (0.02)**	**-0.08* (0.02)**	**-0.13* (0.01)**	**-0.14* (0.02)**
Phase	0.06 (0.30)	0.30 (0.32)	-0.28 (0.64)	**0.98* (0.45)**	-0.90 (2.86)
Session*Phase	-0.01 (0.02)	-0.02 (0.02)	0.00 (0.05)	**-0.11* (0.03)**	**-0.44* (0.20)**
Number of sessions	**0.02* (0.02)**	**0.03* (0.01)**	**0.03* (0.01)**	**0.02* (0.01)**	**0.03* (0.01)**
Level 2		0.21 (0.23)	0.18 (0.24)	-0.21 (0.01)	**-0.62* (0.29)**
Level 2*Phase			0.40 (0.68)		0.24 (0.32)

Level 2*Session		-0.02 (0.01)	-0.02 (0.01)	**0.02* (0.0)**	**0.03* (0.01)**
Level 2*Session*Phase			-0.06 (0.06)		**0.16* (0.04)**
Level 3		**-0.62* (0.20)**	-0.71 (0.22)	-0.54 (0.53)	-0.08 (0.66)
Level 3*Phase			0.42 (0.51)		1.99 (2.21)
Level 3*Session		**0.03* (0.01)**	**0.03* (0.01)**	0.04 (0.03)	0.05 (0.03)
Level 3*Session*Phase			0.05 (0.04)		-0.41 (0.25)
Random Effects					
Level 1					
Residual	**2.96* (0.06)**	**3.00* (0.07)**	**3.00* (0.07)**	**2.95* (0.06)**	**2.94* (0.06)**
Level 2					
Intercept	**6.90* (0.59)**	**7.05* (0.62)**	**7.06* (0.62)**	**6.95* (0.59)**	**6.84* (0.58)**
Time	**0.02* (0.06)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**	**0.02* (0.00)**
Intercept/time	**-0.20* (0.03)**	**-0.20* (0.03)**	**-0.20* (0.03)**	**-0.20* (0.03)**	**-0.19* (0.03)**
Model Fit					
-2Log	22095.1	20849.1	20852.6	22093.0	22075.4
AIC	22103.1	20857.1	20860.6	22101.0	22083.4
AICC	22103.1	20857.1	20860.6	22101.0	22083.4
BIC	22119.6	20873.4	20876.9	22117.4	22099.9

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

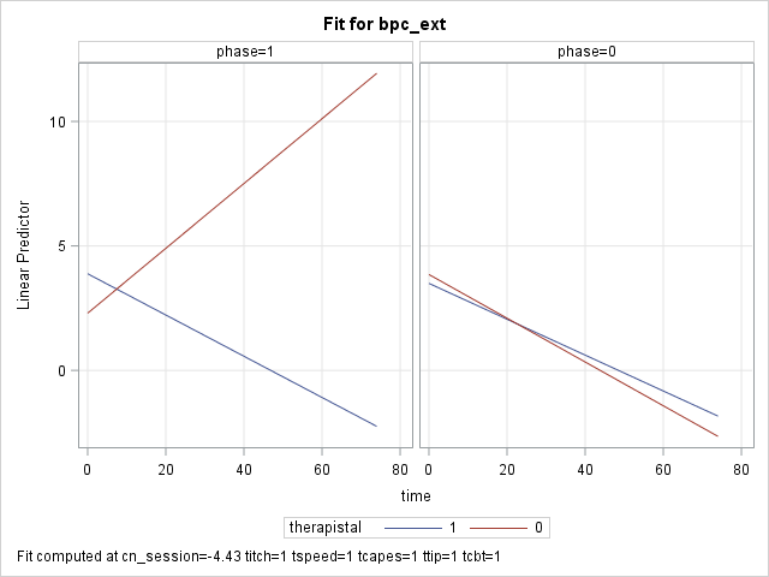

Figure 19. Interaction between Active Listening, Session, and Phase for BPC externalizing

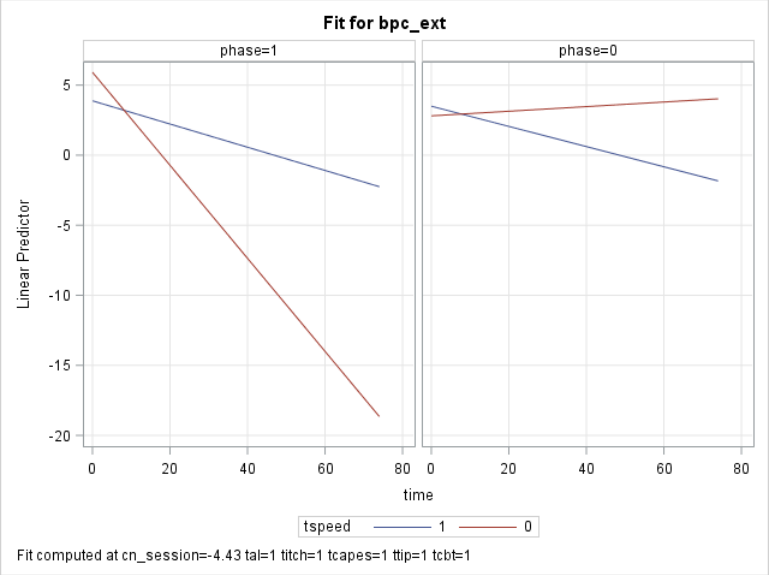

Figure 20. Interaction between SPEED, Session, and Phase for BPC externalizing

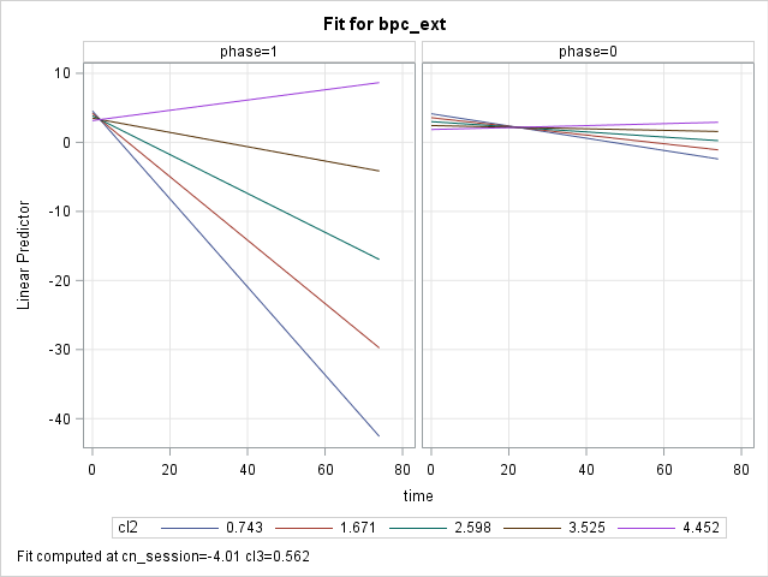

Figure 21. Interaction between Level 2, Session, and Phase for BPC externalizing

Model results – TPA total. Tables 37 and 38 presents the results for the TPA total models. For therapist skill fidelity, not being endorsed in Active Listening led to more rapid improvements in the Sustainment Phase (See Figure 22). For staff skill fidelity, lower levels of endorsement in SPEED led to steeper improvement in outcomes. Lower levels of endorsement in TIP led to more rapid change in the Sustainment Phase vs. Implementation Phase 2 (See Figure 23). In contrary, higher levels of endorsement in CBT led to more rapid change in the Sustainment Phase, but not the Implementation Phase 2 (See Figure 24). For therapist level fidelity, being endorsed in Level 2 led to more rapid change in the Sustainment Phase versus the Implementation 2 Phase (See Figure 25). For staff level fidelity, lower values of Level 2 endorsement led to higher improvements during the Sustainment Phase but not the Implementation 2 Phase (See Figure 26). In contrary, higher values of Level 3 endorsement led to more rapid change during the Sustainment Phase but not the Implementation 2 Phase (See Figure 27).

Table 37. Model results for TPA total and skill fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist skill	Therapist skill	Monthly skill	Monthly skill
		Fixed Effects			
Intercept	**5.06* (0.16)**	**5.36* (0.34)**	**5.30* (0.36)**	**5.14* (0.17)**	**5.18* (0.18)**
Session	**-0.08* (0.01)**	-0.10 (0.02)	**-0.09* (0.02)**	**-0.08* (0.01)**	**-0.08* (0.01)**
Phase	0.03 (0.24)	0.09 (0.27)	0.92 (1.32)	**1.68* (0.44)**	-0.42 (1.65)
Session*Phase	**-0.06* (0.02)**	**-0.07* (0.02)**	**0.04* (0.97)**	**-0.28* (0.08)**	-0.44 (0.28)
Number of sessions	**0.02* (0.01)**	**0.02* (0.02)**	**0.03* (0.01)**	**0.02* (0.01)**	**0.02* (0.01)**
Active Listening		0.29 (0.36)	0.22 (0.43)	-0.23 (0.13)	0.10 (0.45)
AL*Phase			-0.50 (1.03)		0.07 (0.58)
AL*Session		-0.02 (0.03)	-0.05 (0.03)	-0.00 (0.01)	0.01 (0.02)
AL*Session*Phase			**0.24* (0.12)**		0.01 (0.06)
ITCH		0.44 (0.37)	0.21 (0.46)	-0.00 (0.17)	-0.99 (1.10)
ITCH*Phase			0.84 (0.91)		0.56 (1.19)
ITCH*Session		-0.02 (0.03)	0.03 (0.03)	-0.01 (0.02)	0.04 (0.06)
ITCH*Session*Phase			-0.01 (0.15)		0.09 (0.09)
SPEED		-0.50 (0.28)	-0.31 (0.34)	0.02 (0.17)	-0.09 (0.96)
SPEED*Phase			-0.33 (0.94)		0.33 (1.00)
SPEED*Session		0.04 (0.02)	0.01 (0.02)	**0.05* (0.02)**	-0.03 (0.05)
SPEED*Session*Phase			0.17 (0.14)		-0.06 (0.09)
CAPES		-0.02 (0.31)	-0.01 (0.39)	-0.01 (0.28)	1.02 (1.13)
CAPES*Phase			-0.02 (1.21)		0.62 (1.48)
CAPES*Session		0.00 (0.02)	-0.00 (0.02)	0.02 (0.02)	**-0.04* (0.06)**
CAPES*Session*Phase			-0.41 (0.96)		-0.26 (0.15)
TIP		-0.39 (0.24)	-0.29 (0.27)	0.26 (0.37)	-0.27 (1.27)
TIP*Phase			-0.64 (0.69)		-0.54 (1.53)
TIP*Session		0.02 (0.02)	0.02 (0.02)	**-0.07* (0.03)**	**0.03* (0.07)**
TIP*Session*Phase			-0.10 (0.15)		**0.57* (0.24)**
CBT chat forms		-0.31 (0.23)	-0.15 (0.24)	0.36 (0.34)	0.52 (0.39)
CBT*Phase			-0.51 (1.08)		-0.12 (1.34)

CBT*Session		-0.00 (0.01)	-0.01 (0.01)	0.00 (0.02)	**-0.00* (0.02)**
CBT*Session*Phase			-0.42 (0.96)		**-0.70* (0.29)**
			Random Effects		
Level 1					
Residual	**2.96* (0.06)**	**2.91* (0.07)**	**2.89* (0.07)**	**2.94* (0.06)**	**2.93* (0.06)**
Level 2					
Intercept	**3.87* (0.37)**	**3.84* (0.38)**	**3.88* (0.38)**	**3.86* (0.37)**	**3.85* (0.37)**
Time	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**
Intercept/time	**-0.11* (0.02)**	**-0.11* (0.02)**	**-0.11* (0.02)**	**-0.10* (0.02)**	**-0.10* (0.02)**
			Model Fit		
-2Log	20961.9	19628.8	19611.2	20951.6	20934.4
AIC	20969.9	19636.8	19619.2	20959.6	20942.4
AICC	20969.9	19636.8	19619.2	20959.6	20942.4
BIC	20986.4	19653.0	19635.2	20976.1	20958.9

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

Table 38. Model results for TPA total and level fidelity

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
Model Description	Baseline	Therapist level	Therapist level	Monthly level	Monthly level
			Fixed Effects		
Intercept	**5.06* (0.16)**	**5.15* (0.21)**	**5.29* (0.22)**	**5.72* (0.23)**	**5.85* (0.28)**
Session	**-0.08* (0.01)**	**-0.10* (0.01)**	**-0.11* (0.01)**	**-0.11* (0.01)**	**-0.11* (0.02)**
Phase	0.03 (0.24)	0.03 (0.26)	-1.23 (0.548)	**1.65* (0.42)**	0.19 (1.82)
Session*Phase	**-0.06* (0.02)**	**-0.07* (0.02)**	0.01 (0.04)	**-0.12* (0.03)**	-0.25 (0.19)
Number of sessions	**0.02* (0.01)**	**0.02* (0.01)**	**0.02* (0.01)**	**0.02* (0.01)**	**0.02* (0.01)**
Level 2		-0.02 (0.21)	-0.20 (0.23)	**-0.55* (0.11)**	**-0.71* (0.28)**

Level 2*Phase			**1.31* (0.60)**		-0.05 (0.32)
Level 2*Session		0.00 (0.01)	0.01 (0.01)	0.02 (0.01)	**0.02* (0.01)**
Level 2*Session*Phase			**-0.11* (0.06)**		**0.15* (0.04)**
Level 3		0.04 (0.18)	-0.06 (0.21)	-0.21 (0.50)	0.05 (0.63)
Level 3*Phase			0.26 (0.43)		2.11 (2.17)
Level 3*Session		0.01 (0.01)	0.02 (0.01)	0.03 (0.03)	0.04 (0.03)
Level 3*Session*Phase			0.02 (0.04)		**-0.53* (0.25)**
Random Effects					
Level 1					
Residual	**2.96* (0.06)**	**2.90* (0.07)**	**2.90* (0.07)**	**2.95* (0.06)**	**2.95* (0.06)**
Level 2					
Intercept	**3.87* (0.37)**	**3.86* (0.38)**	**3.85* (0.38)**	**3.84* (0.37)**	**3.79* (0.36)**
Time	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**	**0.01* (0.00)**
Intercept/time	**-0.11* (0.02)**	**-0.11* (0.02)**	**-0.11* (0.02)**	**-0.11* (0.02)**	**-0.10* (0.02)**
Model Fit					
-2Log	20961.9	19608.5	19608.9	20944.1	20933.8
AIC	20969.9	19616.5	19616.9	20952.1	20941.8
AICC	20969.9	19616.6	19616.9	20952.1	20941.9
BIC	20986.4	19632.8	19633.2	20968.6	20958.3

Note. AL = Active listening; ITCH = Problem Solving; SPEED = Mood Identification and Intervention Mapping; CAPES = Activity Scheduling; TIP = Distress Tolerance; CBT = Cognitive Restructuring; AIC = Akaike Information Criterion; AICC = AIC Corrected; BIC = Bayesian Information Criteria.

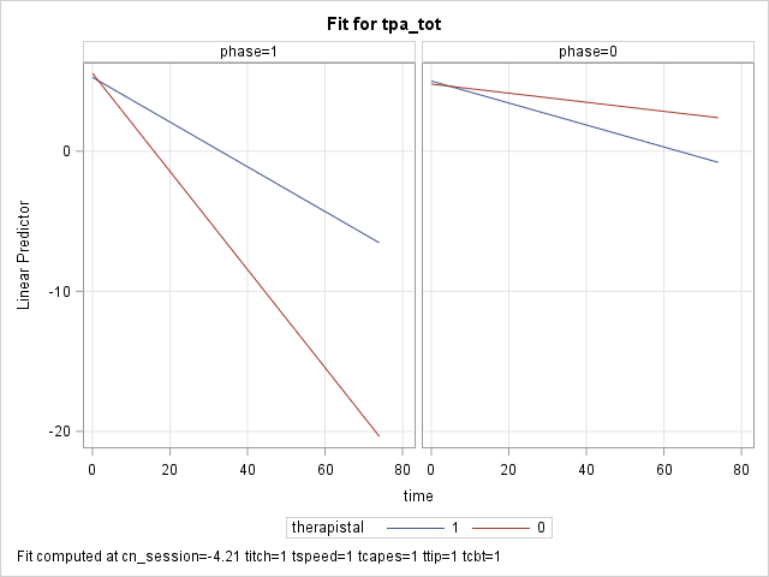

Figure 22. Interaction between Active Listening, Session, and Phase for TPA total

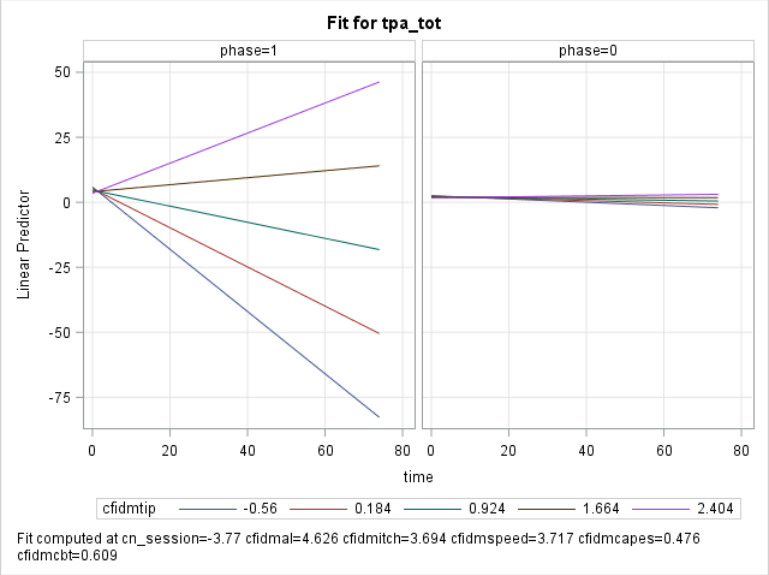

Figure 23. Interaction between TIP, Session, and Phase for TPA total

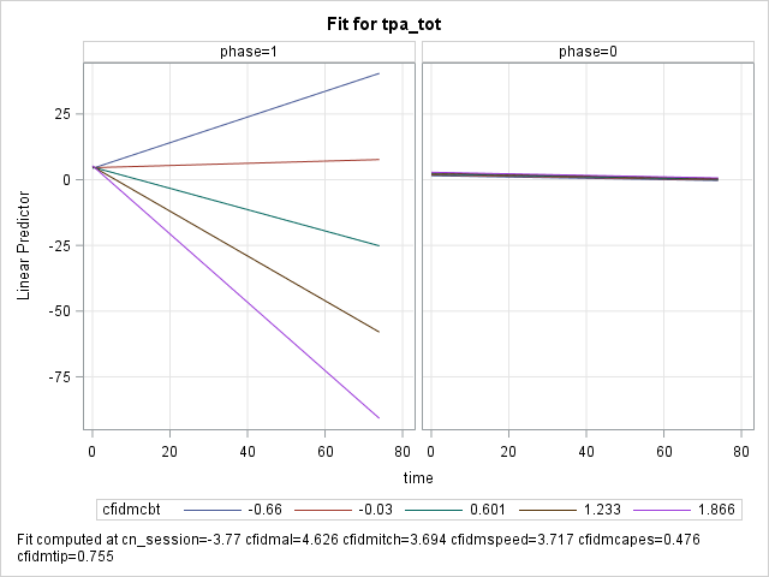

Figure 24. Interaction between CBT, Session, and Phase for TPA total

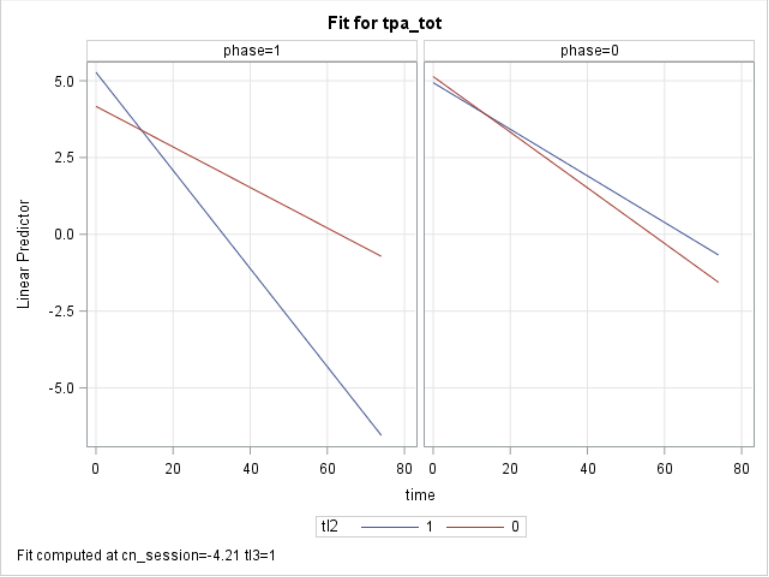

Figure 25. Interaction between Level 2, Session, and Phase for TPA total

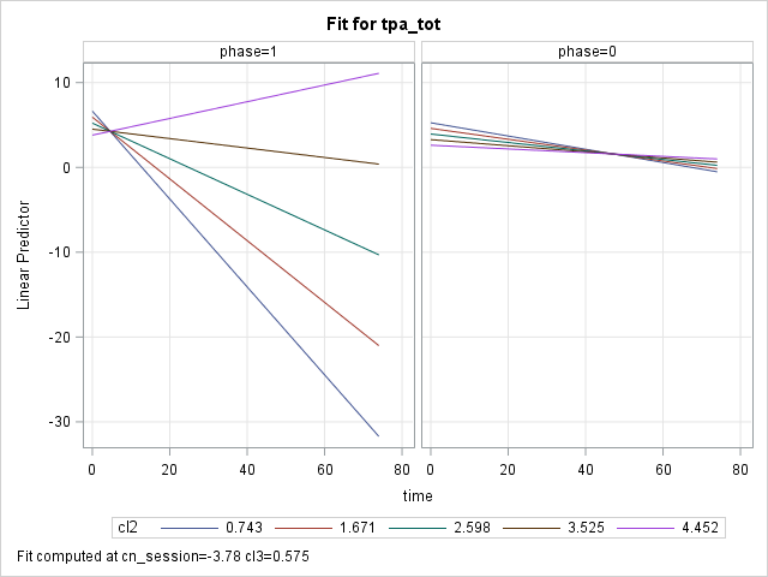

Figure 26. Interaction between Level 2, Session, and Phase for TPA total

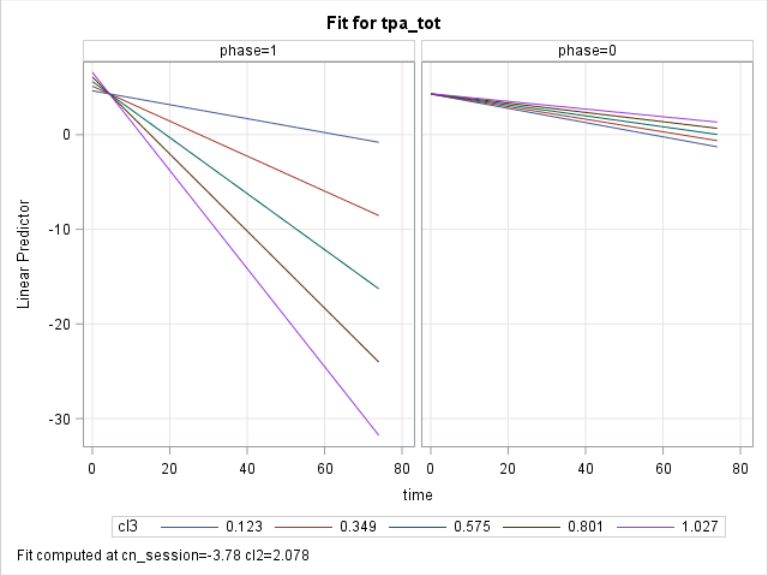

Figure 27. Interaction between Level 3, Session, and Phase for TPA total

Study 3 Discussion

The goal of the present study was to evaluate the impact of CBT Core Skill staff and therapist fidelity on youth clinical outcomes (i.e., symptomatology and problem severity).

Results from the study suggest that therapist fidelity to the core CBT skills of behavioral activation (i.e., CAPES) and cognitive restructuring (i.e., CBT Chat Forms) were related to improved internalizing symptoms. Active listening was related to improvement in externalizing symptoms and Level 2 endorsement reduced the severity of top problems. In addition, staff monthly fidelity to CBT Chat Forms and Level 3 endorsement were associated with improved outcomes (i.e., BPC total, BPC internalizing, and TPA). In addition, distress tolerance (i.e., TIP) and Level 2 endorsement were related to improvement in externalizing symptoms. On the contrary, it seemed that mood mapping and intervention mapping (i.e., SPEED) was related to exacerbation of symptoms across staff levels and outcomes. Furthermore, some of the effects were present only during the Sustainment Phase and not the Implementation Phase 2.

Staff monthly fidelity to CBT Chat Forms and TIP had an impact on youth symptoms and severity of top problems. In addition, it seemed that Level 2 skills were related to externalizing symptoms and Level 3 skills to internalizing symptoms and severity of top problems. These findings are not surprising as these skills have been thought of as core components of CBT protocols for depression and anxiety (Weersing, Rozenman, & Gonzalez, 2009). The results that fidelity to distress tolerance had an effect of decreasing severity of top problems is important as a previous study that implemented Dialectical Behavior Therapy (DBT) into a youth RTF found that youth reported most frequently using distress-tolerance skills (McCredie, Quinn, & Covington, 2017). These findings support that all skills, but in particular, both cognitive restructuring and distress tolerance are indeed an important skill for all staff to be trained in.

Therapist fidelity to behavioral activation (i.e., CAPES) and CBT Chat Forms were related to improved internalizing symptoms. In addition, active listening was related to externalizing symptoms and Level 2 to severity of top problems. Active listening is thought of as

a common factor in psychotherapy that allows the youth to be understood and heard, as well as increase positive communication and this study provides more evidence to support the therapeutic effect of active listening (McAleavey & Castonguay, 2015; Payton et al., 2000). During training at WHS, active listening was emphasized as the first skill that staff should be endorsed in and is it part of the first level of the endorsement system. Behavioral activation allows youth to connect and receive rewards from their environment, as well as have structure (Cuijpers, van Straten, & Warmerdam, 2007; Sturmey, 2009). Often times, youth at RTFs are removed from a hectic environment, and perhaps behavioral activation is providing a much-needed routine and structure that is beneficial for youth (Miller, 2013).

Two findings were striking. First, SPEED was found to exacerbate most clinical outcomes regardless of staff role. Given that one of the aspects of SPEED is to learn how to monitor moods, it might be that this can lead to initial distress (i.e., get better before getting worse; Swinkels & Giuliano, 2007). Second, even though some skills had positive effects during the Sustainment Phase (e.g., CBT Chat Forms), some (e.g., TIP for staff) subsequently exacerbated symptoms. This seems to be consistent with studies that suggest that fidelity to core components can taper off during that phase (Edmunds et al., 2014). It is important that future research addresses this concern by studying and attempting to prevent it.

Limitations and Future Directions

This study contains several limitations. First, the fidelity data includes information about whether staff were endorsed for a skill but did not include data about whether the skills were used with youth or how often; this prevents an evaluation of fidelity dosage effects. Second, data collection for this study was pragmatic, as this was not a primary research study but rather a clinical demonstration project. Therefore, we were unable to collect or obtain some data that would have

been important to include in the studies. For example, we are unable to determine the level of interaction of specific staff with youth, which could help to disentangle the effect of staff monthly fidelity for each skill on clinical outcomes. Third, we evaluated monthly staff fidelity to each individual skill and level, which might not have been as accurate as evaluating fidelity on a daily basis. Fourth, we used BR as a fidelity indicator in this study, yet there are other alternative methods of fidelity that could have provided different results (e.g., observational coding, fidelity checklists). Fifth, this study lacks a comparison treatment group or randomization into treatment or skills, which prevents us from minimizing the effects of other variables on the outcomes of interests.

Even though this study adds to the literature by attempting to understand the role that staff and therapist fidelity play on clinical outcomes in a youth RTF, more research is needed. One extension to the current study could be gathering data on what skills are used and how often, both in therapy sessions and in the unit. In addition, future research should focus on evaluating the different fidelity methods available to determine the best one for an RTF in terms of both accuracy and feasibility. This line of work is important as it would shed light on effective ways of measuring fidelity in settings that have overburdened staff and low resources. In addition, studies exploring specific strategies that aid efficiency in training staff and therapists to fidelity would be relevant as it could expand the literature on efficient training of core components of CBT. In addition, understanding what the minimum levels of fidelity that are needed by all staff and therapists to improve outcomes could be very relevant to implementation efforts. The current study finding that most CBT Core Skills were not related to improvement in youth clinical outcomes might have been due to the majority of staff not being endorsed (i.e., low percentage of endorsement) in all of the skills and levels. Therefore, it might be that more dosage in each CBT

Core Skill was needed to have an effect. It may be the case that staff need different fidelity monitoring and ongoing support strategies than therapists. This could have important implications for future work looking at tailored approaches to staff training.

Conclusions

To our knowledge, this is the first study to examine the effect of staff and therapist fidelity on clinical outcomes in a youth RTF. Results demonstrated positive impact of both staff and therapist fidelity to cognitive restructuring, therapist fidelity to behavioral activation and active listening, and staff fidelity to distress tolerance. Findings from this study address the crucial gap of understanding the role fidelity plays in the implementation of EBPs in a youth RTF setting and provide guidance about the types of skills that might be optimal to train staff and therapists in given their different roles with youth. Implementation efforts in RTFs might benefit from training staff on these core skills.

General Discussion

Implementation science is a relatively new field that is attempting to breach the research to practice gap (Bauer et al., 2015). Residential Treatment Facilities (RTFs) have been mostly ignored, yet they have high needs. Three interrelated pragmatic studies were conducted in order to evaluate the impact of a tailored approach to Cognitive Behavior Therapy (CBT) implementation in a youth RTF through an implementation science lens. The integration of Proctor and colleagues' (2009) Conceptual Model of Implementation Research with Aarons' and colleagues (2011) Exploration, Preparation, Implementation, and Sustainment (EPIS) framework (see Figure 1) enabled an exploration of implementation and clinical outcomes over the course of implementation phases. Together, these studies offered evidence that the tailored implementation of transdiagnostic and team-based adaptation of CBT led to change in staff-level implementation

outcomes and youth-level clinical outcomes. Although there are several limitations that should be considered as important context for these findings given the pragmatic nature of the design, research on this topic in youth RTFs has been scarce, making the current set of studies an appropriate starting place to guide future research questions.

The first study evaluated how two implementation outcomes, intention to use CBT (or adoption) and attitudes towards Evidence Based Practices (EBPs; or acceptability) changed over the course of implementation. Findings suggest that, through a careful implementation plan and training, staff attitudes and intention to use CBT can change. This finding is hopeful as both of these variables are crucial implementation outcomes that have been deemed as common implementation barriers (S. James et al., 2017; Proctor et al., 2009). The second study evaluated how youth clinical outcomes (i.e., total symptomatology, internalizing symptoms, externalizing symptoms, and severity of top problems) and administrative outcomes (i.e., number of restraints, number of client restraints, number of youth incidents, and staff injuries) changed over the course of implementation. Findings suggest preliminary effectiveness for adapted CBT, which is encouraging to the efforts to adapt already effective approaches to their context (McHugh, Murray, & Barlow, 2009; Wiltsey Stirman, Gamarra, Bartlett, Calloway, & Gutner, 2017b). The third study sought to understand the effects of staff and therapist fidelity to CBT Core Skills had on youth clinical outcomes. Findings suggest that when there is higher fidelity among some skills, youth get better more rapidly. Not only are these results adding to the literature on fidelity-outcome relationships, but also highlights the importance of fidelity monitoring over the course of implementation (Borrelli, 2011; Webb, Auerbach, & DeRubeis, 2012).

CBT has shown to be effective for youth (Zhou et al., 2015). Nonetheless, most studies do not take place in the settings for which they are intended, which may explain subsequent

implementation failures. That has been the case in RTFs for which mental health needs are alarmingly high and unaddressed, yet implementation science has just recently started to address (James, 2017). Fortunately, hybrid designs may expedite the closing of the science-practice gap as they incorporate both effectiveness and implementation research (Curran et al., 2012). The studies presented herein offer a unique evaluation of both implementation and clinical outcomes over the course of implementation in a youth RTF giving insight to the implementation processes taking place in RTFs.

This work could have several implications. First, this study found differences between attitudes among staff. Perhaps organizations looking to implement CBT might benefit from explicitly addressing operations staff attitudes towards CBT prior to sustainment and prevent drift of divergence during sustainment. Second, the adapted version of CBT showed promise, therefore, it should be adopted by other implementation efforts in settings that require a more flexible and transdiagnostic treatment for youth. Organizations that are seeking to train all their staff (i.e., therapists and operations staff) could also benefit from a similar implementation process (Lewis et al., 2019). However, it is still important to understand if this version of CBT leads to improvements that are above standard practice. Third, previous work has been focused on understanding the core components of interventions in order to help expedite symptom improvement (Weersing et al., 2009).

The findings from this dissertation revealed that there was a difference between higher fidelity to certain core skills depending on staff level (e.g., distress tolerance for all staff and behavioral activation for therapists) but also convergence between roles (i.e., cognitive restructuring). Future research should continue to evaluate what components of CBT might be more beneficial for youth, and also determine what is the most efficient way of training and

supporting staff in the use of these core components. That is, it may suggest the selection of different strategies for training as well as potential need to emphasize different core components of CBT dependent on staff role. Thereby, it would be possible to tailor training not only to the context of the organization but to those who will receive the training. For example, this study revealed that staff fidelity to distress tolerance led to improved youth clinical outcomes. Providing training for staff in distress tolerance at the beginning of employment for all staff might be beneficial, regardless of treatment approach being used (McAleavey & Castonguay, 2015). Overall, the approach taken in the implementation of CBT might be applicable to similar settings that offer team-based care for youth with multiple comorbidities.

Limitations and Future Directions

One key limitation to the studies that relate to the adapted conceptual framework is that implementation strategies, thought to mediate the relationship between the intervention strategy an outcome, were not systematically tracked and therefore their individual effects could not be assessed. Therefore, even though some effects varied by implementation phases, they could have been better explained by specific implementation strategies. Future research can directly track implementation strategies to better understand how they relate to clinical and implementation outcomes (Boyd et al., 2018).

Implementation research in youth RTFs is in its infancy. Given that the adapted version of CBT seemed to improve youth clinical outcomes, future work could focus on including a comparison condition, with either treatment as usual or another form of EBP, in order to provide more evidence towards the effectiveness of CBT in a youth RTF. This future work should also provide standard assessments throughout the implementation process for both clinical and implementation outcomes. Measurement of fidelity is crucial in order to know if the intended

intervention was implemented as intended (Carroll et al., 2007). However, the field would benefit from comparing the endorsement system that was developed for this study to other fidelity approaches. This would aid in determining the types of outcomes they are related with and if it does indeed increase fidelity in the organization. It would also be important to determine who needs to be evaluated for fidelity and when (e.g., therapists more frequently than operations staff). Another important aspect of RTFs is the alarming rates of staff turnover (Connor et al., 2003). Future work should directly link turnover to individual staff and explore if any aspects of implementation had an impact, positive or negative, on turnover rates. Implementation outcomes are thought to be related to each other, and additional studies could explore the temporal sequence of multiple outcomes (e.g., does attitudes towards EBPs precede intention to use CBT; Proctor et al., 2011).

Conclusions

In sum, these three studies are some the first to enhance understanding of how clinical and implementation outcomes change over the course of implementation in a youth RTF. The findings suggest that important implementation outcomes, acceptability and adoption, are able to change during crucial implementation phases. In addition, a transdiagnostic and team-based approach to CBT shows promise in improving clinical outcomes in residential settings. Staff fidelity to core CBT elements might aid in improving youth clinical outcomes. Assessment of fidelity is important and might help guide training efforts. More research is needed to better understand the crucial implementation phases and strategies and how they influence improvement in clinical and implementation outcomes. These studies provide guidance regarding reproducible implementation approaches to facilitate the use of adapted EBPs in RTFs with the ultimate goal of enhancing mental health outcomes for high risk and high need youth.

References

Aarons, G. A. (2004). Mental health provider attitudes toward adoption of evidence-based practice: the Evidence-Based Practice Attitude Scale (EBPAS). *Mental Health Services Research*, *6*(2), 61–74. https://doi.org/10.1023/B:MHSR.0000024351.12294.65

Aarons, G. A., Glisson, C., Green, P. D., Hoagwood, K. E., Kelleher, K. J., Landsverk, J. A., & Health, T. R. N. on Y. M. (2012). The organizational social context of mental health services and clinician attitudes toward evidence-based practice: a United States national study. *Implementation Science*, *7*(1), 56. https://doi.org/10.1186/1748-5908-7-56

Aarons, G. A., Hurlburt, M., & Horwitz, S. M. (2011). Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(1), 4–23. https://doi.org/10.1007/s10488-010-0327-7

Adolescence, C. on. (2011). Health Care for Youth in the Juvenile Justice System. *Pediatrics*, *128*(6), 1219–1235. https://doi.org/10.1542/peds.2011-1757

Ajzen, I. (1991). The Theory of Planned Behavior. *Orgnizational Behavior and Human Decision Processes*, *50*, 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

APA Presidential Task for on Evidence-Based Practice. (2006). Evidence-based practice in psychology. *American Psychologist*, *61*(4), 271–285. Retrieved from https://eds.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=1&sid=63d59797-a2b9-4c7b-bb2f-b34e8cd25993%40sessionmgr4008

Balas, E. A., & Boren, S. A. (2000). Managing Clinical Knowledge for Health Care Improvement. *Yearbook of Medical Informatics*, (1), 65–70. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/27699347

Battagliese, G., Caccetta, M., Luppino, O. I., Baglioni, C., Cardi, V., Mancini, F., & Buonanno, C. (2015). Cognitive-behavioral therapy for externalizing disorders: A meta-analysis of treatment effectiveness. *Behaviour Research and Therapy*, *75*, 60–71. https://doi.org/10.1016/j.brat.2015.10.008

Bauer, M. S., Damschroder, L., Hagedorn, H., Smith, J., & Kilbourne, A. M. (2015). An introduction to implementation science for the non-specialist. *BMC Psychology*, *3*(1), 32. https://doi.org/10.1186/S40359-015-0089-9

Bearman, S. K., Schneiderman, R. L., & Zoloth, E. (2017). Building an Evidence Base for Effective Supervision Practices: An Analogue Experiment of Supervision to Increase EBT Fidelity. *Administration and Policy in Mental Health and Mental Health Services Research*, *44*(2), 293–307. https://doi.org/10.1007/s10488-016-0723-8

Beidas, R. S., Cross, W. F., & Dorsey, S. (2014). Show Me, Don't Tell Me: Behavioral Rehearsal as a Training and Analogue Fidelity Tool. *Cognitive and Behavioral Practice*, *21*(1), 1–11. https://doi.org/10.1016/j.cbpra.2013.04.002

Beidas, R. S., Edmunds, J. M., Marcus, S. C., & Kendall, P. C. (2012). Training and Consultation to Promote Implementation of an Empirically Supported Treatment: A Randomized Trial. *Psychiatric Services*, *63*(7), 660–665. https://doi.org/10.1176/appi.ps.201100401

Beidas, R. S., Marcus, S. C., Wolk, C. B., Powell, B. J., Aarons, G. A., Evans, A. C., … Mandell, D. S. (2016). A Prospective Examination of Clinician and Supervisor Turnover Within the Context of Implementation of Evidence-Based Practices in a Publicly-Funded Mental Health System. *Administration and Policy in Mental Health and Mental Health Services Research*, *43*(5), 640–649. https://doi.org/10.1007/s10488-015-0673-6

Borrelli, B. (2011). The assessment, monitoring, and enhancement of treatment fidelity in public health clinical trials. *Journal of Public Health Dentistry*, *71*(SUPPL. 1), S52–S63. https://doi.org/10.1111/j.1752-7325.2011.00233.x

Boyd, M. R., Powell, B. J., Endicott, D., & Lewis, C. C. (2018). A Method for Tracking Implementation Strategies: An Exemplar Implementing Measurement-Based Care in Community Behavioral Health Clinics. *Behavior Therapy*, *49*(4), 525–537. https://doi.org/10.1016/j.beth.2017.11.012

Breitenstein, S. M., Gross, D., Garvey, C. A., Hill, C., Fogg, L., & Resnick, B. (2010). Implementation fidelity in community-based interventions. *Research in Nursing & Health*, *33*(2), 164–173. https://doi.org/10.1002/nur.20373

Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science*, *2*(1), 40–48. https://doi.org/10.1186/1748-5908-2-40

Chorpita, B. F., Reise, S., Weisz, J. R., Grubbs, K., Becker, K. D., & Krull, J. L. (2010). Evaluation of the brief problem checklist: Child and caregiver interviews to measure clinical progress. *Journal of Consulting and Clinical Psychology*, *78*(4), 526–536. https://doi.org/10.1037/a0019602

Connor, D. F., McIntyre, E. K., Miller, K., Brown, C., Bluestone, H., Daunais, D., & LeBeau, S. (2003). Staff Retention and Turnover in a Residential Treatment Center. *Residential Treatment For Children & Youth*, *20*(3), 43–53. https://doi.org/10.1300/J007v20n03_04

Cross, W. F., Matthieu, M. M., Cerel, J., & Knox, K. L. (2007). Proximate outcomes of gatekeeper training for suicide prevention in the workplace. *Suicide & Life-Threatening Behavior*, *37*(6), 659–670. https://doi.org/10.1521/suli.2007.37.6.659

Cross, W. F., Seaburn, D., Gibbs, D., Schmeelk-Cone, K., White, A. M., & Caine, E. D. (2011). Does practice make perfect? A randomized control trial of behavioral rehearsal on suicide prevention gatekeeper skills. *Journal of Primary Prevention*, *32*(3–4), 195–211. https://doi.org/10.1007/s10935-011-0250-z

Cuijpers, P., van Straten, A., & Warmerdam, L. (2007, April 1). Behavioral activation treatments of depression: A meta-analysis. *Clinical Psychology Review*. Pergamon. https://doi.org/10.1016/j.cpr.2006.11.001

Curran, G. M., Bauer, M. S., Mittman, B., Pyne, J. M., & Stetler, C. (2012). Effectiveness-implementation hybrid designs: Combining elements of clinical effectiveness and implementation research to enhance public health impact. *Medical Care*, *50*(3), 217–226. https://doi.org/10.1097/MLR.0b013e3182408812

Dorsey, S., Lyon, A. R., Pullmann, M. D., Jungbluth, N., Berliner, L., & Beidas, R. S. (2017). Behavioral Rehearsal for Analogue Fidelity: Feasibility in a State-Funded Children's Mental Health Initiative. *Administration and Policy in Mental Health and Mental Health Services Research*, *44*(3), 395–404. https://doi.org/10.1007/s10488-016-0727-4

Edmunds, J. M., Read, K. L., Ringle, V. A., Brodman, D. M., Kendall, P. C., & Beidas, R. S. (2014). Sustaining clinician penetration, attitudes and knowledge in cognitive-behavioral therapy for youth anxiety. *Implementation Science*, *9*(1), 89. https://doi.org/10.1186/s13012-014-0089-9

Evangelist, M., Ryan, J. P., Victor, B. G., Moore, A., & Perron, B. E. (2017). Disparities at Adjudication in the Juvenile Justice System: An Examination of Race, Gender, and Age. *Social Work Research*, *41*(4), 199–211. https://doi.org/10.1093/swr/svx017

Fishbein, M.; Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action*

approach. New York, NY: Psychology Press.

Herschell, A. D., Kolko, D. J., Baumann, B. L., & Davis, A. C. (2010, June). The role of therapist training in the implementation of psychosocial treatments: A review and critique with recommendations. *Clinical Psychology Review*. NIH Public Access. https://doi.org/10.1016/j.cpr.2010.02.005

Hockengerry, S., Wachter, A., Sladky, A., & Sickmund, M. (2016). Juvenile Residential Facility Census, 2014: Selected Findings. Retrieved June 25, 2018, from https://www.ojjdp.gov/pubs/250123.pdf

Hoeft, T. J., Fortney, J. C., Patel, V., & Unützer, J. (2018). Task-Sharing Approaches to Improve Mental Health Care in Rural and Other Low-Resource Settings: A Systematic Review. *Journal of Rural Health*, *34*(1), 48–62. https://doi.org/10.1111/jrh.12229

Ibrahim, J. G., & Molenberghs, G. (2009). Missing data methods in longitudinal studies: a review. *Test (Madrid, Spain)*, *18*(1), 1–43. https://doi.org/10.1007/s11749-009-0138-x

James, A. C., James, G., Cowdrey, F. A., Soler, A., & Choke, A. (2015, February 18). Cognitive behavioural therapy for anxiety disorders in children and adolescents. *Cochrane Database of Systematic Reviews*. John Wiley & Sons, Ltd. https://doi.org/10.1002/14651858.CD004690.pub4

James, S. (2017). Implementing Evidence-Based Practice in Residential Care: How Far Have We Come? *Residential Treatment for Children & Youth*, *34*(2), 155–175. https://doi.org/10.1080/0886571X.2017.1332330

James, S., Thompson, R., Sternberg, N., Schnur, E., Ross, J., Butler, L., … Muirhead, J. (2015). Attitudes, perceptions, and utilization of evidence-based practices in residential care. *Residential Treatment For Children & Youth*, *32*(2), 144–166.

https://doi.org/10.1080/0886571X.2015.1046275

James, S., Thompson, R. W., & Ringle, J. L. (2017). The Implementation of Evidence-Based Practices in Residential Care: Outcomes, Processes, and Barriers. *Journal of Emotional and Behavioral Disorders*, *25*(1), 4–18. https://doi.org/10.1177/1063426616687083

Lambie, I., & Randell, I. (2013). The impact of incarceration on juvenile offenders. *Clinical Psychology Review*, *33*(3), 448–459. https://doi.org/10.1016/j.cpr.2013.01.007

Lewis, C. C., Rodriguez-Quintana, N., Boys, C., Scott, K., Marriott, B. R., Hoffaker, C., … Hindman, R. (2019). A tailored implementation of CBT in a youth residential setting. *Manuscript in Preparation*.

Lewis, C. C., Scott, K., & Marriott, B. R. (2018). A methodology for generating a tailored implementation blueprint : an exemplar from a youth residential setting. *Implementation Science*, *13*(1), 1–13. https://doi.org/10.1186/s13012-018-0761-6

Lundgren, L., Amodeo, M., Cohen, A., Chassler, D., & Horowitz, A. (2011). Modifications of evidence-based practices in community-based addiction treatment organizations: A qualitative research study. *Addictive Behaviors*, *36*(6), 630–635. https://doi.org/10.1016/j.addbeh.2011.01.003

Lyon, A. R., Dorsey, S., Pullmann, M., Silbaugh-Cowdin, J., & Berliner, L. (2015). Clinician use of standardized assessments following a common elements psychotherapy training and consultation program. *Administration and Policy in Mental Health*, *42*(1), 47–60. https://doi.org/10.1007/s10488-014-0543-7

McAleavey, A. A., & Castonguay, L. G. (2015). The process of change in psychotherapy: Common and unique factors. In *Psychotherapy Research: Foundations, Process, and Outcome* (pp. 293–310). Vienna: Springer Vienna. https://doi.org/10.1007/978-3-7091-

1382-0_15

McCredie, M. N., Quinn, C. A., & Covington, M. (2017). Dialectical Behavior Therapy in Adolescent Residential Treatment: Outcomes and Effectiveness. *Residential Treatment for Children & Youth*, *34*(2), 84–106. https://doi.org/10.1080/0886571X.2016.1271291

McHugh, R. K., Murray, H. W., & Barlow, D. H. (2009). Balancing fidelity and adaptation in the dissemination of empirically-supported treatments: The promise of transdiagnostic interventions. *Behaviour Research and Therapy*, *47*(11), 946–953. https://doi.org/10.1016/j.brat.2009.07.005

McKenna, H. P., Ashton, S., & Keeney, S. (2004). Barriers to evidence-based practice in primary care. *Journal of Advanced Nursing*, *45*(2), 178–189. https://doi.org/10.1046/j.1365-2648.2003.02879.x

Mcleod, B. D., Southam-Gerow, M. A., Tully, C. B., Rodríguez, A., & Smith, M. M. (2013). Making a Case for Treatment Integrity as a Psychosocial Treatment Quality Indicator for Youth Mental Health Care. *Clinical Psychology: Science and Practice*, *20*(1), 14–32. https://doi.org/10.1111/cpsp.12020

Miller, J. (2013). Individual Offending, Routine Activities, and Activity Settings: Revisiting the Routine Activity Theory of General Deviance. *Journal of Research in Crime and Delinquency*, *50*(3), 390–416. https://doi.org/10.1177/0022427811432641

Miller, T. R., Fisher, D. A., & Cohen, M. A. (2001). Costs of Juvenile Violence: Policy Implications. *Pediatrics*, *107*, 1–7. Retrieved from http://pediatrics.aappublications.org/content/107/1/e3.long

Mohr, W. K., Petti, T. A., & Mohr, B. D. (2003, June 29). Adverse effects associated with physical restraint. *Canadian Journal of Psychiatry*. SAGE PublicationsSage CA: Los

Angeles, CA. https://doi.org/10.1177/070674370304800509

Montgomery, E. C., Kunik, M. E., Wilson, N., Stanley, M. A., & Weiss, B. (2010). Can paraprofessionals deliver cognitive-behavioral therapy to treat anxiety and depressive symptoms? *Bulletin of the Menninger Clinic*, *74*(1), 45–62. https://doi.org/10.1521/bumc.2010.74.1.45

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*(1), 53. https://doi.org/10.1186/s13012-015-0242-0

Nilsen, T. S., Eisemann, M., & Kvernmo, S. (2013). Predictors and moderators of outcome in child and adolescent anxiety and depression: a systematic review of psychological treatment studies. *European Child & Adolescent Psychiatry*, *22*(2), 69–87. https://doi.org/10.1007/s00787-012-0316-3

Pagoto, S. L., Spring, B., Coups, E. J., Mulvaney, S., Coutu, M. F., & Ozakinci, G. (2007). Barriers and facilitators of evidence-based practice perceived by behavioral science realth professionals. *Journal of Clinical Psychology*, *63*(7), 695–705. https://doi.org/10.1002/jclp.20376

Payton, J. W., Wardlaw, D. M., Graczyk, P. A., Bloodworth, M. R., Tompsett, C. J., & Weissberg, R. P. (2000). Social and emotional learning: A framework for promoting mental health and reducing risk behavior in children and youth. *Journal of School Health*, *70*(5), 179–185. https://doi.org/10.1111/j.1746-1561.2000.tb06468.x

Pollastri, A. R., Lieberman, R. E., Boldt, S. L., & Ablon, J. S. (2016). Minimizing Seclusion and Restraint in Youth Residential and Day Treatment Through Site-Wide Implementation of Collaborative Problem Solving. *Residential Treatment for Children and Youth*, *33*(3–4), 186–205. https://doi.org/10.1080/0886571X.2016.1188340

Powell, B. J., Beidas, R. S., Lewis, C. C., Aarons, G. A., McMillen, J. C., Proctor, E. K., & Mandell, D. S. (2017). Methods to Improve the Selection and Tailoring of Implementation Strategies. *Journal of Behavioral Health Services and Research*, *44*(2), 177–194. https://doi.org/10.1007/s11414-015-9475-6

Powell, B. J., McMillen, J. C., Proctor, E. K., Carpenter, C. R., Griffey, R. T., Bunger, A. C., … York, J. L. (2012). A compilation of strategies for implementing clinical innovations in health and mental health. *Medical Care Research and Review*, *69*(2), 123–157. https://doi.org/10.1177/1077558711430690

Proctor, E. K., Landsverk, J. A., Aarons, G. A., Chambers, D., Glisson, C., & Mittman, B. (2009). Implementation research in mental health services: An emerging science with conceptual, methodological, and training challenges. *Administration and Policy in Mental Health and Mental Health Services Research*, *36*(1), 24–34. https://doi.org/10.1007/s10488-008-0197-4

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*(1), 139. https://doi.org/10.1186/1748-5908-8-139

Proctor, E. K., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G. A., Bunger, A., … Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Puzzanchera, C., Hockengerry, S., Sladky, T. J., & Kang, W. (2018). Juvenile Residential Facility Census Databook.

Ringle, J. L., James, S., Ross, J. R., & Thompson, R. W. (2017). Measuring Youth Residential

Care Provider Attitudes. *European Journal of Psychological Assessment*, 1–7. https://doi.org/10.1027/1015-5759/a000397

Rodriguez-Quintana, N., & Lewis, C. C. (2018). Observational Coding Training Methods for CBT Treatment Fidelity: A Systematic Review. *Cognitive Therapy and Research*, *42*(4), 358–368. https://doi.org/10.1007/s10608-018-9898-5

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York, NY: Free Press. https://doi.org/10.1525/aa.1963.65.5.02a00230

Sburlati, E. S., Schniering, C. A., Lyneham, H. J., & Rapee, R. M. (2011). A Model of Therapist Competencies for the Empirically Supported Cognitive Behavioral Treatment of Child and Adolescent Anxiety and Depressive Disorders. *Clinical Child and Family Psychology Review*, *14*(1), 89–109. https://doi.org/10.1007/s10567-011-0083-6

Schafer, J. L. (1999, February 2). Multiple imputation: A primer. *Statistical Methods in Medical Research*. https://doi.org/10.1191/096228099671525676

Schufelt, J., & Cocozza, J. J. (2006). Youth with mental health disorders in the juvenile justice system: Results from a multi-state prevalence study. *NCMHJJ Research and Program Brief*, (June), 1–6. Retrieved from https://www.ncmhjj.com/wp-content/uploads/2015/02/2006_Youth_with_Mental_Health_Disorders_in_the_Juvenile_Justice_System.pdf

Scott, K., & Lewis, C. C. (2015). Using Measurement-Based Care to Enhance Any Treatment. *Cognitive and Behavioral Practice*, *22*(1), 49–59. https://doi.org/10.1016/j.cbpra.2014.01.010

Shelton, R. C., Cooper, B. R., & Wiltsey Stirman, S. (2018). The Sustainability of Evidence-Based Interventions and Practices in Public Health and Health Care. *Annual Review of*

Public Health, *39*(1), 55–76. https://doi.org/10.1146/annurev-publhealth-040617-014731

Stroobants, T., Vanderfaeillie, J., Andries, C., & Van Holen, F. (2016). Youth care workers' perspectives on and adoption of evidence-based practice. *Children and Youth Services Review*, *71*, 299–307. https://doi.org/10.1016/j.childyouth.2016.11.017

Sturmey, P. (2009, November 20). Behavioral activation is an evidence-based treatment for depression. *Behavior Modification*. SAGE PublicationsSage CA: Los Angeles, CA. https://doi.org/10.1177/0145445509350094

Swinkels, A., & Giuliano, T. A. (2007). The Measurement and Conceptualization of Mood Awareness: Monitoring and Labeling One's Mood States. *Personality and Social Psychology Bulletin*, *21*(9), 934–949. https://doi.org/10.1177/0146167295219008

Tabak, R. G., Khoong, E. C., Chambers, D. A., & Brownson, R. C. (2012). Bridging Research and Practice: Models for Dissemination and Implementation Research. *American Journal of Preventive Medicine*, *43*(3), 337–350. https://doi.org/10.1016/J.AMEPRE.2012.05.024

Tarolla, S. M., Wagner, E. F., Rabinowitz, J., & Tubman, J. G. (2002). Understanding and treating juvenile offenders: A review of current knowledge and future directions. *Aggression and Violent Behavior*, *7*(2), 125–143. https://doi.org/10.1016/S1359-1789(00)00041-0

Teplin, L. A., Welty, L. J., Abram, K. M., Dulcan, M. K., & Washburn, J. J. (2012). Prevalence and persistence of psychiatric disorders in youth after detention: A prospective longitudinal study. *Archives of General Psychiatry*, *69*(10), 1031–1043. https://doi.org/10.1001/archgenpsychiatry.2011.2062

Underwood, L. A., & Washington, A. (2016). Mental illness and juvenile offenders. *International Journal of Environmental Research and Public Health*, *13*(2), 1–14.

https://doi.org/10.3390/ijerph13020228

Webb, C. A., Auerbach, R. P., & DeRubeis, R. J. (2012, September). Processes of change in CBT of adolescent depression: Review and recommendations. *Journal of Clinical Child and Adolescent Psychology*. Taylor & Francis Group. https://doi.org/10.1080/15374416.2012.704842

Weersing, V. R., Rozenman, M., & Gonzalez, A. (2009). Core Components of Therapy in Youth. *Behavior Modification*, *33*(1), 24–47. https://doi.org/10.1177/0145445508322629

Weisz, J. R. (2012). Testing Standard and Modular Designs for Psychotherapy Treating Depression, Anxiety, and Conduct Problems in Youth. *Archives of General Psychiatry*, *69*(3), 274. https://doi.org/10.1001/archgenpsychiatry.2011.147

Weisz, J. R., Chorpita, B. F., Frye, A., Ng, M. Y., Lau, N., Bearman, S. K., … Hoagwood, K. E. (2011). Youth top problems: Using idiographic, consumer-guided assessment to identify treatment needs and to track change during psychotherapy. *Journal of Consulting and Clinical Psychology*, *79*(3), 369–380. https://doi.org/10.1037/a0023307

Weisz, J. R., Kuppens, S., Ng, M. Y., Eckshtain, D., Ugueto, A. M., Vaughn-Coaxum, R., … Fordwood, S. R. (2017). What five decades of research tells us about the effects of youth psychological therapy: A multilevel meta-analysis and implications for science and practice. *American Psychologist*, *72*(2), 79–117. https://doi.org/10.1037/a0040360

Williams, N. J., Glisson, C., Hemmelgarn, A., & Green, P. D. (2017). Mechanisms of Change in the ARC Organizational Strategy: Increasing Mental Health Clinicians' EBP Adoption Through Improved Organizational Culture and Capacity. *Administration and Policy in Mental Health and Mental Health Services Research*, *44*(2), 269–283. https://doi.org/10.1007/s10488-016-0742-5

Wiltsey Stirman, S., Gamarra, J. M., Bartlett, B. A., Calloway, A., & Gutner, C. A. (2017a). Empirical Examinations of Modifications and Adaptations to Evidence-Based Psychotherapies: Methodologies, Impact, and Future Directions. *Clinical Psychology: Science and Practice*, *24*(4), 396–420. https://doi.org/10.1111/cpsp.12218

Wiltsey Stirman, S., Gamarra, J. M., Bartlett, B. A., Calloway, A., & Gutner, C. A. (2017b). Empirical Examinations of Modifications and Adaptations to Evidence-Based Psychotherapies: Methodologies, Impact, and Future Directions. *Clinical Psychology: Science and Practice*, *24*(4), 396–420. https://doi.org/10.1111/cpsp.12218

Wiltsey Stirman, S., Kimberly, J., Cook, N., Calloway, A., Castro, F., & Charns, M. (2012, December 14). The sustainability of new programs and innovations: A review of the empirical literature and recommendations for future research. *Implementation Science*. BioMed Central. https://doi.org/10.1186/1748-5908-7-17

Wiltsey Stirman, S., Miller, C. J., Toder, K., & Calloway, A. (2013). Development of a framework and coding system for modifications and adaptations of evidence-based interventions. *Implementation Science*, *8*(1), 65. https://doi.org/10.1186/1748-5908-8-65

Young, J., & Beck, A. T. (1980). Cognitive Therapy Scale: Rating manual. *Unpublished Manuscript*. https://doi.org/10.1016/S0005-7894(70)80030-2

Zhou, X., Hetrick, S. E., Cuijpers, P., Qin, B., Barth, J., Whittington, C. J., … Xie, P. (2015). Comparative efficacy and acceptability of psychotherapies for depression in children and adolescents: A systematic review and network meta-analysis. *World Psychiatry*, *14*(2), 207–222. https://doi.org/10.1002/wps.20217

Appendix A

EBPAS

The following questions relate to your feelings toward using new types of therapy, interventions, or treatments. Manualized therapy, treatment, or intervention refers to any intervention that has specific guidelines and/or components that are outlined in a manual and/or that are to be followed in a structured or predetermined way. Indicate the extent to which you agree with each item using the following scale:

Not at All	To a Slight Extent	To a Moderate Extent	To a Great Extent	To a Very Great Extent
0	1	2	3	4

1. I like to use new types of therapy/interventions to help my clients.	⓪ ① ② ③ ④
2. I am willing to try new types of therapy/interventions even if I have to follow a treatment manual.	⓪ ① ② ③ ④
3. I know better than academic researchers how to care for my clients.	⓪ ① ② ③ ④
4. I am willing to use new and different types of therapy/interventions developed by researchers.	⓪ ① ② ③ ④
5. Research based treatments/interventions are not clinically useful.	⓪ ① ② ③ ④
6. Clinical experience is more important than using manualized treatments/interventions.	⓪ ① ② ③ ④
7. I would not use manualized treatments/interventions.	⓪ ① ② ③ ④
8. I would try a new therapy/intervention even if it were very different from what I am used to doing.	⓪ ① ② ③ ④

For questions 9-15: If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if:

9. It was intuitively appealing?	⓪ ① ② ③ ④
10. It “made sense” to you?	⓪ ① ② ③ ④
11. It was required by your supervisor?	⓪ ① ② ③ ④
12. It was required by your agency?	⓪ ① ② ③ ④
13. It was required by your state?	⓪ ① ② ③ ④
14. It was being used by colleagues who were happy with it?	⓪ ① ② ③ ④
15. You felt like you had enough training to use it correctly?	⓪ ① ② ③ ④

Theory of planned behavior/intention to use

Please fill in the number of your corresponding agreement level below

1. I expect to incorporate the skills gained during this training session into my work.	Strongly Disagree	① ② ③ ④ ⑤ ⑥ ⑦	Strongly Agree
2. I want to incorporate the skills gained during this training session into my work.	Strongly Disagree	① ② ③ ④ ⑤ ⑥ ⑦	Strongly Agree
3. I intend to incorporate the skills gained during this training session into my work.	Extremely Unlikely	① ② ③ ④ ⑤ ⑥ ⑦	Extremely Likely

Brief Problems Checklist

The list of items below describes kids. For each item, rate how true you think it is of you in the last week using the scale below. And remember this is asking about how things have been this week.

Not True	Somewhat True	Very True
0	1	2

1. I argue a lot	⓪ ① ②
2. I destroy things belonging to others	⓪ ① ②
3. I disobey my parents or people at school	⓪ ① ②
4. I feel too guilty	⓪ ① ②
5. I feel worthless or inferior	⓪ ① ②
6. I am self-conscious or easily embarrassed	⓪ ① ②
7. I am stubborn	⓪ ① ②
8. I have a hot temper	⓪ ① ②
9. I threaten to hurt people	⓪ ① ②
10. I am too fearful or anxious	⓪ ① ②
11. I am unhappy, sad, or depressed	⓪ ① ②
12. I worry a lot	⓪ ① ②

Top Problems Assessment

Here are the top three problems you told your therapist about in your first meeting. For each, rate how much of a problem it still is, from 0 "*not at all a problem*" to 10 "*a huge problem.*"

Not at all a problem										**A huge problem**
0	1	2	3	4	5	6	7	8	9	10

1. Top Problem #1: _____	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
2. Top Problem #2: _____	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
3. Top Problem #3: _____	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

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2012-2014 Master of Public Health
University of Puerto Rico, Medical Sciences Campus, San Juan, PR
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Thesis: *Hypertension and Physical Inactivity in Sabana Seca, Toa Baja, PR*

2008-2012 Bachelor of Arts
University of Puerto Rico, Rio Piedras Campus, San Juan, PR
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2014 **Graduate Scholars Fellowship, Indiana University, Bloomington**
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2013 **Capacitating Professionals in Public Health Program, Puerto Rico Florida Public Health Training Center**
Summer graduate fellowship covering stipend

2010-2012 **National Institute of Mental Health (NIMH) Career Opportunities in Research (COR) Education and Training Program**
Two-year undergraduate fellowship covering stipend, tuition, fees, health insurance, and conference travel

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2020 Excellence in Research Award, Department of Psychiatry and Behavioral Sciences, The University of Texas Health Science Center

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2014 President's Diversity Doctoral Scholars Award, Indiana University, Bloomington

2013 Outstanding Student due to Academic Excellence, Department of Biostatistics, Graduate School of Public Health, University of Puerto Rico, Medical Sciences Campus

2012 Summa Cum Laude, University of Puerto Rico, Rio Piedras Campus

Honorable Mention, Ford Foundation Predoctoral Fellowship, The National Academies

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2009-2012 Member, Honor's Program at the University of Puerto Rico, Rio Piedras Campus

2008-2012 Dean's List, University of Puerto Rico, Rio Piedras Campus

2008-2012 Honor's Tuition Waiver (Top 5% of major in academic year), University of Puerto Rico, Rio Piedras Campus

2007 Scholar Finalist at the National Hispanic Recognition Program, The College Board, Puerto Rico

RESEARCH EXPERIENCE

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Advisor: Ana M. Ugueto, Ph.D.
Projects:

- Profiles of adolescents in an inpatient hospital at time of admission
- Screening of depression for adolescents in an inpatient hospital
- Adverse childhood experiences in adolescents in an inpatient hospital
- Evaluation of an early intervention program for severe mental illness

2014-2020 **Doctoral Student, Training Research and Implementation in Psychology (TRIP) Lab**
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Advisor: Cara. C. Lewis, Ph.D., HSPP
Projects:

- Readiness to change in adolescents with depression
- Fidelity training of observational coding methods
- Effects of trainee therapist's treatment fidelity on client's outcomes
- Implementing CBT in a youth residential treatment center

2013-2014 **Research Coordinator, Institute for Psychological Research**
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Projects:

- Meta-analysis of Therapeutic Effectiveness in Hispanic/Latinos
- The Therapeutic Alliance in Cognitive Behavioral Therapy for Adolescents with Depression

2012-2013 **Research Assistant, Department of Biostatistics**
University of Puerto Rico, Medical Sciences Campus
Advisor: Heidi Venegas, Dr.Ph.
Projects:

- Nutritional outcomes in Puerto Rican youth in school-settings
- Experiences with cancer in Puerto Rican women
- Hypertension in the community of Sabana Seca, Puerto Rico

2010-2012 **Research Assistant, Institute for Psychological Research**
University of Puerto Rico, Río Piedras, PR
Advisor: Guillermo Bernal, Ph.D. and Giovanni Tirado-Santiago, Ph.D.
Projects:

- Change processes in Cognitive Behavioral Therapy for Adolescents with Major Depressive Disorder
- Processing of Emotional Content and Brain Activation in Adolescents Treated with Cognitive Behavioral Therapy or SSRIs (fluoxetine) for Major Depression

Summer 2011 **Summer Research Intern, Clinical Psychology Summer Undergraduate Internship Program**
University of Pennsylvania, Philadelphia, PA
Advisor: Robert J. DeRubeis, Ph.D.
Project: Sex Differences in Depression

2010-2011 **Research Assistant, Institute for Psychological Research**
University of Puerto Rico, Río Piedras, PR
Advisor: Blanca Ortíz, J.D., Ph.D.
Project: Role of Norms, Beliefs, and Practices in Effective Prevention with Heterosexual Puerto Rican Men

Summer 2010 **Summer Research Fellow, The Leadership Alliance, Summer Research Early Identification Program (SR-EIP), Summer Undergraduate Research Fellowship (SURF) Program**
Yale University, New Haven, CT
Advisor: Julia Kim-Cohen, Ph.D.
Project: Maternal Depression and its Effects on Boys and Girls' Emotion Processing

Spring 2010 **Research Volunteer, Department of Psychology**
University of Puerto Rico, Río Piedras, PR
Advisor: José Toro-Alfonso, Ph.D.
Project: Eating Disorders in Homosexual Men

PUBLICATIONS

Lake, A. J., **Rodriguez-Quintana, N**., Lewis, C. C., & Brothers, B. M. (in press) ADRESSING Diversity: Clinical Assessment and Outcomes in a Psychology Training Clinic. *Training and Education in Professional Psychology.*

Lorenzo-Luaces, L., **Rodriguez-Quintana, N**., Riley, T., Weisz, J. (in press). A prognostic index (PI) as a moderator of outcomes in the treatment of adolescent depression: A risk-stratified stepped care model of treatment with cognitive-behavioral therapy, fluoxetine, or their combination. *Psychotherapy Research.*

Lorenzo-Luaces, L., **Rodriguez-Quintana, N.,** Bailey, A. (in press). Do depression severity and duration interact to predict outcomes in the treatment of adolescent depression? *Behavior Research and Therapy*.

Rodriguez-Quintana, N. & Lewis, C. C. (2019). Ready or Not? Transitions of Depressed Adolescents During Acute Phase of Treatment. *Child Psychiatry & Human Development*, 50(6), 950-959.

Bernal, G., Rivera-Medina, C., Cumba-Avilés, E., Nazario, L., Reyes, M. L., Sáez, E., Duarté-Vélez, Y., **Rodriguez-Quintana, N.**, & Rosselló, J. (2019). Can CBT be optimized with Parent Psychoeducation? A randomized effectiveness trial of adolescents with Major Depression in Puerto Rico. *Family Process, 58(4), 832-854.*

Rodriguez-Quintana, N. & Lewis, C. C. (2018). Observational coding training methods for CBT treatment fidelity: A systematic review. *Cognitive Therapy and Research*, 42(4), 358-368.

Rodriguez-Quintana, D., Beaton, D., **Rodriguez-Quintana, N.**, & Lopez-Gonzalez, F. (2017). Radial Head Ingrowth Anatomic Implant Vs. Smooth Stem Monoblock Implant in Acute Terrible Triad Injury: A Prospective Comparative Study. *Journal of Orthopaedic Trauma*, *31*(9), 503-509.

Preston, A. M., & **Rodriguez-Quintana, N.** (2015). Number and type of meals consumed by children in a subset of schools in San Juan, Puerto Rico. *Puerto Rico Health Sciences Journal*, *34*(2), 78-82.

Bernal, G., Cumba-Avilés, E., & **Rodriguez-Quintana, N.** (2014). Methodological challenges in research with ethnic, racial, and ethnocultural groups. In F. T. L. Leong, L. Comas-Díaz, G. C. N. Hall, V. C. McLoyd & J. E. Trimble (Eds.), *APA handbook of multicultural psychology, Vol. 1: Theory and research* (pp. 105-123). Washington, DC, US: American Psychological Association.

Under review

Rodriguez-Quintana, N., Walker, M., & Lewis, C. C. (2018). In Search of Reliability: Expert-informed Training Methods for Conducting Observational Coding of Treatment Fidelity.

Scott, K., **Rodriguez-Quintana, N.,** Lewis, C. C., Marriott, B., & Hindman, R. (2020). Implementation of Cognitive Behavioral Therapy for Residential Environments (CBT-RE) Through an Academic-Community Partnership: The Adoption Phase.

Rodriguez-Quintana, N., Lewis, C. C., Scott, K., Marriot, B., Wahlen, S., & Hindman, R. (2020). Implementation of Cognitive Behavioral Therapy for Residential Environments (CBT-RE) Through an Academic-Community Partnership: The Implementation Phase.

Lewis, C. C., Scott, K., **Rodriguez-Quintana, N**., Hoffacker, C., Boys, C., & Hindman, R. (2020). Implementation of Cognitive Behavioral Therapy for Residential Environments (CBT-RE) Through an Academic-Community Partnership: The Sustainment Phase.

In preparation

Rodriguez-Quintana, N., Lorenzo-Luaces, L., & Lewis, C. C. (2020). Three Perspectives of Competence and Their Relation to Treatment Outcome in a Cognitive Behavior Therapy Training Clinic.

Rodriguez-Quintana, N., Lewis, C. C., Scott, K., Hoffaker, C., Lorenzo-Luaces, L., Aalsma, M., D'Onofrio, B. (2020). Relationship of Fidelity to Core Cognitive Behavioral Therapy Skills and Clinical Outcomes in a Youth Residential Setting.

Rodriguez-Quintana, N. & Ugueto, A. M. (2020). Who are the adolescents admitted to an inpatient hospital? Profiles of adolescents in a county psychiatric hospital.

Other writing

Rodriguez-Quintana, N. (2015, July). *Cognitive Behavioral Therapy for Depression and Anxiety.* Retrievable from https://blog.provost.indiana.edu/blog/2015/07/14/cognitive-behavioral-therapy-for-depression-and-anxiety/

PRESENTATIONS

National and International Conferences

Rodriguez-Quintana, N., & Lorenzo-Luaces, L., & Bailey, A. (2020, May). *Do depression severity and duration interact to predicting outcomes in the treatment of adolescent depression?* Paper accepted for the Association of Psychological Science Annual Conference. Chicago, IL. (Conference Cancelled).

Lorenzo--Luaces, L., **Rodriguez-Quintana, N**. & Weisz, J. (2020, May). *A placebo prognostic index (PI): Could it inform risk-stratification in treatment with cognitive-behavioral therapy, fluoxetine, or their combination?* Paper accepted for the Association of Psychological Science Annual Conference. Chicago, IL. (Conference Cancelled).

Rodriguez-Quintana, N., Lewis, C. C. (2019, November). *Implementing Cognitive Behavioral Therapy in a Youth Residential Setting: An Evaluation of Implementation Outcomes.* Paper accepted for the Association of Behavioral and Cognitive Therapies Annual Conference. Atlanta, GA.

Rodriguez-Quintana, N., & Warner, A. (2019). *Treatment Outcomes Following Inpatient Early Intervention for and Indigent Population with SMI*. Poster accepted for the Association of Cognitive and Behavioral Therapies Annual Convention. Atlanta, GA.

Blassingame, J. C., **Rodriguez-Quintana, N**., & Warner, A. (2019). *Impact of Inpatient Early Intervention on Rehospitalization Rates Compare to Long-term Inpatients*. Poster accepted for the Association of Cognitive and Behavioral Therapies Annual Convention. Atlanta, GA.

Rodriguez-Quintana, N., Walker, M., & Lewis, C. C. (2018, November). *A Qualitative Content Analysis of Expert Practices in Observational Coding Training Methods for Treatment Fidelity*. Paper presented at the Association of Behavioral and Cognitive Therapies Annual Conference. Washington, DC.

Boys, C., **Rodriguez-Quintana, N**., & Lewis, C. C. (2018, November). *Informing a Tailored CBT Implementation Project: The Use of an Organization-Wide Reassessment Survey Feedback Process*. Poster presented at the Association of Behavioral and Cognitive Therapies Annual Conference. Washington, DC.

Rodriguez-Quintana, N., Lewis, C. C., & Hindman, R. (2017, November). *Evaluating CBT training in the context of a tailored implementation in a residential youth treatment center*. Paper presented at the Association of Behavioral and Cognitive Therapies Annual Conference. San Diego, CA.

Rodriguez-Quintana, N. & Lewis, C. C. (2017, November). *Latent transition analysis of readiness to change in CBT for depressed adolescents*. Poster presented at the Association of Behavioral and Cognitive Therapies Annual Conference. San Diego, CA.

Rodriguez-Quintana, N. & Lewis, C. C. (2016, October). *A systematic review of observational coding training methods for CBT treatment fidelity.* Poster presented at the Association of Behavioral and Cognitive Therapies Annual Conference. New York City, NY.

Rodriguez-Quintana, N., Schultz, P. D. & Lewis, C. C. (2015, November). *Achieving reliability in observational psychotherapy coding for treatment fidelity: methods and recommendations.* Poster presented at the Association of Behavioral and Cognitive Therapies Annual Conference. Chicago, IL.

Rodriguez-Quintana, N. & Lewis, C. C. (2015, November). *A confirmatory factor analysis of the Stages of Change Questionnaire (SOCQ) in a sample of depressed adolescents.* Poster presented at the Association of Behavioral and Cognitive Therapies Annual Conference. Chicago, IL.

Rodriguez-Quintana, N. & Lewis, C. C. (2015, October). *A confirmatory factor analysis and latent transition analysis of stages of change in a sample of depressed adolescents*. Poster presented at the Psychological and Brain Sciences Homecoming and Alumni Recognition Day. Bloomington, IN.

Rodriguez-Quintana, N. & Bernal, G. (2015, April). *Therapeutic alliance and treatment response in Cognitive Behavioral Therapy for Puerto Rican adolescents: A pilot study.* Poster presented at the Anxiety and Depression Association of America Annual Conference. Miami, FL.

Bernal, G., Adames, C., **Rodriguez-Quintana, N.**, Yusif, N., Pérez, C., Ortíz, S. & Negrón, L. (2014, August). *A systematic review of treatments with adult Latinos: Part 1-mood and anxiety*. Paper presented at the APA 122 Convention. Washington, DC.

Preston, A. M., Venegas, H., **Rodriguez-Quintana, N**., Rodriguez, C. A. & Rodriguez, R. V. (2014, April). *Snacks contribute one third of nutrient intake at three school levels in a population of Puerto Rican children.* Poster presented at the American Society for Nutrition Annual Meeting. San Diego, CA.

Bernal, G., Adames, C., Ortíz, S., **Rodriguez-Quintana, N.**, López, J., Negrón, L., Yusif, N. & Pérez, C. (2013, October). *State of the art and science on psychosocial treatments with adult Latinos.* Paper presented at the Michigan State University Symposium on Multicultural Psychology. East Lansing, MI.

Preston, A. M., Venegas, H., Velez-Rodriguez, R. M., Rodriguez, C. A. & **Rodriguez-Quintana, N.** (2013, April). *Contribution of snacks to total nutrient intake by normal and overweight Puerto Rican children at three different school levels.* Poster presented at the American Society for Nutrition Annual Meeting. Boston, MA.

Rodriguez-Quintana, N. & Bernal, G. (2012, April). *Change processes in CBT for adolescents with depression.* Poster presented at the Council of Undergraduate Research Posters on Capitol Hill. Washington, D.C.

Rodriguez-Quintana, N. & DeRubeis, R. (2012, April). *Sex differences in depression*. Paper presented at the 4th Student Symposium of Psychological Research. San Juan, PR.

Rodriguez-Quintana, N. & DeRubeis, R. (2012, January). *A comparison of sex differences in two measures of depressive symptoms.* Poster presented at the Diversifying Clinical Psychology Recruitment Event in the Council of University Directors of Clinical Psychology Meeting. San Diego, CA.

Rodriguez-Quintana, N. & TARA Team. (2011, November). *Change processes in CBT for Puerto Rican Adolescents with MDD.* Paper presented at the Caribbean Regional Conference of Psychology. Nassau, Bahamas.

Rodriguez-Quintana, N. & DeRubeis, R. (2011, August). *Sex differences in depression*. Poster presented at the Annual SUIP Research Symposium. University of Pennsylvania, Philadelphia, PA.

Bernal, G., **Rodriguez-Quintana, N.** & Lorenzo-Luaces, L. (2011, August). *Effectiveness of psychotherapy with multicultural populations*. Paper presented at the APA 119 Convention. Washington, DC.

Rodriguez-Quintana, N. & DeRubeis, R. (2011, July). *Sex differences in depression*. Paper presented at The Leadership Alliance National Symposium (LANS). Old Greenwich, CT.

Ortíz-Torres, B., Mendoza, S., Rivera-Ortíz, R., & **Rodriguez-Quintana, N.** (2011, June). *Appraised value of accelerated ethnography for the transformation of normative beliefs and social norms about gender and sexuality in heterosexual Puerto Rican men*. Paper presented at the XXXIII Interamerican Congress of Psychology. Medellin, Colombia.

Rodriguez-Quintana, N. & Kim-Cohen, J. (2011, April). *Maternal depression and its effects on boys and girls' emotion processing*. Poster presented at the Institute for Psychological Research 1st Open House. San Juan, PR.

Rodriguez-Quintana, N. & Bernal, G. (2011, April). *Change processes in psychotherapy for adolescents with depression*. Poster presented at the Career Opportunities in Research (COR) Education and Training Program 9th Open House. San Juan, PR.

Rodriguez-Quintana, N. & Kim-Cohen, J. (2010, July). *Maternal depression and its effects on boys and girls' emotion processing*. Paper presented at The Leadership Alliance National Symposium (LANS). East Brunswick, NJ.

Rodriguez-Quintana, N. & Kim-Cohen, J. (2010, July). *Maternal depression and its effects of boys and girls' emotion processing*. Paper presented at the Summer Undergraduate Research Fellowship (SURF) Program Final Presentation. Yale University. New Haven, CT.

Invited Panels

Rodriguez-Quintana, N. et al. (2017, April). *Psi Chi Graduate School Information Panel*. Panel presented at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

Rodriguez-Quintana, N., et al. (2017, April). *Teaching research methods in Psychology*. Panel presented in PSY-P660 The Teaching of Psychology course at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

Rodriguez-Quintana, N. (2017, April). *Evaluating CBT fidelity in the context of a tailored implementation in a residential youth treatment center: Background and preliminary aims*. Presentation at the Clinical Colloquium of the Clinical Science program at Indiana University. Bloomington, IN.

Rodriguez-Quintana, N., et al. (2016, October). *Being a beginning therapist*. Panel presented in PSY-P480 Empirically Supported Treatments course at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

Rodriguez-Quintana, N. et al. (2016, April). *Applying to graduate school in clinical psychology*. Break-out session presented at the Department of Psychological and Brain Sciences Annual Undergraduate Student Panel. Bloomington, IN.

Rodriguez-Quintana, N. (2016, February). *A clinical case presentation using the PICO framework to guide clinical questions.* Case presented at the Clinical Colloquium of the Clinical Science program at Indiana University. Bloomington, IN.

Rodriguez-Quintana, N., et al. (2014, October). *Graduate school planning for careers in mental health.* Roundtable discussion presented at the Department of Psychological and Brain Sciences 2nd Annual Alumni Recognition and Homecoming Day. Bloomington, IN.

Rodriguez-Quintana, N., Ryan, N. & Cintrón, D. (2011, September). *What is a good mentor?* Panel presented at the Center for Academic Excellence, University of Puerto Rico, Rio Piedras Campus. San Juan, PR.

AD-HOC REVIEWER

2019 Psychotherapy Research

2016 Journal of Clinical Child and Adolescent Psychology

CLINICAL TRAINING

Supervisory role

2017-2018 **Cognitive Behavioral Therapy Clinic, Indiana University**
Duties: Provided weekly evidence-based supervision to graduate students providing CBT to adults with mood and anxiety disorders
Site: Indiana University, Department of Psychological and Brain Sciences, Bloomington, IN
Supervisor: Brittany M. Brothers, Ph.D., HSPP

Clinician role

2020 **Changing Lives through Autism Spectrum Services (CLASS) Clinic**
Site: University of Texas Health Science Center
Supervisors: Dr. Katherine Loveland, Ph.D.

2019-2020 **Trauma and Resiliency Center, Adult Rotation**
Site: University of Texas Health Science Center
Supervisors: Dr. Melissa Goldberg, Psy.D, Dr. Ronald Acierno, Ph.D., Dr. Leslie Taylor, Ph.D., & Dr. Sandra Soenning, Ph.D.

2019 **Child and Adolescent Inpatient Unit**
Duties: Therapist providing assessment, individual therapy, and group therapy to youth in an inpatient hospital
Site: University of Texas Health Science Center, Harris County Psychiatric Center
Supervisor: Dr. Ana M. Ugueto, Ph.D.

2017-2018 **Child and Adolescent Mood and Anxiety Clinic, Riley Hospital for Children**
Duties: Co-therapist providing evidence-based treatment for children and adolescents with behavior, mood, and anxiety disorders. Worked as co-therapist with post-doctoral students, clinical interns, and other practicum students.
Site: Riley Hospital for Children, Department of Child and Adolescent Psychiatry, Indianapolis, IN
Supervisor: Dr. Ann Lagges, Ph.D., HSPP, ABPP

2015-2017 **Cognitive Behavioral Therapy Research and Training Clinic, Indiana University**
Duties: Therapist providing Cognitive Behavioral Therapy to adults with anxiety and mood disorders.
Site: Indiana University, Department of Psychological and Brain Sciences, Bloomington, IN
Supervisors: Brittany M. Brothers, Ph.D., HSPP and Cara. C. Lewis, Ph.D., HSPP

2017 **Child Neuropsychology Assessment Clinic, Riley Hospital for Children**
Duties: Administered, scored, and assisted in interpretation of neuropsychological assessments to children and adolescents.
Site: Riley Hospital for Children, Department of Child and Adolescent Psychiatry, Indianapolis, IN
Supervisor: William G. Kronenberger, Ph.D.

2015-2017 **Parent-Child Behavior Training Clinic, Indiana University**
Duties: Therapist providing evidence-based treatment for parents with children with behavioral disorders.
Site: Indiana University, Department of Psychological and Brain Sciences, Bloomington, IN
Supervisor: John E. Bates, Ph.D.

TRAINER EXPERIENCE

2015-2018 **Cognitive Behavioral Therapy Trainer**
Wolverine Human Services, Vassar, MI
Population: Adolescent Residential Training Facility Staff

2014-2018 **Trainer, Training Research and Implementation in Psychology (TRIP) Lab**
Indiana University-Bloomington
Topic: Observational coding for Cognitive Behavioral Therapy adherence and competence
Population: Undergraduate research assistants

2011-2012 **Trainer, Institute for Psychological Research**
University of Puerto Rico, Rio Piedras Campus, San Juan, PR
Observational coding for Cognitive Behavioral Therapy adherence, competence, and alliance
Population: Undergraduate research assistants

TEACHING EXPERIENCE

2016 Associate Instructor
Research Methods in Psychology

Guest lectures

Rodriguez-Quintana, N. (2018, November). *Evaluation of CBT implementation phases on youth clinical outcomes*. Presentation in STAT-S 690 – Statistical consulting course at the Indiana University Department of Statistics. Bloomington, IN.

Rodriguez-Quintana, N. (2018, February). *Treatments for Anxiety Disorders*. Presentation in PSY-P631 – Intervention course at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

Rodriguez-Quintana, N. (2017, April). *Dissemination and Implementation Science*. Presentation in PSY-P48- Empirically Supported Treatments course at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

Rodriguez-Quintana, N. (2016, March). *Non-empirically Supported Treatments and the Dodo Bird Effect*. Presentation in PSY-P318 Foundations of Clinical Science course at the Indiana University Department of Psychological and Brain Sciences. Bloomington, IN.

STATISTICAL CONSULTING EXPERIENCE

2014 Dr. Alan Preston, M.D., University of Puerto Rico, Medial Sciences Campus

First Medical Health Plan, San Juan, Puerto Rico

Dr. David Rodriguez-Quintana, M.D., University of Puerto Rico, Medical Sciences Campus

SERVICE ACTIVITIES

2019 Mentor, Cientifico Latino

2018-2019 Clinical Science Student Representative, Department of Psychological and Brain Sciences, Indiana University-Bloomington

2014-2019 Student member, Diversity Advancement Committee, Department of Psychological and Brain Sciences, Indiana University-Bloomington

ACADEMIC AND PROFESSIONAL MEMBERSHIPS

2017-Present Association for Psychological Science, Student member

2015-2016 Anxiety and Depression Association of America (ADAA), Student member

2014-Present Association for Behavioral and Cognitive Therapies (ABCT), Student member

ABCT's Dissemination and Implementation Science Special Interest Group, Student member

2012-2013 Student Association of Epidemiology and Biostatistics
Treasurer (2012-2013)

2011-Present Psi Chi, The International Honor Society in Psychology, UPR-RP Chapter
Treasurer (2011-2012)
Sub-treasurer (2010-2011)

2011-Present American Psychological Association (APA), Student affiliate

Council on Undergraduate Research (CUR), Student member

2009-Present National Society of Collegiate Scholars (NSCS)

LANGUAGES

Fluent in reading, writing, and speaking, both English and Spanish.