Fidelity to the ACT SMART Toolkit: An Instrumental Case Study of Implementation Strategy Fidelity

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Research

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Abstract

Background: Although evidence-based practices (EBPs) have been shown to improve a variety of outcomes for autistic children, they are often inconsistently implemented or not implemented in community settings where many autistic children receive usual care services. One blended multi-phased implementation strategy developed to support the adoption and implementation of EBPs for autism spectrum disorder (ASD) in community-based settings is the Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART Toolkit). Guided by an adapted version of the EPIS, the ACT SMART Toolkit is comprised multiple phases, each with steps and activities to be completed by agency implementation teams. In the present study, we evaluated implementation strategy fidelity, given the potential for important insights into the use of the toolkit and limited information on the phenomenon of implementation strategy fidelity more broadly.

Methods: We used an instrumental case study approach to assess fidelity to the ACT SMART Toolkit during its pilot study with six ASD community agency implementation teams. We assessed adherence, dose, and implementation team responsiveness for each phase and activity of the toolkit at both an aggregate and individual agency level. We also conducted repeated measures ANOVAs to determine whether implementation strategy fidelity significantly differed by toolkit phase.

Results: Overall, we found that adherence, dose, and participant responsiveness to the ACT SMART Toolkit were high, with some variability by toolkit phase and activity, as well as by ASD community agency. There was a significant main effect of toolkit phase for dose ($F(2,8) = 10.93$, $MSE = .190$, $p = .005$, $\eta^2 = .73$), such that dose was significantly lower during the preparation phase as compared to the implementation phase of the toolkit.

Conclusions: Our instrumental case study evaluation of fidelity to the ACT SMART Toolkit demonstrated potential for the strategy to be used with fidelity in ASD community-based agencies. Findings related to variability of implementation strategy fidelity in the present study may also inform future adaptations to the toolkit and point to broader trends of how implementation strategy fidelity may vary by content and context.

Contributions to the literature

- Assessing implementation strategy fidelity is critical to advance the field of implementation science but is rarely evaluated in extant literature.
- In an instrumental case study, we found high but variable fidelity to a blended, multi-phased implementation strategy (the ACT SMART Toolkit) for increasing EBP use in ASD community agencies.
- These findings provide evidence that community-based providers utilize the ACT SMART Toolkit with fidelity, furthering the rationale that the toolkit is a promising strategy to increase EBP use within ASD community agencies.

- The paper contributes an innovative model of assessing implementation strategy fidelity, suggesting important influences of strategy content and context.

Background

Autism Spectrum Disorder. An autism spectrum disorder (ASD) affects approximately 1 in 44 children in the United States and has been identified as a public health concern estimated to cost $461 billion dollars a year for services and treatment by 2030 (1–3). ASD is characterized by social and communication difficulties as well as restricted and repetitive behaviors and interests, and commonly co-occurs with anxiety disorders, obsessive compulsive disorder, attention deficit hyperactivity disorder, and/or oppositional defiant disorder (4–6). Additionally, children on the autism spectrum have higher rates of behaviors such as self-injury, aggression, tantrums, and property destruction compared to neurotypical peers (7–9).

Both the core features and co-occurring disorders and behaviors of ASD have been found to predict unsatisfactory outcomes in quality-of-life factors, including peer relationships, educational attainment, employment, and independent living in adulthood (5, 10, 11). Associations between autistic characteristics and unsatisfactory quality-of-life outcomes are also maintained by systemic barriers to inclusion of autistic individuals, such as societal stigma and lack of appropriate accommodations, in education, employment, and housing opportunities (12–14).

The prevalence rate for ASD continues to grow dramatically as practices for diagnosis improve (3, 15). However, despite their potential to improve outcomes for autistic youth and reduce individual and societal costs (16–18), barriers to community level identification and intervention remain (3, 19). Although evidence-based practices (EBPs) have been shown to improve a variety of outcomes for autistic children, they are often inconsistently implemented or mis-implemented in community-based settings where many autistic children receive services (20–24). As a result, there is a considerable number of children on the autism spectrum not receiving practices empirically demonstrated to improve outcomes as part of their usual care. Thus, there is a need to identify, develop, and evaluate strategies facilitating the implementation of EBPs for ASD within community settings.

ACT SMART Implementation Toolkit. Drahota and colleagues (25, 26) developed a blended implementation strategy to support the implementation of EBPs for ASD in community settings: Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART Toolkit). The ACT SMART Toolkit was developed through a review of existing implementation strategy evidence and by incorporating insight from a community-academic partnership (27). The ACT SMART Toolkit involves facilitation meetings led by trained ACT SMART facilitators and a web-based interface to guide ASD community agency leaders, supervisors, and providers that comprise agency implementation teams through phases of implementing an EBP (25, 26, 28). Drahota and colleagues (20, 25) designed the ACT SMART Toolkit to have steps and activities that align with an adapted implementation model, the adapted Exploration, Adoption, Preparation, Implementation, Sustainment (EPIS) model (20, 29). Overall,

the toolkit guides ASD agency implementation teams to explore their agency's receptivity to implementing a new EBP, identify and decide upon an EBP that meets their needs, prospectively plan to implement the EBP, implement the EBP, and finally evaluate implementation and develop a plan for sustainment (See Fig. 1; 25).

Importantly, the ACT SMART Toolkit has been pilot tested with six ASD community-based agencies. Preliminary work by Drahota and colleagues (in preparation) suggests that the toolkit is feasible, acceptable, and useful to agency implementation teams (30). In addition, Sridhar and Drahota (31) found that the toolkit facilitates clinically meaningful changes in agency provider- and supervisor-reported EBP use. Moreover, Sridhar and colleagues (32) identified salient facilitators (i.e., facilitation, facilitation meetings, and phase specific activities) and salient barriers (i.e., website issues, perceived lack of resources, and contextual factors within ASD community agencies such as time constraints and funding) to the utilization of the ACT SMART Toolkit in the pilot study. Therefore, the next incremental, yet crucial, step in evaluating initial use of the ACT SMART Toolkit is to assess implementation strategy fidelity.

Implementation Strategy Fidelity. Fidelity is a construct that assesses the extent to which individuals (e.g., providers) deliver a strategy as planned (33–35). Researchers have proposed components that contribute to fidelity include: (1) adherence to the outlined procedures, (2) proportion of the strategy received (i.e., dose), (3) extent of individual responsivity to the strategy (i.e., participant responsiveness), (4) quality of implementation, and (5) differentiation from unspecified procedures (36, 37). Researchers have also proposed that quality and differentiation primarily capture the characteristics of an EBP being implemented whereas adherence, dose, and participant responsiveness hold relevance for implementation strategy fidelity (35, 38).

Dusenbury (36) defines *adherence* as the extent to which activities are consistent with the way a strategy is proposed, *dose* as the amount of strategy content received by participants, and *participant responsiveness* as the extent to which participants are engaged by and involved in the strategy. In relation to the ACT SMART Toolkit, participants would refer to the agency implementation teams (i.e., a group of individuals within an agency responsible for facilitating EBP implementation; 39).

Fidelity is also considered dynamic and may be influenced by factors such as provider characteristics, the setting, and/or complexity of the strategy (35, 40). Assessing implementation strategy fidelity can help implementation strategy developers further understand which components of an implementation strategy may be core functions needed to produce desired outcomes and which components may be adapted to account for varying contextual characteristics (41–43). Of course, this is contingent upon an ability to determine whether implementation of the strategy remained consistent with its underlying theory (44, 45). Notably, increasing understanding about how implementation strategies work has been identified as a research priority within the field of dissemination and implementation science (46–48).

Despite its importance, fidelity to implementation strategies has rarely been assessed; instead, research has often focused only on fidelity to the EBPs being implemented (35, 49). Indeed, Slaughter et al. (35) conducted a scoping review that indicated no articles reporting fidelity to implementation strategies included definitions or conceptual frameworks for assessing implementation strategy fidelity. To our knowledge, few studies have examined fidelity to an implementation strategy, and only one recent study has used a guiding theoretical framework (49, 50).

Present Study. Using an instrumental case study approach to assess fidelity to the ACT SMART toolkit during its pilot study may be able to provide important insights into the use of the toolkit as well as the phenomenon of implementation strategy fidelity more broadly (51). Examining implementation strategy fidelity can provide insight into the overall potential for ASD community-based agencies to use the toolkit as planned and ultimately report greater use of EBPs. This information may be particularly useful for ASD community-based agencies, given potential competing priorities and contextual barriers to completing the toolkit in its entirety (32). Further, we provide one of the first process models to assess fidelity to a blended, multi-phased implementation strategy. This model may then inform a broader understanding of implementation strategy fidelity and contribute to underlying theory.

Specifically, we addressed two key questions:

1. What was fidelity to the ACT SMART Toolkit at an aggregate and individual agency level according to adherence, dose, and participant responsiveness during its pilot study?
2. Was fidelity to the ACT SMART Toolkit significantly different by toolkit phases?

Methods

Participants. A total of six ASD community agencies located in Southern California were included in the pilot study of the ACT SMART toolkit. Four of the ASD community agencies were Applied Behavior Analysis (ABA) organizations, one was an ABA and mental health organization, and one agency was a Speech and Language Pathology organization. Five of the six ASD community agencies chose to adopt the EBP, Video Modeling, during the pilot study and complete all phases of the ACT SMART toolkit. One ABA agency chose not to adopt an EBP at the end of the adoption decision phase of the toolkit.

Each ASD community agency developed implementation teams composed of agency staff (see Table 1 for implementation team demographic and discipline information). At least one agency leader was required for each implementation team. Eligibility criteria for agency leaders were: (1) holding the role of CEO, director, or leading decision-maker regarding treatment use at an ASD community agency eligible to participate in the ACT SMART pilot study, (2) willingness to participate in the pilot study for 1 year, and (3) agreement to provide feedback after completing each phase of the pilot study. The agency leader for each participating agency then invited up to four other agency staff members (i.e., supervisors and direct providers) to complete their agency's implementation team. Eligibility criteria for implementation team

members was to agree to complete the toolkit and provide feedback about its feasibility, acceptability, and utility.

Table 1
Demographic and discipline information across implementation teams

	Agency Leaders (*n* = 7)	**Supervisors (*n* = 8)**	**Direct Providers (*n* = 1)**
Sex Assigned at Birth (Females)	100%	100%	100%
Race			
White	100%	25%	100%
Mixed Race	-	25%	-
Prefer Not to Answer	-	12.5%	-
Missing	-	37%	-
Education Level			
Master's Degree	42.9%	50%	100%
Doctorate	57.1%	12.5%	-
Missing	-	37%	-
Discipline			
Psychology	28.6%	25%	-
Behavior Specialist	28.6%	25%	100%
Speech/Language/Communication	28.6%	12.5%	-
Education	14.3%	-	-
Missing	-	37%	-

Materials & Procedure. As part of the pilot study, a research assistant served as an independent observer and evaluated implementation teams' fidelity using the Implementation Milestones form, adapted with permission from the Stages of Implementation Completion (52), and the ACT SMART Activity Fidelity form (53). The ACT SMART Implementation Milestones form required the independent observer to record a Yes or No answer (scored as 1 and 0, respectively) for whether activities during pre-implementation and phase 1 through phase 4 of the ACT SMART Toolkit were completed. Scores were converted into percentages to assist with interpretation. The ACT SMART Activity Fidelity form presented more detailed questions regarding completion of activities during Phase 2: Adoption; Phase 3: Preparation; and Phase 4: Implementation. The independent observer recorded a Yes or No answer (scored as 1 and 0, respectively) for whether implementation teams completed each activity and then rated the amount of

the form completed using a 4-point Likert scale where 0 = “Nothing Completed”, 1 = “Minimally Completed (1–2 items)”, 2 = “Moderately Completed (3–4 items)”, and 3 = “Mostly/All Completed (5–6 items)”.

In addition to the observational data collected using the ACT SMART Implementation Milestones form and the ACT SMART Activity Fidelity form, ACT SMART facilitators rated implementation team engagement using the ACT SMART Implementation Team Engagement Rating Scale that was created by the toolkit developers. Immediately after each facilitation meeting, the ACT SMART facilitator(s) rated implementation team engagement in ACT SMART activities and facilitation meetings since the last facilitation meeting occurred. Engagement ratings were completed using a 5-point Likert scale where 1 = “Not at all engaged”, 2 = “Slightly Engaged”, 3 = “Moderately Engaged”, 4 = “Very Engaged”, and 5 = “Extremely Engaged”.

In the present study, we used the operational definitions from Dusenbury (36) and an overall scoring rubric for implementation strategy fidelity developed in Slaughter et al. (35) as the basis for using the ACT SMART Implementation Milestones form, ACT SMART Activity Fidelity form, and ACT SMART Implementation Team Engagement Rating Scale to assess implementation strategy fidelity via adherence, dose, and participant responsiveness, respectively.

Analysis Plan. We used an instrumental case study approach to explore both fidelity to the ACT SMART Toolkit and potential generalizations to a broader underlying theory of implementation strategy fidelity. The Standards for Reporting Implementation Studies (StaRI) checklist was used to assist reporting given that the ACT SMART Toolkit is an implementation strategy developed to increase EBP use in ASD community agencies (54). First, we assessed adherence, dose, and participant responsiveness for the ACT SMART Toolkit overall as well as for each phase and activity of the toolkit. Utilizing the ACT SMART Implementation Milestones form, we assessed adherence via a Yes/No answer to whether implementation milestones were completed. Overall, by phase, and by activity, we calculated the average percentage of “Yes” answers for required toolkit activities. We assessed dose by analyzing Likert scales on the ACT SMART Activity Fidelity form evaluating how much of each activity was completed. Overall, by phase, and by activity, we calculated the mean dose rating. Finally, we assessed participant responsiveness by analyzing the Likert scales on the ACT SMART Implementation Team Engagement Rating Scale and used dates of completion to confirm phase. Overall and by phase, we calculated the mean participant responsiveness rating. We did not calculate the mean participant responsiveness rating by activity as ratings for engagement were only given by phase. We also calculated an average percent agreement on participant responsiveness ratings from facilitation meetings in which multiple facilitators were present. Lastly, we calculated overall, phase, and activity adherence, dose, and participant responsiveness for each agency implementation team.

To evaluate whether adherence, dose, or participant responsiveness significantly differed by toolkit phase, we conducted repeated measures ANOVAs with toolkit phase as a within-subjects factor. We also conducted Bonferroni post-hoc tests and calculated effect sizes using local error terms. It should be

noted that dose was not observed during phase 1 of the toolkit. Further, the one ASD community agency that chose not to adopt an EBP at the end of the adoption decision phase (Phase 2) of the toolkit did not have any implementation strategy fidelity variables observed during Phase 3 or Phase 4 of the toolkit.

Results

Aggregate Fidelity to the ACT SMART Toolkit. Agency implementation teams adhered to an overall average of 90% (*SD* = 11.3%) of required ACT SMART Toolkit activities. Average adherence ranged from 74% (*SD* = 19.5%) completion of required toolkit activities during the preparation phase of the toolkit to 100% (*SD* = 0%) completion of required toolkit activities during the implementation phase of the toolkit (see Table 2). While completion rate for individual activities within phases was also relatively high across agencies, there was some variability. There were lower average completion rates for activities such as the benefit-cost estimator, gathering treatment materials, and developing adaptation and implementation plans compared to higher average completion rates for activities related to treatment evaluation, funding, and training.

Table 2
Adherence to the ACT SMART Implementation Toolkit in aggregate and by individual agency implementation team

	Aggregate *M%* (*SD*)	**Agency 1** *M%* (*SD*)	**Agency 2** *M%* (*SD*)	**Agency 3**[a] *M%* (*SD*)	**Agency 4** *M%* (*SD*)	**Agency 5** *M%* (*SD*)	**Agency 6** *M%* (*SD*)
Overall Adherence Scores	**90% (11.3)**	**90.8% (14.5)**	**93.3% (14.9)**	**91.7% (14.4)**	**89.5% (17.4)**	**88.0% (26.8)**	**85.3% (20.2)**
Pre-Implementation	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Agency first contacted	100%	100	100	100	100	100	100
Agency interest indicated	100%	100	100	100	100	100	100
Agency recruitment meeting	100%	100	100	100	100	100	100
Orientation meeting attendance	100%	100	100	100	100	100	100
Phase 1: Exploration	**83% (18.0)**	**66.7% (57.7)**	**66.7% (57.7)**	**100%**	**100%**	**100%**	**66.7% (57.7)**
Recruit for agency assessment	83% (40.8)	100	0	100	100	100	100
Agency assessment link sent	100%	100	100	100	100	100	100
Staff response rate ≥ 75%	67% (51.6)	0	100	100	100	100	0
Phase 2: Adoption	**92% (17.8)**	**87.5% (35.4)**	**100%**	**75.0% (46.3)**	**87.5% (35.4)**	**100%**	**100%**
Treatment selection	100%	100	100	100	100	100	100
Evaluate fit	100%	100	100	100	100	100	100
Evaluate feasibility	100%	100	100	100	100	100	100
Evaluate clinical utility and validity	83% (40.8)	100	100	0	100	100	100

Note. Adherence scoring range is 0–100%.

[a] Agency implementation team made the decision to not adopt an EBP.

[b] Agency implementation team created and carried out an implementation plan in Phase 4.

	Aggregate *M%* (*SD*)	Agency 1 *M%* (*SD*)	Agency 2 *M%* (*SD*)	Agency 3[a] *M%* (*SD*)	Agency 4 *M%* (*SD*)	Agency 5 *M%* (*SD*)	Agency 6 *M%* (*SD*)
Evaluate training requirements	100%	100	100	100	100	100	100
Evaluate funding source	100%	100	100	100	100	100	100
Evaluate benefits and costs	50% (54.8)	0	100	0	0	100	100
Validate adoption decision	100%	100	100	100[a]	100	100	100
Phase 3: Preparation	**74% (19.5)**	**100%**	**100%**		**60% (54.8)**	**40% (54.8)**	**60% (54.8)**
Gather and review treatment materials	60% (54.8)	100	100		0	0	100
Evaluate prospective adaptations	80% (44.7)	100	100		100	0	100
Develop adaptation plan	50% (70.7)	100	N/A		N/A	0	N/A
Develop training plan	100%	100	100		100	100	100
Develop implementation plan	80% (44.7)	100	100		100	100	0
Phase 4: Implementation	**100%**	**100%**	**100%**		**100%**	**100%**	**100%**
Carry out adaptation plan	100%	100	N/A		N/A	N/A	N/A
Carry out training plan	100%	100	100		100	100	100
Carry out implementation plan	100%	100	100		100	100	100[b]

Note. Adherence scoring range is 0–100%.

[a] Agency implementation team made the decision to not adopt an EBP.

[b] Agency implementation team created and carried out an implementation plan in Phase 4.

Related to dose, the independent observer gave agency implementation teams an overall average rate falling between “Moderately Completed” to “Mostly/All Completed” (*M* = 2.3, *SD* = .60). The lowest average dose rating was between “Minimally Completed” to “Moderately Completed” (*M* = 1.7, *SD* = .60)

during the preparation phase whereas the highest average dose rating was between “Moderately Completed” to “Mostly/All Completed” (M = 2.9, SD = .01) during the implementation phase of the toolkit (see Table 3). Consistent with observations of adherence, there were lower average dose ratings for activities such as the benefit-cost estimator, gathering treatment materials, and developing adaptation and implementation plans compared to higher average completion rates for activities related to treatment evaluation, funding, training, and carrying out developed plans. Here, it should be noted that average dose ratings by activity could not be calculated for the implementation phase given that evaluation surveys during this phase were designed to be dynamic and capture completion of different sets of tasks by agency (30).

Table 3
Dose to the ACT SMART Implementation Toolkit in aggregate and by individual agency implementation team

	Aggregate *M* (*SD*)	**Agency 1** *M* (*SD*)	**Agency 2** *M* (*SD*)	**Agency 3**[a] *M* (*SD*)	**Agency 4** *M* (*SD*)	**Agency 5** *M* (*SD*)	**Agency 6** *M* (*SD*)
Overall Dose Scores	**2.3 (0.6)**	**2.7 (0.4)**	**2.7 (0.4)**	**1.5 (0)**	**2.3 (0.7)**	**2.3 (1.3)**	**2.3 (0.7)**
Phase 1: Exploration	†	†	†	†	†	†	†
Phase 2: Adoption	**2.4 (0.6)**	**3.0 (0)**	**2.7 (0.8)**	**1.5 (1.6)**	**2.4 (1.1)**	**3.0 (0)**	**2.0 (1.3)**
Evaluate fit	3.0 (0)	3	3	3	3	3	3
Evaluate feasibility	3.0 (0)	3	3	3	3	3	3
Evaluate clinical utility and validity	2.5 (1.2)	3	3	0	3	3	3
Evaluate training requirements	2.3 (1.0)	*	3	*	2	*	3
Evaluate funding source	2.3 (1.0)	3	1	3	3	3	1
Evaluate benefits and costs	1.4 (1.5)	-	3	0	0	3	1
Validate adoption decision	2.0 (1.6)	3	3	0[a]	3	3	0
Phase 3: Preparation	**1.7 (0.6)**	**2.2 (1.1)**	**2.3 (1.0)**		**1.6 (1.5)**	**0.8 (1.3)**	**1.8 (1.5)**
Gather and review treatment materials	0.6 (0.6)	1	1		0	0	1
Evaluate prospective adaptations	2.4 (1.3)	3	3		3	0	3

Note. Dose scoring ranges from 0 (Nothing completed) to 3 (Mostly/All completed [5–6 items]).

[a] Agency implementation team made the decision to not adopt an EBP, therefore, did not progress past Phase 2.

† Denotes that this is not applicable for the fidelity domain.

* Agency implementation team indicated that there were no training requirements while completing form.

- Indicates missing data.

	Aggregate *M* (*SD*)	Agency 1 *M* (*SD*)	Agency 2 *M* (*SD*)	Agency 3[a] *M* (*SD*)	Agency 4 *M* (*SD*)	Agency 5 *M* (*SD*)	Agency 6 *M* (*SD*)
Develop adaptation plan	1.0 (1.7)	3	N/A		N/A	0	N/A
Develop training plan	2.6 (0.9)	3	3		3	1	3
Develop implementation plan	1.6 (1.1)	1	2		2	3	0
Phase 4: Implementation	**2.9 (0.1)**	**2.9 (0.4)**	**3.0 (0)**		**3.0 (0)**	**3.0 (0)**	**3.0 (0)**
Note. Dose scoring ranges from 0 (Nothing completed) to 3 (Mostly/All completed [5–6 items]).							
[a] Agency implementation team made the decision to not adopt an EBP, therefore, did not progress past Phase 2.							
† Denotes that this is not applicable for the fidelity domain.							
* Agency implementation team indicated that there were no training requirements while completing form.							
- Indicates missing data.							

For participant responsiveness, ACT SMART facilitators rated agency implementation teams an overall average corresponding to “Very Engaged” (*M* = 4.0, *SD* = .50). The lowest average participant responsiveness rating was between “Slightly Engaged” and “Moderately Engaged” (*M* = 2.3, *SD* = 1.0) during the adoption decision phase of the toolkit. The highest average participant responsiveness rating was between “Very Engaged” to “Extremely Engaged” (*M* = 4.7, *SD* = .50) during the implementation phase (see Table 4). For facilitation meetings with multiple ACT SMART facilitators present, there was a 92.43% average agreement on participant responsiveness ratings.

Table 4
Participant responsiveness to the ACT SMART Implementation Toolkit in aggregate and by individual agency implementation team

	Aggregate *M* (*SD*)	**Agency 1** *M* (*SD*)	**Agency 2** *M* (*SD*)	**Agency 3**[a] *M* (*SD*)	**Agency 4** *M* (*SD*)	**Agency 5** *M* (*SD*)	**Agency 6** *M* (*SD*)
Overall Participant Responsiveness Scores	**4.0 (0.5)**	**4.1 (0.7)**	**4.6 (0.5)**	**3.3 (0.1)**	**3.8 (0.3)**	**4.5 (0.4)**	**3.8 (0.9)**
Phase 1: Exploration	3.8 (0.7)	4	4	3.25	3.5	5	3
Phase 2: Adoption	2.3 (1.0)	3.5	5	3.4[a]	3.5	4.5	3.5
Phase 3: Preparation	3.5 (1.9)	3.8	4.5		4.0	4.1	3.6
Phase 4: Implementation	4.7 (0.5)	5	5		4	4.3	5

Note. Dose scoring ranges from 1 (Not at all engaged) to 5 (Extremely engaged).

[a] Agency implementation team made the decision to not adopt an EBP, therefore, did not progress past Phase 2.

Individual Agency Fidelity to the ACT SMART Toolkit. Across agencies, there was generally high adherence to toolkit activities; the lowest agency implementation team adhered to an overall average of 85.3% (*SD* = 20.2%) of required toolkit activities (Table 2). While there was some variability in adherence across phases and activities by agency, there was no readily identifiable pattern of agencies consistently having lower or higher adherence compared to other agencies. Consistent with other results, the preparation phase appeared to have the lowest adherence ratings across agencies.

Agencies also all had generally high dose ratings for toolkit activities, except for the one agency (Agency 3) that chose not to adopt an EBP at the end of the Phase 2: Adoption (Table 3). Like the ratings of adherence by agency, there was variability in dose ratings but no consistent identifiable patterns. Further, the preparation phase had the lowest dose ratings across agencies.

Consistent with both observations of adherence and dose ratings across agencies, all agencies also had relatively high ratings of participant responsiveness (Table 4). The agency with the lowest average participant responsiveness rating was rated between “Moderately Engaged” to “Very Engaged” (*M* = 3.3, *SD* = 0.1). However, in contrast to observations of adherence and dose ratings, agencies did not appear to have lower participant responsiveness during the preparation phase compared to other toolkit phases.

Differences in Fidelity to the ACT SMART Toolkit by Toolkit Phase. Our repeated measures ANOVAs to compare implementation strategy fidelity variables (i.e., adherence, dose, participant responsiveness) across phases revealed a significant main effect of toolkit phase for dose ($F(2, 8) = 10.93$, $MSE = .190$, p

= .005, η^2 = .73, 95% CI [.15, .84]). However, there was not a significant main effect of toolkit phase for either adherence (F(3, 12) = 2.43, MSE = .035, p = .116, η^2 = .38, 95% CI [0, .57]) or participant responsiveness (F(3, 12) = .2.31, MSE = .258, p = .128, η^2 = .37, 95% CI [0, .69]).

Using the Bonferroni post-hoc tests with local error terms to further examine the significant main effect of toolkit phase on dose, we found that the average dose rating during the preparation phase (Phase 3) of the toolkit was significantly lower than the average dose rating during the implementation phase (Phase 4) of the toolkit (d = 2.93, 95% CI [0.59, 5.20].

Discussion

Fidelity to the ACT SMART Toolkit. Our investigation used an instrumental case study approach to evaluate implementation strategy fidelity to the ACT SMART Toolkit by assessing observational descriptive ratings of adherence, dose, and participant responsiveness. Our evaluation provides one of the first models of assessing fidelity to a blended, multi-phased implementation strategy and important insights into both the potential for ASD community-based agencies to use the toolkit effectively and implementation strategy fidelity more broadly.

Overall, we found that adherence, dose, and participant responsiveness to the ACT SMART Toolkit were relatively high, which supports the potential for the toolkit to be used with fidelity in ASD community agencies. Given that EBPs for ASD are often inconsistently or mis-implemented in community settings despite their potential to improve outcomes for a growing clinical population, understanding effective use of implementation strategies, such as the ACT SMART Toolkit, could contribute to reducing the EBP research-to-practice gap (20–24).

Although we found fidelity to be high overall, there was some variability in implementation strategy fidelity by toolkit phase. Specifically, we found that dose was significantly lower in the preparation phase (Phase 3) compared to the implementation phase (Phase 4). One possible rationale for this finding is that there were substantial differences in demands for toolkit activities by phase. Indeed, the preparation phase required gathering materials, evaluating prospective adaptations, and developing training and adaptation plans whereas the implementation phase required carrying out and evaluating the developed plans. Indeed, there were both lower adherence and dose ratings for toolkit activities such as developing adaptation and implementation plans compared to toolkit activities related to evaluating treatments, funding, and training. Thus, the lower dose in the preparation phase may reflect the need to lower the amount or intensity of toolkit activities required to better align with ASD community agency's capacity to plan for implementation. Considering recently identified context-specific barriers and facilitators to the ACT SMART Toolkit would also likely be critical to enhancing Phase 4 (32, 55).

Another potential rationale for significantly lower dose during the preparation phase compared to the implementation phase may be that ASD community agencies perceived greater value in implementing the chosen EBP than in planning for its implementation. While agency implementation teams were rated as

moderately to very engaged during the preparation phase, it is unclear how well facilitators were able to emphasize the important relationship between planning and implementation. However, researchers have recently proposed that fostering this understanding is necessary to support successful and sustainable implementation (56). Thus, the ACT SMART Toolkit may also benefit from incorporating a greater focus on the practical importance of planning for implementation of EBPs.

Implementation Strategy Fidelity Theory. Taken together, our instrumental case study assessment of fidelity to the ACT SMART Toolkit and exploration of the potential relationship between fidelity and EBP use within ASD community agencies notably provide one of the first models of assessing implementation strategy fidelity. Although a considerable amount of research has been conducted on *intervention fidelity*, few researchers have explored *implementation strategy fidelity* (35, 49, 50). For example, Slaughter et al. (35) found that no studies reporting on fidelity to implementation included a specific definition or theoretical framework for assessing implementation strategy fidelity. To our knowledge, only Berry and colleagues (49) recently adapted the Conceptual Framework for Implementation Fidelity to guide their evaluation of fidelity to practice facilitation as a strategy to improve primary care practices' adoption of evidence-based guidelines for cardiovascular disease.

Despite limited research, evaluating and understanding implementation strategy fidelity has important implications and is identified as a research priority within dissemination and implementation science (44–48). High fidelity to an implementation strategy may be reflective of other important implementation outcomes, such as high acceptability, appropriateness, and feasibility (57, 58). Further, implementation strategy fidelity may inform determination of which components of a strategy are required to produce change and which can be removed or adapted to account for varying contextual characteristics (41–43). This knowledge may allow for demand optimization when the implementation strategy is being used, which may be particularly important when users of an implementation strategy have competing priorities or contextual factors that make completing the entirety of a blended implementation strategy difficult (32).

From our instrumental case study of ACT SMART Toolkit fidelity, we have demonstrated that fidelity to blended, multi-phased implementation strategies is possible. Further, we have highlighted that implementation strategy fidelity may vary according to differing components of a strategy, such as components focusing on preparation for implementation versus components focusing on implementation itself. We also observed that implementation strategy fidelity may vary by context. Here, implementation strategy fidelity was observed to vary across different ASD community agencies using the ACT SMART Toolkit. These findings suggest that a next step to further understand implementation strategy fidelity may be investigating shifts across both strategy content and context. Importantly, increasing this understanding could then also inform commonly needed adaptations to improve implementation strategy fidelity.

Strengths. We propose a main strength of our investigation is that we demonstrate one of the first instrumental case studies to consider fidelity to a blended, multi-phased implementation strategy.

Importantly, our assessment of fidelity to the ACT SMART Toolkit may be able to provide a framework for other evaluations of implementation strategy fidelity and inform the underlying theory of implementation strategy fidelity. Within our evaluation, we also importantly found overall high fidelity to the toolkit within ASD community-based agencies and identified potential ways in which to optimize demands of the toolkit and increase sustainability.

Limitations. In contrast, important limitations of our investigation include potential issues with measurement of specific implementation strategy fidelity variables. For example, Berry and colleagues (49) recently considered participant responsiveness as a moderator of implementation strategy fidelity rather than a component of fidelity itself, as it was considered in our analysis. Moreover, the potential issues with measurement may have been compounded by the fact that standard measures were not used for dose and participant responsiveness. However, as an emerging field, implementation science often faces issues related to measurement and standardized measures specific to implementation strategy fidelity have not yet been developed (46, 47, 59). Researchers have developed some standard measures for intervention fidelity, and these may be able to be adapted to assess implementation strategy fidelity in the future (60).

Another potential limitation in our investigation is that there were different raters for adherence, dose, and participant responsiveness. While an independent observer rated adherence and dose for each implementation team, participant responsiveness was rated by a facilitator following implementation teams' facilitation meetings. Although this presents potential for bias, direct observation by independent observers and even implementers have been found to be more accurate than collecting reports directly from participants (60). Further, when two facilitators independently gave ratings for participant responsiveness, there were high rates of agreement.

Moreover, while we were generally able to assess implementation strategy fidelity by toolkit phase and activities, we were unable to assess all variables for all activities and by toolkit facet (i.e., web-based interface versus facilitation meetings). Thus, we are unable to make conclusions about all activities and the impact of the blended nature of the toolkit on implementation strategy fidelity. Further, our results may not generalize to discrete implementation strategies, which may benefit from their own instrumental case studies.

Lastly, the most important limitation of our assessment of fidelity to the ACT SMART Toolkit was the limited sample size that rendered us under-powered to fully evaluate relationships between implementation strategy fidelity and EBP use. Moreover, our limited sample size also precluded us from considering additional factors such as implementation team and provider demographics and organizational climate within ASD community agencies. While we were able to observe variable implementation strategy fidelity across ASD community agencies, we were not yet able to identify consistent patterns related to higher or lower implementation strategy fidelity. However, there is evidence that some of these factors may moderate the relationship between implementation strategy fidelity to the ACT SMART toolkit and increased EBP use (61).

Future research would benefit from consideration of potential moderators of implementation strategy fidelity and utilizing standard measures and independent raters (59–64). In addition, future studies may benefit from a design intended to systematically evaluate fidelity to all components of a strategy. These lines of research may provide further insight into both effective use of the ACT SMART Toolkit as well as the advancing the field of implementation science more broadly.

Conclusions

By utilizing an instrumental case study approach, we advanced understanding of effective use of the ACT SMART Toolkit as well as the theory of implementation strategy fidelity more broadly. We found that the ACT SMART Toolkit has potential to be used with high fidelity in ASD community-based agencies. However, we also found that there was some variability in fidelity among toolkit phases, which points to possible adaptations needed to improve toolkit use even further. Considering adaptations may be critical as these findings may reflect that fidelity to blended, multi-phased implementation strategies is dynamic and affected by both strategy content and context. By increasing the use of and fidelity to effective implementation strategies that facilitate EBP adoption, utilization and sustainment within community-based settings, there is potential to increase overall public health.

Abbreviations

ASD
Autism Spectrum Disorder
EBP
Evidence-Based Practice
ACT SMART Toolkit
Autism Community Toolkit:Systems to Measure and Adopt Research-Based Treatments
EPIS model
Exploration, Preparation, Implementation, Sustainment model
ABA
Applied Behavior Analysis

Declarations

Ethics approval and consent participate: All participants provided informed consent. The present study received exempt status from IRB review from (MASKED) to conduct secondary analysis. Data was collected while the senior author was at (MASKED), under the IRB approval # (MASKED).

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analyzed during the current study are available from the senior author (MASKED) upon reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: (First Author) contributed to conceptualization, selection of methodology, formal analysis, and writing of the original draft of the present manuscript. (Senior Author) conducted the pilot study of the ACT SMART Toolkit and contributed to conceptualization, selection of methodology, and review and editing of the present manuscript. Both authors read and approved the final manuscript.

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Figures

Figure 1. Adapted EPIS Framework with ACT SMART Implementation Toolkit Steps and Activities to Support EBP Implementation

Adapted EPIS Phases (Drahota et al., 2021)	**ACT SMART Implementation Toolkit** (Drahota et al., 2014)		
	Web-Based Interface		**Facilitation Meetings**
	Steps (12 total)	**Activities (20 total)**	
Phase 1: Exploration	1. Conduct agency assessment	1: Encourage staff participation in agency assessment	• Monthly 30- to 60-minute meetings • Agency implementation team (IT) members and ACT SMART facilitator collaborate to progress through adapted EPIS phases, and ACT SMART steps and activities • Structured facilitation meetings to review steps, phases and activities; troubleshoot previous action items; introduce next steps and phases; plan for future steps
	2. Evaluate implementation receptivity	1: Form implementation team	
Phase 2: Adoption	1. Identify appropriate EBP	1: Select EBP to evaluate for adoption	
	2. Evaluate EBP and provider factors	1: EBP fit	
		2: EBP feasibility	
		3: Clinical value and research validity	
		4: Training requirements	
		5: Funding resources	
		6: Benefit-cost estimator	
	3. Adoption decision	1: Formalize adoption decision	
Phase 3: Preparation	1. Develop prospective adaptation plan	1: Gather and review EBP materials	
		2: Evaluate possible adaptations for EBP	
		3: Adaptation plan worksheet	
	2. Develop training plan	1: Training plan worksheet	
	3. Develop implementation plan	1: Implementation plan worksheet	
Phase 4: Implementation	1. Conduct comprehensive adaptation, training, and implementation plans	1: Develop concrete tasks and establish due dates	
	2. Task evaluation	1: Evaluate task progress and satisfaction	
Phase 5: Sustainment	1. Evaluate implementation success	1: Synthesize task evaluations	
	2. Develop sustainment plan	1: Evaluate sustainment and QI practices	
		2: Sustainment plan worksheet	

Note. Phase 5: Sustainment was not piloted during this study.

Figure 1

Adapted EPIS Framework with ACT SMART Implementation Toolkit Steps and Activities to Support EBP Implementation

Supplementary Files

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- StaRIchecklistforauthorcompletionFinal.pdf