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Matters of Fidelity: School Provider Adherence and Competence in a Clustered Study of Adaptive Implementation Strategies

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Abstract

Schools are a promising access point for youth with mental health concerns, but school-based mental health professionals (SPs) often need ongoing support to provide high-fidelity cognitive behavioral therapy (CBT). Adherence and competence, two critical elements of fidelity, were examined in a cluster-randomized implementation trial. We evaluated CBT adherence and then triangulated CBT adherence with end-of-study competence. We then evaluated the effects of two implementation supports, Coaching and (for slower-responding schools) Facilitation, on adherence and competence. By the end of the 43-week study period, 27.8% of SPs met adherence criteria. Adherent SPs scored higher on the competence measure, the CBT Competence Scale ($t(116.2) = 3.71, p < .001$). No significant difference in adherence was found among SPs at schools assigned to Coaching vs. not ($\chi^2 = 6.0\%, p = .385$), however SPs at schools randomized to Coaching scored significantly higher on two of the four competence subscales (Non-Behavioral and Behavioral skills). Among slower-responder schools, SPs at schools assigned to Facilitation were more likely to demonstrate adherence ($\chi^2 = 16.3\%, p = .022$), but there was no effect of Facilitation on competence. Approximately one quarter of SPs met adherence criteria in the trial; adequate delivery of exposure was a primary obstacle to reaching adherence. Facilitation may be especially suited to help SPs overcome barriers to delivery, whereas Coaching may be especially suited to help SPs improve CBT competence. Both are likely needed to build a mental health work force with the competence and ability to deliver EBPs in schools.

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Youth are currently facing a mental health crisis (Health and Human Services, 2023a). Although rates of mental illness among youth were rising prior to COVID-19 (Phillips & Yu, 2021), the pandemic accelerated the prevalence and acuity of these concerns (Bell et al., 2023; Leith et al., 2022; Meherali et al., 2021; Radomski et al., 2023). Currently, as many as one in six youth experience elevated anxiety or depressive symptoms (Phillips & Yu, 2021), which are among the most prevalent concerns for youth (Bitsko et al., 2022; Merikangas et al., 2010).

Unfortunately, access to effective mental healthcare has been a longstanding challenge for youth, and this too was exacerbated by the pandemic (Kuehn, 2022). In response to this crisis, there has been a call to identify and overcome barriers to healthcare access (Gruber et al., 2021). Schools present a promising setting for increasing youth access to mental healthcare, in that they can surmount many barriers associated with traditional outpatient care such as cost, transportation, and stigma (Hoover et al., 2019; Smith et al., 2022; Stephan et al., 2007). Indeed, most students who report accessing mental healthcare already do so in schools (Ali et al., 2019). Consistent with the potential for school-based interventions, there has been growing national interest in how to increase the capacity of school professionals to deliver effective mental healthcare (Health and Human Services, 2023b).

One treatment that has been shown to effectively address a range of youth mental health concerns is cognitive behavioral therapy (CBT; Chorpita & Weisz, 2009). More than a unitary intervention, CBT can be conceptualized as a comprehensive treatment modality comprising multiple skills, including psychoeducation, relaxation, cognitive restructuring, behavioral activation, and exposure (Benjamin et al., 2011; Chorpita et al., 2005).

Further, CBT has been shown to be effective when delivered in a range of settings, including schools, where it may be an especially appropriate treatment (Allen, 2011; Chiu et al., 2013; Werner-Seidler et al., 2021). Not only is the structured, time-limited, and skill-based approach of CBT well-fitting for the school environment, but anxious and depressed youth often show significant functional impairment in the school domain. Thus, school-delivered CBT may allow for better generalization of skills by presenting more relevant opportunities for practice (Ginsburg et al., 2008).

In line with this well-established evidence base, school-based providers frequently report delivering CBT, although very few seem to do so with fidelity (Ginsburg et al., 2019). Fidelity is an important marker of implementation, and can be defined as providing a treatment both as intended and with appropriate knowledge (Proctor et al., 2009). Fidelity typically comprises three distinct, but related elements: adherence, therapist competence, and treatment differentiation. Adherence refers to the extent to which prescribed skills are used, and conversely the extent to which proscribed skills are not. Competence describes the level of skill and knowledge in providing a given treatment. Finally, treatment differentiation delineates how treatments differ from each other on critical dimensions (Schoenwald et al., 2011). In this manuscript, given the setting and data available, we primarily address the first two elements of fidelity – adherence and competence.

Mental health professionals' fidelity to CBT is quite variable. In usual care settings, clinicians appear to spend much more time reviewing symptoms and providing psychoeducation than directive skill-building techniques (Garland et al., 2010; Whiteside et al., 2020). This can be problematic in that behavioral skills, particularly exposure and behavioral activation (as opposed to the non-behavioral skills), appear to be critical "active ingredients" that drive positive treatment effects (Bilek et al., 2022; Spates et al., 2006). Even after undergoing extensive training in CBT, clinicians deliver the skills unevenly (i.e., with low adherence), more regularly delivering relaxation than behavioral skills such as exposure and behavioral activation (Becker-Haimes et al., 2017; Whiteside et al., 2023). Further, CBT delivered with competence has been shown to predict positive clinical outcomes (Brown et al., 2013; Fauskanger Bjaastad et al., 2018), albeit with some exceptions (c.f., Southam-Gerow et al., 2021). In sum, exposure, and behavioral activation, among other components, must be delivered both consistently *and* competently to deliver CBT with fidelity; CBT must be delivered with fidelity to drive positive treatment outcomes.

Programs to promote the delivery of CBT with fidelity in schools can be difficult to initiate and then sustain across time, given strain on resources, staff turnover, and lack of ongoing training (Herlitz et al., 2020; Mufson et al., 2004). Although implementation challenges can be significant in school-based adoption of the treatment (Forman & Barakat, 2011), implementation strategies, such as technical assistance or facilitation, can be used to address them (Eiraldi et al., 2015; Hershfeldt et al., 2012). Measuring and monitoring provider fidelity is critical in determining whether implementation of a program has occurred, and where opportunities lie for improvement and further training (Carroll et al., 2007; McHugh et al., 2009). From a training perspective, it is also important to be able to anticipate the intensity and type of implementation support needed for providers to achieve sufficient fidelity. Research has demonstrated that different implementation strategies have varying impacts on provider fidelity (Sanetti & Collier-Meek, 2015). For example, the provision of consultation has been linked to higher fidelity (Beidas, Edmunds, et al., 2012). Thus, understanding provider fidelity in relation to specific implementation strategies can inform effective and efficient methods for increasing competent delivery of evidence-based practices, such as CBT.

Context of ASIC trial

The Adaptive School-based Implementation of CBT (ASIC) study used a clustered, sequential, multiple-assignment randomized trial (SMART) design (Kilbourne et al., 2018; NeCamp et al., 2017) to compare the effectiveness of four sequences of implementation support, combining three different implementation strategies, on school mental health providers' (SPs') delivery of CBT. The primary aim analyses of ASIC (Smith et al., 2022) compared the effectiveness of the least intensive versus the most intensive sequences of support (see Methods below for definitions of support and strategies entailed) on the number of CBT sessions SPs reported delivering; no significant difference was found between them. Rather, an adaptive implementation strategy of intermediate intensity resulted in the highest average number of CBT sessions delivered by SPs (Smith et al., 2022).

Although frequency of CBT delivery is a key implementation outcome, understanding whether CBT was delivered by SPs as intended (i.e., *with adherence*) and with appropriate knowledge and skills (i.e., *with competence*) is a critical next step to determine how best to scale up delivery of CBT in schools to ensure optimal clinical outcomes. This is especially true given apparent differences among both the efficacy and frequency of delivery of various CBT components, with behavioral components being the most effective, yet least frequently delivered (Becker-Haimes et al., 2017; Garland et al., 2010; Spates et al., 2006; Whiteside et al., 2020).

In addition, using this trial to evaluate the effects of different implementation strategies on SP CBT fidelity, including both adherence and competence, can provide guidance as to which types of implementation strategies are most likely to increase provider fidelity to EBPs. Different or more intensive implementation supports may be needed to support clinicians' delivery of the full range of skills, inclusive of both behavioral and non-behavioral skills, and to do so in a competent way.

Terminology

A brief note on terminology: In this manuscript, we differentiate between *adherence* and *competence* when describing our operationalizations of the specific elements of fidelity. We use the term *fidelity* to describe the broader umbrella concept, inclusive of adherence, therapist competence and treatment differentiation.

Study aims

The current paper evaluates SP fidelity within the ASIC trial by examining (1) in aim 1, adherence to prescribed CBT component delivery, (2) in aim 2, associations between adherence and CBT competence, and (3) in aim 3, whether treatment adherence and competence varied across implementation strategies – Coaching and Facilitation (for slower-responder schools only) – randomized in the study.

Method

All study procedures were approved by Michigan Medicine's Institutional Review Board (HUM # 00132239). All SPs provided informed consent to participate in the study.

Study design & randomization procedures

The full study protocol for ASIC has been published elsewhere (Kilbourne et al., 2018; Smith et al., 2022). As noted, the primary aim of ASIC was to compare the effectiveness of four sequences of implementation support, comprising three implementation strategies, to increase SPs' delivery of CBT. Implementation support was provided by TRAILS (Transforming Research into Action to Improve the Lives of Students), a school-based mental health implementation program. Implementation strategies included: Replicating Effective Programs (REP) which all schools received and included training, access to intervention materials, and technical assistance (Kilbourne et al., 2007); Coaching, which involved live modeling and coaching in CBT use in the context of co-led CBT skills

groups (Beidas, Mychailyszyn, et al., 2012; Koschmann et al., 2019), and Facilitation, which provided one-to-one consultation focused on overcoming administrative and logistical barriers to CBT delivery (Kilbourne et al., 2014; Smith et al., 2019). See Table 1 for a comparison of Coaching and Facilitation (Figure 1).

Study timeline

All schools began receiving REP in October 2018 (pre-randomization run-in phase). In January 2019, SPs attended a one-day training, as part of REP. Two weeks following the training, schools (within which SPs were clustered) were randomized to either continue REP or add Coaching (REP + Coaching) (Phase 1). In April 2019, after eight further weeks, schools where SPs had either (1) reported multiple organizational barriers to CBT delivery or (2) were not demonstrating sufficient implementation of the skills were designated as “slower-responders.” These schools were re-randomized to either continue their existing implementation support (REP; REP + Coaching), or to further add Facilitation to existing support (REP + Facilitation; REP + Coaching + Facilitation). “Faster-responder” schools continued with their previously assigned implementation strategies (REP or REP + Coaching) (Phase 2a and 2b). At the end of December 2019, Coaching and Facilitation support were discontinued (Phase 3); data collection continued until Spring of 2020.

In summary, this study design included two points of randomization: After the training, in Phase 1, all schools were randomized to add Coaching or not; eight weeks later, in Phase 2, slower-responding schools were re-randomized to add Facilitation to their current support or not.

School and SP eligibility

As noted in Smith et al. (2022), eligible schools met the following criteria: served high school students, had not previously participated in a school-based CBT implementation initiative, were located within geographic range of a trained coach, reported sufficient space resources and allowed for mental health support services on site, and had at least one SP willing to participate. Eligible SPs met the following criteria: employed at an eligible Michigan high school, had a background in a field like clinical school social work, counseling, or psychology, were able to meet regularly with students to deliver mental health support services outside of the general classroom environment, and participated in the one-day study didactic training in CBT.

Manualized component delivery

TRAILS’ manual for CBT delivery includes six CBT components¹ and specifies the number of sessions to be dedicated to each component as part of a standard delivery of a course of CBT (10 sessions over approximately 10 weeks). At a one-day training, SPs were trained in each component and given access to session agendas and materials. The manual includes delivery of the following CBT skills across the 10 sessions: psychoeducation on CBT (one session), psychoeducation about mental health (one session), relaxation (one session),

¹A revised version of this manual is available on the TRAILS website: <https://trailstowellness.org/materials/cbt-and-mindfulness/manuals/9-12/depression-and-anxiety/session-1>

cognitive coping (two sessions), behavioral activation (one session) and exposure (two sessions). The remaining two sessions in the manual were dedicated to group orientation and rapport building (session one) and relapse prevention and wrap up (session 10). A description of the six primary components is included in Table 2.

Defining adherence

Based on the study manual (10-session manual, with eight sessions dedicated to CBT skills), and the time frame of study data collection (43 weeks), we defined adherence to CBT protocols as delivering the equivalent of two courses of the manualized CBT components over the course of two semesters (i.e., one group per semester in Spring 2019 and Fall 2019). Note that this definition was defined retrospectively. Although SPs were expected to continue delivering and reporting CBT into Spring 2020, our definition does not require additional CBT delivery due to the start of the COVID-19 pandemic and the statewide closure of brick-and-mortar schools across Michigan in March of 2020. Therefore, we define adherence in this study as SPs reporting CBT component use consistent with delivering *at least* two complete skills groups, as intended by the treatment manual.

Thus, to meet our adherence criterion (conceptualized here as a binary outcome), an SP would report by the study end at least 16 weeks of CBT, decomposed with the following minimal frequency: two weeks' delivery of psychoeducation on CBT, two weeks of psychoeducation on mental health, two weeks of relaxation, four weeks of cognitive coping, two weeks of behavioral activation, and four weeks of exposure. Additional sessions related to group orientation and termination of treatment were not documented. Importantly, the modality (individual, group, or a combination) in which the components were delivered could vary. No certain order of delivery of components was required to meet the adherence criteria, although the order was specified in the manual.

Data sources and measures

CBT component delivery (adherence)—SPs self-reported on their CBT delivery weekly. Specifically, each week they indicated the overall number of CBT sessions delivered, delivery of each CBT component (*yes* or *no*) and whether they delivered the component in either a group or individual modality (Smith et al., 2022). For each CBT component and each modality, we computed the total number of weeks SPs reported delivery by the study end. Note that SPs (1) reported on whether or not they delivered components in a given week, and not how many sessions of each component they delivered, and (2) reported separately on group and individual component delivery. Thus, SPs could be coded as having two weeks of delivery of a single component in a one-week span if they reported both individual and group delivery for that component. On the other hand, if SPs had delivered a component twice in one week using the same modality (either group or individual), they would be coded as having only one week of delivery of that component, which may contribute to a conservative estimate of adherence.

The current analyses used data collected weekly from SPs across a period of 43 largely consecutive weeks, exempting school holidays and summer break, beginning in January

2019. We assumed an absence of report of component delivery reflected its true absence. No imputation was used for these data.

CBT competence scale (CCS; competence)—The CCS (Rodriguez-Quintana et al., 2021) is a psychometrically-validated scale to assess providers' competence in CBT delivery with youth. The CCS comprises four subscales: Non-Behavioral skills, Behavioral skills, Perceptions, and Knowledge. Each of the four subscales and the total score has a possible range from zero to four. Higher total scores indicate overall CBT competence. Higher scores on the Behavioral and Non-Behavioral subscales indicate greater expertise and use of CBT skills in practice. Higher scores on the Perceptions subscale reflect stronger beliefs that implementing CBT will result in better outcomes. Higher scores on the Knowledge subscale suggest greater knowledge about appropriate application of CBT components. Full descriptions and example items of the subscales are included in Table 3. SPs completed the CCS prior to CBT training (pre-randomization) and quarterly throughout the study. These analyses used CCS scores collected at the final time point (April to May, 2020) to capture SPs' CBT competence after receiving the maximal amount of training and implementation. Given the relatively low survey completion rate (53.3%) due to COVID-19 and subsequent school building closures, the primary analyses were conducted with multiply-imputed data. Forty imputed datasets for CCS scores were generated, and the statistical tests involving CCS scores followed standard rules for combining the results across the imputed datasets (Rubin, 1987). Identical analyses were also conducted with incomplete (raw) data.

Statistical methods

For the first aim of evaluating adherence to prescribed CBT component delivery, univariate analysis was used to describe the proportion of SPs (irrespective of school or implementation support) who delivered CBT adherence, as defined above. We also explored SPs' delivery of each individual CBT component to better understand the extent to which SPs were delivering each component at the expected frequency and prominent barriers to achieving adherence.

For the second aim of examining associations between adherence and CBT competence, we cross-validated SP adherence with CBT competence, which was operationalized as SP scores on the self-report measure of CBT competence, the CCS. We used *t*-tests to examine whether SPs who were adherent scored higher on the total and each subscale score of the CCS.

For the third aim, we examined whether our measure of (1) adherence (the proportion of SPs who delivered CBT with adherence) and (2) competence (CCS total score and subscores) varied by randomization to Coaching (for all schools) or Facilitation (for slower-responder schools only). Specifically, we examined the main effect of Coaching on the proportion of SPs who delivered CBT with adherence and CCS scores, and (for SPs at slower-responder schools only) and the main effect of Facilitation on these same two outcomes. Chi-squared tests and *t*-tests were used to examine if either type of implementation support was associated with adherence and competence. All analyses were tested at the significance level of $\alpha = .05$. For clinical interpretation, we reported risk differences for the main

effects of implementation support on adherence rate. We calculated effect sizes for the main effects on competence as the difference divided by standard deviation of CCS scores. Effect sizes can be interpreted using the following thresholds: 0.2 as small; 0.5 as moderate; 0.8 as large (Cohen, 1988).

Results

Sample

The sample for this study consists of the 169 school professionals (SPs) at 94 schools that were randomized as part of the ASIC study. Among the 94 participating schools, slightly more than half (56%) were rural, with a mean school size of 869 students ($SD = 600$). On average, 44% of students at these schools qualified for free or reduced lunch. Among the 94 schools, 38 schools (40.4%) had one participating SP, 37 schools (39.4%) had two participating SPs, and 19 schools (20.2%) had three participating SPs. SPs reported being in their current position for a mean of 8.0 years ($SD = 7.7$). The majority of SPs (59.2%) reported being in a school counselor role, whereas approximately one quarter (23.1%) were school social workers. The remaining 17.8% reported being in another role (e.g., psychologist, behavioral intervention specialist, teacher). Nearly all SPs reported holding a master's degree ($n = 153, 90.5%$). When surveyed at baseline, 37% of SPs reported no previous CBT training, 26% reported informal exposure to CBT (e.g., through professional development), and 34% reported some formal training in CBT (e.g., graduate courses). The reader is encouraged to refer to previously-published detailed descriptive statistics for both randomized schools and SPs (Smith et al., 2022).

Proportion of SPs reaching adherence

Just over one quarter (27.8%; $n = 47$) of SPs demonstrated treatment adherence – that is, they reported delivery of CBT skills consistent with delivering at least two courses of the treatment manual over the study period. Considering the delivery of individual CBT components, approximately three quarters of SPs delivered an adequate number of weeks of each of the following: psychoeducation about CBT (80.5%; $n = 136$), psychoeducation about mental health (72.2%; $n = 122$), and relaxation (76.9%; $n = 130$). A somewhat smaller proportion of SPs reported an adequate number of weeks of cognitive coping (62.1%; $n = 105$) and behavioral activation (58.6%; $n = 99$). Far fewer reported delivering an adequate number of weeks of exposure (30.8%; $n = 52$) (Figure 2). Conversely, nearly one-third of SPs reported *never* using behavioral activation (29.0%) or exposure (33.1%) during the study period. See Appendix A for the proportion of SPs who reported never delivering each component.

Association between CBT adherence & competence

Next, we examined whether SPs who delivered CBT with adherence also exhibited higher levels of competence, as measured by CCS total and subscale scores. The mean CCS total scores were significantly higher among SPs who demonstrated adherence compared to those who did not (2.96 vs. 2.71 out of a maximum score of 4; $d = 0.25, t = 3.71, p < .001$). SPs who demonstrated adherence also scored significantly higher on two of the four CCS subscales: Non-Behavioral skills (2.85 vs 2.55; $d = 0.30; t = 2.86, p = .005$) and Behavioral

skills (2.11 vs 1.70; $d = 0.42$; $t = 3.03$, $p = .003$). CBT Perceptions and Knowledge subscale scores did not significantly vary by adherence status (see Table 4). Analyses using the incomplete, raw CCS data revealed similar findings; see Appendix C, Table C.1.

Impacts of implementation strategies on adherence

We next examined if SPs were more likely to reach CBT adherence when their schools were randomized to receive one of the more intensive implementation strategies – Coaching (for all SPs) or Facilitation (for SPs at slower-responder schools only).

SPs at schools randomized to Coaching had somewhat higher rates of adherence than those at no-Coaching schools (30.7% [$n = 27$ of 88 SPs with Coaching] vs. 24.7% [$n = 20$ of 81 SPs with no-Coaching]). However, this difference was not statistically significant ($X^2(1, N = 169) = 0.75$, $p = .385$). The risk difference was 6%, which showed that schools assigned to Coaching had 6 more SPs per 100 SPs reach adherence compared to schools assigned to no-Coaching.

Among SPs at slower-responder schools, three SPs had already achieved the adherence threshold prior to the second randomization. As Facilitation could not affect their meeting of adherence, we omitted these three SPs from this analysis only. SPs in schools randomized to receive Facilitation were significantly more likely to meet the adherence threshold (34.3% [$n = 25$ of 73 SPs assigned to Facilitation]) than their counterparts (18.0% [$n = 14$ of 78 SPs assigned to no Facilitation]; $X^2(1, N = 151) = 5.23$, $p = .022$). The risk difference was 16%, which showed that among slower-responder schools, those assigned to Facilitation had 16 more SPs per 100 SPs reach adherence than slower-responder schools not assigned to Facilitation.

Impacts of implementation support on competence

We also examined the main effect of implementation support on SPs' CBT competence. We first confirmed that the CCS scores were balanced prior to each of two randomizations: CCS total and subscale scores at baseline were not significantly different between SPs assigned to Coaching vs. not ($t(159.1) = -0.29$, $p = .773$). Similarly, CCS scores immediately prior to the second randomization were not significantly different among SPs at slower responder schools assigned to Facilitation vs. not ($t(116.1) = -0.24$, $p = .812$).

End-of-study CCS total scores were not significantly higher among SPs in schools randomized to Coaching, compared to SPs in schools not randomized to Coaching (2.84 vs. 2.72; $d = 0.13$, $t = 1.82$, $p = .073$, effect size (ES) = 0.34). When considering specific subscales, SPs at schools randomized to Coaching did score significantly higher for the Non-Behavioral ($d = 0.24$, $t = 2.09$, $p = .041$, ES = 0.43) and Behavioral ($d = 0.29$, $t = 2.02$, $p = .047$, ES = 0.39) skills subscales, but not on Perceptions or Knowledge subscales (see Table 5). Among slower-responder schools, neither CCS total nor subscale scores differed significantly for SPs in schools randomized to receive Facilitation vs. not (total score: 2.81 vs. 2.77; $d = 0.03$; $t = 0.48$, $p = .630$, ES = 0.09; See Appendix B for subscales). Analyses using the incomplete, raw data were similar, with the exception that CCS total score was higher among SPs at schools assigned to Coaching than their counterparts; all other results and statistical tests were consistent (see Appendix C, Tables C.2 and C.3).

Discussion

In this paper, we evaluated the fidelity – inclusive of both adherence and competence – of SPs participating in a cluster-randomized trial to optimize sequences of implementation support. We first presented descriptive statistics on the proportion of SPs who met adherence to the manualized CBT model. We found that just over one quarter of the SPs met the adherence criteria. Exposure was the component with the lowest proportion of adequate delivery. Second, we evaluated whether adherence was associated with competence, measured using the CBT Competence Scale (CCS). SPs who demonstrated adherence also scored higher on CCS total score, as well as the Non-Behavioral and Behavioral skills subscale scores. Finally, we examined whether randomized assignment to specific, intensive, implementation supports – Coaching, which all schools could be randomized to receive, and Facilitation, which was offered later only to slower-responding schools – were associated with higher rates of SP adherence and competence. At schools randomized to receive Coaching (versus not), we found no significant difference in the proportion of SPs demonstrating adherence. However, SPs at slower-responding schools randomized to add Facilitation were significantly more likely to demonstrate adherence. In a somewhat different pattern, SPs at schools assigned to Coaching scored significantly higher on the Behavioral and Non-Behavioral CCS subscales (but not on total score), whereas no differences in CCS total or subscales were found among SPs at slower-responding schools randomized to receive Facilitation vs. not.

Adherence and its component parts

We defined adherence in this study as consisting of delivering the following CBT components for a minimum number of weeks: Psychoeducation about CBT (two weeks), Psychoeducation about Mental Health (two weeks), Relaxation (two weeks), Cognitive Coping (four weeks), Behavioral Activation (two weeks), and Exposure (four weeks). The required weeks of delivery was determined by the equivalent of two courses of the manualized treatment.

Just over one quarter of the sample (27.8%) met this study-specific threshold for adherence. Notably, the delivery of exposure four times during the study duration was the biggest barrier to SP adherence; without the requirement for exposure, nearly half (46.8%) of SPs would have met adherence criteria. Although exposure is often a more challenging skill for SPs, this difficulty may also be partially explained by exposure being the last in the sequence of manualized skills – however, this seems unlikely to account completely for the low delivery rates. Note, for example, that this pattern is consistent with other studies showing low rates of implementing exposure and other directive skills in the community setting, even after extensive training of providers in the community. In a study of community mental health clinicians who participated in city-wide EBP initiatives, Becker-Haimes et al. (2017) reported that only 37% of clinicians reported routine exposure use in a subsample of anxious clients; conversely, 41% of clinicians reported *never* using exposure with their anxious clients. In our sample, 30.1% of SPs provided an adequate number of weeks of exposure; on the other hand, 33.1% of SPs did *not* report ever delivering a single session of exposure across the 43-week study period. In a different study of community clinicians,

clinicians reported concerns about exposure that related to practicality of implementing the skill, and negative beliefs about patients' and their own ability to tolerate distress (Pittig et al., 2019). Other CBT components are much more likely to be implemented. For example, in the aforementioned study, 74.1% of community mental health clinicians reported using relaxation routinely with their clients (Becker-Haimes et al., 2017). Comparably, in our sample, 76.9% of SPs delivered an adequate number of weeks of relaxation.

As suggested in our data and other literature, exposure is a component that SPs, and indeed community clinicians more widely, may find challenging to deliver, even with significant implementation supports. This study was well-poised to consider which implementation supports could increase delivery of exposure specifically. Therefore, as a supplemental, exploratory, analysis, we evaluated the effect of Coaching and Facilitation on delivery of exposure. We found that the assignment of schools to Coaching did not significantly impact SP rates of adequate delivery (four weeks) of exposure ($p = .758$) by study end. However, SPs at slower-responder schools assigned to Facilitation were significantly more likely to deliver an adequate number of weeks of exposure ($p = .026$). These results suggest that Facilitation, which showed positive effects on adherence overall, also specifically improved delivery of the exposure component. This is an important outcome, given that exposure is thought to be one of the active ingredients driving positive clinical outcomes (Bilek et al., 2022; Spates et al., 2006). If this result is replicated, Facilitation may be a helpful implementation strategy to specifically target delivery of exposure in future studies.

Examining links between adherence and competence

Although we evaluated adherence (one element of fidelity) as a binary outcome due to having an *a priori* expectation of minimum CBT delivery, we did not have similar expectations for the measure of competence. The CCS had been previously validated among an SP sample (which included but did not completely overlap with SPs enrolled in ASIC; Rodriguez-Quintana et al., 2021). In that study, initial pre-training means for total and subscale scores were established. The present study is the first to examine post-training CCS scores, and to compare post-implementation scores across SPs delivering CBT with adherence versus non-adherence. We found that SPs in this study who demonstrated adherence had higher post-study scores on the CCS total score and on two of the subscales (Behavioral and Non-Behavioral skills). This analysis provides a helpful triangulation for our measure of adherence as an element of fidelity.

The non-significant differences, in any comparison, for the other two subscales of the CCS – Knowledge and Perceptions – is somewhat surprising. Original validation of the CCS suggested a potential ceiling effect for the Perceptions subscale (Rodriguez-Quintana et al., 2021), which could provide a partial explanation. This ceiling effect is likely to be more profound among a study population of SPs that signed up to participate in a trial to implement CBT, and thus likely already had strongly positive perceptions of CBT. An additional factor to consider is that all SPs received a one-day training in CBT, which may have been enough to reduce variance across group comparisons on both the Perceptions and Knowledge subscales. Further investigation may be needed to understand why neither

adherence nor implementation strategies was associated with any positive changes on Knowledge subscale scores.

The analyses comparing CCS scores among SPs who did and did not reach adherence, can begin to provide indicators of competence on the CCS for SPs who may also show high adherence. In our sample, SPs who met adherence criteria had mean CCS scores as follows: Total Score = 2.96; Behavioral skills score = 2.12; Non-Behavioral skills score = 2.85. With further validation, these scores could be considered as CCS cut-points suggestive of post-training CBT competence. However, we were not able to determine parallel cut points for the Knowledge or Perceptions scales with the current sample because we did not find any significant differences in these subscales among SPs who did and did not show adherence. Given limited research and use outside of our own research group, the CCS is likely not ready to be a stand-alone indicator of SP fidelity, but significant differences on the total score and two subscales can support diagnostic evaluation of SPs who may need additional support.

Impacts of coaching and facilitation implementation strategies on adherence and competence

We also considered whether receipt of implementation support was associated with end-of-study SP adherence and competence, with end-of-study CCS scores considered a parallel to the end-of-study measures of adherence. Facilitation, which was offered to slower-responder schools only, consists of personalized consultation and strategic planning with a Facilitator who is also an expert in the intervention being delivered (e.g., CBT). In ASIC, Facilitation was designed to focus on overcoming administrative and logistical barriers to CBT delivery and was offered later in the study (in Phase 2) only to the schools that seemed to be experiencing organizational barriers to initial adoption or maintenance. As such, Facilitation was not hypothesized to impact fidelity or quality of CBT delivery (e.g., by directly targeting SP deficiencies in CBT skills), but was hypothesized to improve total CBT delivery. As noted above, the primary outcomes findings of the ASIC study (Smith et al., 2022) found that the adaptive sequence of implementation support that provided REP in Phase 1 and then added Facilitation in Phase 2 only for slower-responder schools resulted in the most CBT delivery, on average. Analyses here also found that SPs at slower-responder schools that were assigned to Facilitation were significantly more likely to achieve adherence (but did not necessarily see larger increases in competence). However, the key role of number of sessions as a key component of our definition of adherence (but not competence) may explain this disparity – it seems reasonable to think that as SPs were able to deliver more CBT sessions, they also became more likely to deliver later, more challenging components, like exposure. The supplemental, exploratory results presented earlier in the discussion section showing that among slower-responder schools, Facilitation also increased use of exposure, seem to suggest this mechanism. Given that primary outcomes analyses did not consider component delivery, it is thus somewhat edifying to see that SPs at slower-responder schools that received Facilitation also delivered a modicum of active ingredient components (particularly as Facilitation was not designed or hypothesized to directly impact SP CBT skill). Concerns remain, however, about SP competence given the lack of impact of Facilitation on competence measures. To ensure full effectiveness of CBT,

Facilitation might need to be coupled with other implementation strategies that focus more specifically on improving competence.

The patterns were different for Coaching compared to Facilitation. Coaching, in this study, consisted of live modeling and coaching in CBT use in the context of co-led CBT skills groups, and was hypothesized to impact SP CBT delivery via improved CBT competence and self-efficacy. Our findings show that Coaching was associated with higher competence, with SPs at schools randomized to Coaching having higher end-of-study CCS scores than SPs at schools that were not randomized to receive Coaching. Although differences in total CCS scores were not significant, Non-Behavioral and Behavioral subscale scores were significantly higher under Coaching. This suggests that Coaching may be especially suited to help SPs gain CBT expertise and self-efficacy. As shown in the primary aims paper (Smith et al., 2022), however, Coaching did not improve the frequency of self-reported CBT delivery, which may explain the lack of a significant effect on the proportion of SPs that met adherence in the study.

Strengths and limitations

This paper leveraged unique data produced from a cluster-randomized optimization study of SPs at 94 high schools that was designed to compare four different sequences of implementation support on SP delivery of CBT. This paper provides an important complement to our primary aims analyses which compared these sequences of implementation support on the total CBT delivery reported without regard for component delivery (Smith et al., 2022). Although this paper does not use the same analytic strategy as the primary ASIC analyses, it uses data collected by the study to (1) examine two key components of fidelity, adherence and competence, pragmatically as measured by this study involving SPs at 94 diverse schools and in a context where “gold-standard” fidelity measurement was not feasible; and (2) compare the effects of two implementation strategies, Coaching and Facilitation (among slower-responders), on adherence and competence as critical elements of fidelity.

Despite the strengths of the paper, some limitations persist. First, data are limited in granularity, which impacted how we were able to define and examine adherence. Specifically, we relied on provider self-reports of both adherence and competence, rather than independent evaluations of adherence or competence, which we acknowledge as non-optimal. Additionally, to minimize SP data collection burden, ASIC only asked SPs to report weekly on whether they delivered each component or not, and not during how many sessions they delivered each component. As such, it is possible that substantial variation exists in component delivery even among SPs who reported component delivery for the same number of weeks. For example, if an SP delivered cognitive coping in six individual sessions across three weeks, we would only receive documentation of three weeks of cognitive coping. As a result, this definition of adherence is likely biased toward SPs who reported delivering CBT content across both individual and group modalities, and it likely undercounts SPs who may have delivered content multiple times using the same modality within a week. Nonetheless, it appears that our definition of adherence is bolstered by the finding that CCS scores were

higher among SPs who met adherence criteria. This suggests that measuring and evaluating multiple elements of fidelity is a valuable enterprise.

Third, the final phase of the study was interrupted by the global COVID-19 pandemic and statewide closures of in-person school in Michigan. These closures also impacted final wave data collection – only 53.3% of SPs completed the final wave survey and CCS. We assumed that this attrition was largely at-random, so we used imputation to reduce missingness. We replicated all analyses with our raw (incomplete) data (Appendix C). These analyses were largely consistent. Third, we have not yet analyzed the fidelity of implementers to the implementation strategies (Coaching and Facilitation), which has been identified as an important and yet challenging process in trials comparing types of implementation supports (Akiba et al., 2022). We also have yet to examine the role of SP engagement with the implementation strategies as a key mediator. These are likely to be more central concerns for Coaching, as Facilitation was provided for all assigned schools by one central, study team-employed Facilitator for whom fidelity to the Facilitation model was assessed throughout the study. Coaching, alternatively, was provided by members of the community who were each assigned no more than two schools to provide Coaching. As such, there is likely to be important variation in the extent to which these Coaches executed the planned Coaching model of support. Fourth, we do not use a measure of adherence that can be directly compared with other research or implementation studies. However, as established by fidelity scholars (McLeod et al., 2023), it is very common for treatment adherence to be established on a study-by-study basis. A final limitation to note is that the study design does not allow us to make direct comparisons between Coaching and Facilitation, as each strategy was implemented for different periods of time. Additionally, different populations of schools were eligible to receive them. This study does allow us to understand how the strategies impacted fidelity for the populations eligible to receive them.

In summary, we have defined and presented rates of adherence in our study. These are useful markers to be able to compare other similar implementation studies. Second, we showed in our measure of adherence that it was both sensitive to the delivery of exposure, which is historically a difficult component for mental health providers to deliver consistently. We also showed that SPs who achieved adherence also showed higher competence, as measured by the written competence measure, the CCS. Finally, we provide valuable information demonstrating complementary influences of Facilitation on adherence and Coaching on competence. These results can be used to inform the development of future implementation support for mental health providers in schools. Both Facilitation and Coaching may be vital to build a mental health work force with the competence and ability to deliver EBPs in schools.

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Appendix A: SP CBT Fidelity by Component

Table A.1

Proportion of SPs Who Never Delivered Each Component By End-of-Study

Component	N (%)
Psychoeducation-CBT	25 (14.79%)
Psychoeducation-Mental Health	31 (18.34%)
Relaxation	27 (15.98%)
Cognitive Coping	33 (19.53%)
Behavioral Activation	49 (28.99%)
Exposure	56 (33.14%)

Note. Sample size, $N = 169$

Appendix B: Main Effect of Facilitation on Competence

Table B.1

End-of-Study CCS Scores by Facilitation Assignment, Among Slower-Responder Schools

	Total CCS Score	Non-Behavioral Skills	Behavioral Skills	Perceptions	Knowledge
Not Assigned to Facilitation	2.77	2.58	1.80	3.58	3.14
Assigned to Facilitation	2.81	2.70	1.84	3.60	3.07
t-test	$t(93.2)=0.48$	$t(83.1)=1.22$	$t(55.0)=0.25$	$t(55.4)=0.21$	$t(53.8)=-0.42$
Effect size	0.09	0.24	0.06	0.05	-0.09

Note. The scores range from 0 (low competence) to 4 (high competence). School-level randomization. None of the differences was statistically significant at $\alpha = 0.05$.

Appendix C: Analyses using incomplete (raw) data

Table C.1

End-of-study Differences in CCS Scores between Adherent and Non-Adherent SPs

	Total CCS Score	Non-Behavioral Skills	Behavioral Skills	Perceptions	Knowledge
Adherent	2.98	2.84	2.11	3.65	3.32
Non-Adherent	2.71	2.50	1.54	3.68	3.08
t-test	$t(88)=3.67^{***}$	$t(83)=3.13^{**}$	$t(88)=4.38^{***}$	$t(88)=-0.27$	$t(87)=1.73$

Note. The scores range from 0 (low competence) to 4 (high competence). Incomplete, raw data were used. School-level randomization.

p < .001.

**

p < .01.

*

p < .05.

Table C.2

End-of-Study CCS Scores by Coaching Assignment

	Total CCS Score	Non-behavioral skills	Behavioral skills	Perceptions	Knowledge
Not Assigned to Coaching	2.74	2.53	1.65	3.65	3.14
Assigned to Coaching	2.92	2.77	1.95	3.68	3.23
t-test	$t(88)=2.26^*$	$t(83)=2.17^*$	$t(88)=2.11^*$	$t(88)=0.27$	$t(87)=0.68$
Effect Sizes	0.47	0.46	0.44	0.06	0.14

Note. The scores range from 0 (low competence) to 4 (high competence). Incomplete, raw data were used. School-level randomization.

p < .001.

**

p < .01.

*

p < .05.

Table C.3

End of study CCS Scores by Facilitation Assignment, Among Slower-Responder Schools

	Total CCS Score	Non-behavioral skills	Behavioral skills	Perceptions	Knowledge
Not Assigned to Facilitation	2.82	2.57	1.75	3.67	3.22
Assigned to Facilitation	2.86	2.74	1.87	3.67	3.16
t-test	$t(82)=0.51$	$t(77)=1.37$	$t(82)=0.82$	$t(82)=-0.003$	$t(82)=-0.40$
Effect Sizes	0.11	0.31	0.18	-.001	-.009

Note. The scores range from 0 (low competence) to 4 (high competence). Incomplete, raw data were used. School-level randomization.

None of the differences was statistically significant at $\alpha = 0.05$.

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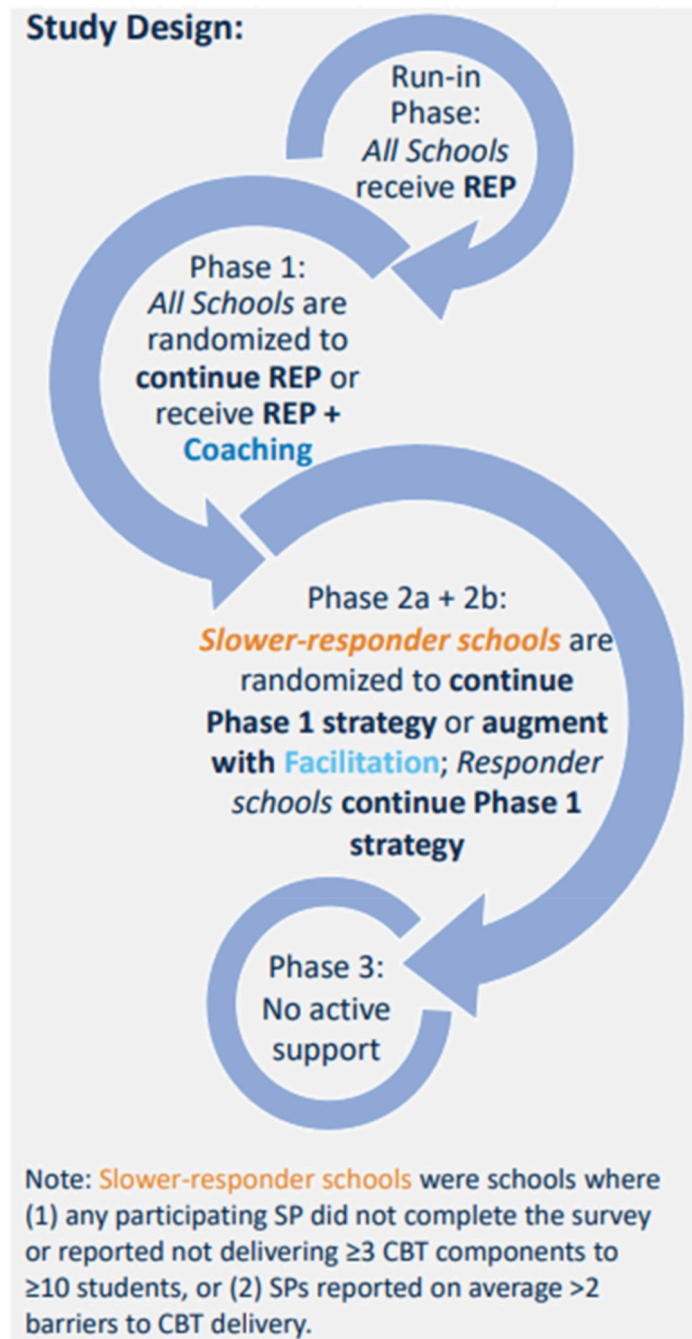


Figure 1.
Study design.

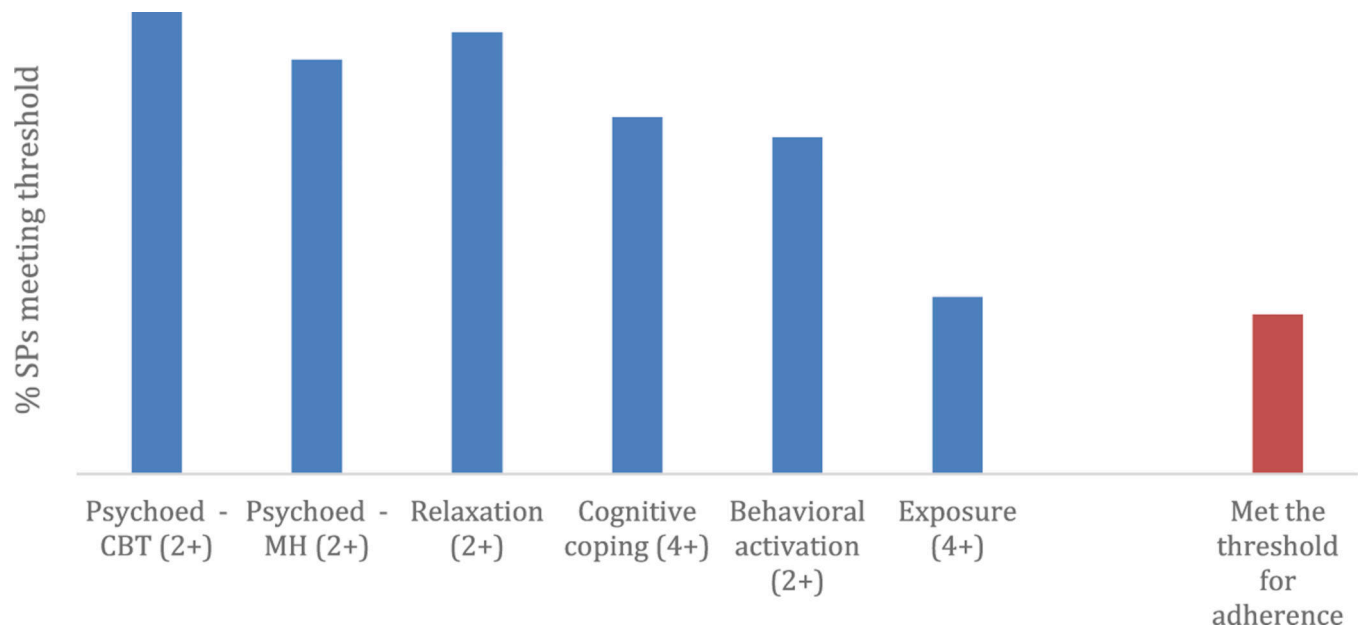


Figure 2.

Percentage of SPs who met adherence threshold for delivery of CBT components. $N = 169$. Psychoed-CBT = Psychoeducation about cognitive behavioral therapy; Psychoed-MH = Psychoeducation about mental health. An adequate number of weeks for delivery of each component was: Two weeks of Psychoeducation about CBT, Two weeks of Psychoeducation about Mental Health, Two Weeks of Relaxation, Four Weeks of Cognitive Coping, Two Weeks of Behavioral Activation, and Four Weeks of Exposure.

Table 1.

Description of implementation supports: coaching and facilitation.

	Implementation Support	Coaching	Facilitation
Theoretical Model	Based on PBIS model of coaching (Hershfeldt et al., 2012)	Based on the i-PARIHS framework (Harvey & Kitson, 2016; Kilbourne et al., 2013)	
Purpose	Designed to increase SP competency in delivery of CBT skills	Designed to help SPs overcome organizational barriers to delivery of CBT skills	
Training	Coaches were trained via a one-day didactic training and 15 additional weeks of 1:1 consultation with TRAILS staff	Facilitator was trained in Facilitation through the Quality Enhancement Research Initiative for Team-based Behavioral Health (Kirchner, n.d.)	
Type of Support	Coaches attended SP-delivered CBT student group sessions	Facilitator provided phone call support in overcoming barriers using a five-step process (Smith et al., 2022; Table 1)	

Table 2.

Description of CBT components in skills manual.

CBT component (<i>n</i> = number of sessions)	Description
Psychoeducation on CBT (<i>n</i> = 1)	An introduction to the CBT model; supports students in distinguishing between thoughts, feelings, and behaviors.
Psychoeducation about mental health (<i>n</i> = 1)	Information on common symptoms of anxiety and depression with intention of normalizing thoughts, feelings, and behaviors consistent with anxiety and depression.
Relaxation (<i>n</i> = 1)	Teaches students about rationale for relaxation skills. Introduces a variety of techniques including progressive muscle relaxation, deep breathing, and guided imagery.
Cognitive coping (<i>n</i> = 2)	Introduces cognitive restructuring to students, supports students in identifying cognitive distortions; students learn to challenge their thoughts
Behavioral activation (<i>n</i> = 1)	Introduces the cycle of inactivity to students; Encourages physical activity to improve mood
Exposure (<i>n</i> = 2)	Teaches the cycle of avoidance; Supports students in building/executing a fear hierarchy

Table 3.

Description of CCS subscales.

Subscale	Description of Contents	Sample Question(s)
Non-Behavioral 10 items	Self-perceived expertise and frequency of use of the following components: - Psychoeducation - Relaxation - Cognitive Coping	Please indicate how often you use each strategy listed when working with students with depression and/or anxiety: • Teaching students to notice and measure their thoughts, emotions, and behavior in the context of a given situation Please indicate your level of expertise for each strategy listed: • Teaching students to challenge their unhelpful or illogical automatic thoughts
Behavioral 8 items	Self-perceived expertise and frequency of use of the following components: - Exposure - Behavioral - Activation	Please indicate how often you use each strategy listed when working with students with depression and/or anxiety: • Creating and using a Behavioral Activation Schedule Please indicate your level of expertise for each strategy listed: • Providing a definition and rationale for exposure
Perceptions 6 items	Assesses SP perceptions of CBT utility for their local settings	• CBT is appropriate for students of a wide variety of ethnicities, cultures, and socio-economic backgrounds. • CBT, if used appropriately, will improve the average clinical outcomes of most students
Knowledge 8 items	Presents sample vignettes and asks about appropriate application of CBT skills to address symptoms	<i>Damien is a 14 year old boy with social anxiety. He has trouble speaking up in class and has stayed home sick for his last 3 class presentations. Please answer the following questions about Damien.</i> One exposure that you might have Damien do would be: (a) Practice his next presentation until he feels confident (b) Have him practice relaxation right before his next presentation (c) Teach him about the cycle of avoidance (d) Ask him to raise his hand in class

Table 4.

End-of-study differences in CCS scores between adherent and non-adherent SPs.

	Total CCS Score	Non-Behavioral Skills	Behavioral Skills	Perceptions	Knowledge
Adherent SPs	2.96	2.85	2.11	3.64	3.25
Non-Adherent SPs	2.71	2.55	1.70	3.56	3.04
t-test	$t(116.2) = 3.71$ ***	$t(114.4) = 2.86$ **	$t(108.9) = 3.03$ **	$t(95.5) = 0.75$	$t(91.2) = 1.54$

The scores range from 0 (low competence) to 4 (high competence).

 $p < .001$.**
 $p < .01$.*
 $p < .05$.

Table 5.

End-of-study CCS scores by coaching assignment.

	Total CCS Score	Non-Behavioral Skills	Behavioral Skills	Perceptions	Knowledge
Not assigned to Coaching	2.72	2.51	1.66	3.58	3.11
Assigned to Coaching	2.84	2.75	1.94	3.59	3.08
t-test	$t(78.9) = 1.82,$	$t(57.1) = 2.09^*$	$t(72.3) = 2.02^*$	$t(73.0) = 0.09$	$t(62.2) = -0.21$
Effect size	0.34	0.43	0.39	0.02	-0.04

The scores range from 0 (low competence) to 4 (high competence).

 $p < .001.$

**
 $p < .01.$

*
 $p < .05.$

School-level randomization.