FIDELITY TO THE ACT SMART TOOLKIT: AN ASSESSMENT OF IMPLEMENTATION STRATEGY FIDELITY

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ABSTRACT

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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 primarily receive care. One multi-faceted implementation strategy that researchers have developed and tested in a pilot study to support the implementation of EBPs for ASD in community settings is The Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART Toolkit). Here, we used a case study approach to assess fidelity to the toolkit during its pilot study (implementation strategy fidelity) using measures of adherence, dose, and participant responsiveness and examined the relationship between implementation strategy fidelity and EBP use in an exploratory analysis. Overall, we found that adherence, dose, and participant responsiveness to the ACT SMART Toolkit were high with some variability by toolkit phase and activity. However, our exploratory analysis was ultimately unequipped to evaluate the relationship between increased fidelity and increased EBP use given the limited sample size of the pilot study. Our case study evaluation provides one of the first models of considering fidelity in the context of multi-faceted implementation strategies as well as important insights into potential core and peripheral components of the ACT SMART Toolkit.

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INTRODUCTION

Background and Significance. 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 (Blaxill et al., 2021; Leigh & Du, 2015; Maenner et al., 2021). ASD is characterized by core social and communication difficulties as well as restricted and repetitive behaviors and interests (RRBIs) and commonly co-occurs with other disorders such as anxiety, obsessive compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), and oppositional defiant disorder (ODD) (American Psychiatric Association, 2013; Lai et al., 2014; Simonoff et al., 2008). In addition, children on the autism spectrum have higher rates of behaviors such as self-injury, aggression, tantrums, and property destruction compared to neurotypical peers (Hattier et al., 2011; Horner et al., 2002; Stevens et al., 2017).

Moreover, both the core features as well as the associated diagnoses and behaviors of ASD have been found to predict unsatisfactory outcomes in quality-of-life factors such as peer relationships, educational attainment, employment, and independent living as an adult (Kim & Bottema-Beutel, 2019; Lai et al., 2014; Mason et al., 2019). These associations between autistic[1] 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 (Bottema-Beutel et al.,

[1] I use "identity-first" language in some instances due to recent studies showing that identity-first language is preferred by some autistic individuals (Bury et al., 2020; Kenny et al., 2016) and a recent review highlighting potentially ableist language in autism research (Bottema-Beutel et al., 2020).

2020; Pitney, 2020; Robertson, 2009). The lack of systemic accommodations for autistic individuals also exacerbates public health costs and primarily burdens autistic individuals and their families (Bottema-Beutel et al., 2020; Pitney, 2020).

The prevalence rate for ASD continues to grow dramatically as practices for diagnosis improve (King & Bearman, 2009; Maenner et al., 2020). However, despite their potential to improve outcomes for autistic youth and reduce individual and societal costs (Eapen et al., 2013; Horlin et al., 2014; Vinen et al., 2018), barriers to community level identification and intervention remain (Elder et al., 2016; Maenner et al., 2020). 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 services (Drahota et al., 2020; Paynter et al., 2016; Pickard et al., 2017; Wong et al., 2015; Wood et al., 2015). As a result, there is a considerable number of children on the autism spectrum not receiving the practices empirically demonstrated to improve outcomes as part of their usual care. Thus, there is a need to identify, develop, and evaluate strategies to support the implementation of EBPs for ASD within community settings.

ACT SMART Implementation Toolkit. Drahota and colleagues (2014, 2017) developed one multi-faceted implementation strategy to support the implementation of EBPs for ASD in community settings: The Autism Community Toolkit: Systems to Measure and Adopt Research-Based Treatments (ACT SMART Toolkit). These researchers developed the ACT SMART Toolkit based on a review of existing evidence and by incorporating insight from a community-academic partnership. 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 (Drahota et al., 2012, 2014, 2017).

Drahota and colleagues (2017, 2020) designed the ACT SMART Toolkit to have steps and activities that align with an adapted implementation model – the Exploration, Adoption, Preparation, Implementation, Sustainment (EAPIS) model (Aarons et al., 2011; Drahota et al., 2020). Overall, implementation teams from ASD community agencies use the toolkit to explore their agency's receptivity to implementing a new EBP, identify and decide upon an EBP that meets their needs, prepare prospectively to implement the EBP, implement the EBP, and finally evaluate implementation and develop a plan for sustainment (See Figure 1; Drahota et al., 2017).

ACT SMART Phase	Activity
Pre-Implementation *Recruitment*	Agency first contacted
	Agency interest indicated
	Agency recruitment meeting
	Orientation workshop
Phase 1 *Agency Exploration*	Meeting at agency to recruit for agency assessment
	Emails sent to agency staff for agency assessment
	ACT SMART agency assessment
Phase 2 *Treatment Selection and Adoption Decision*	Treatment selection
	Evaluate treatment fit
	Evaluate treatment feasibility
	Evaluate clinical value and research validity
	Evaluate training requirements
	Evaluate funding source
	Evaluate benefit-cost estimator
	Make an adoption decision
Phase 3 *Planning for Implementation*	Gather treatment materials
	Evaluate prospective treatment adaptations
	Develop an adaptation plan
	Develop a training plan
	Develop an implementation and sustainment plan
Phase 4 *Implementation*	Carry out adaptation plan
	Carry out training plan
	Carry out implementation and sustainment plan

Figure 1. Phases and steps of the ACT SMART Toolkit

Importantly, the ACT SMART Toolkit has been tested in a pilot study with six ASD community agencies. Evaluating the ACT SMART Toolkit's use and associated outcomes from the pilot study can provide insight into the effectiveness of its current design and inform needed adaptations. The results of preliminary work by Drahota and colleagues (in preparation) support the suggestion that the toolkit is feasible, acceptable, and useful to agency implementation teams. In addition, Sridhar and Drahota (2020; in review) have reported that the ACT SMART Toolkit facilitates clinically meaningful changes in agency provider- and supervisor-reported EBP use. Moreover, Sridhar and colleagues (2021) have identified salient facilitators (i.e., facilitation teams, 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 team fidelity to the toolkit: 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 (Allen et al., 2018; Mowbray et al., 2003; Slaughter et al., 2015). 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 (Dusenbury et al., 2003; Teague, 2013). 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 (Century et al., 2010; Slaughter et al., 2015).

Dusenbury (2003) 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).

Fidelity is also considered dynamic and may be influenced by factors such as provider characteristics, the setting, and/or complexity of the strategy (Cross & West, 2011; Slaughter et al., 2015). 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 (Kirk et al., 2019; Mihalic, 2004; Perez Jolles et al., 2019). Of course, this is contingent upon an ability to determine whether implementation of the strategy remained consistent with its underlying theory (Haynes et al., 2015; Moore et al., 2015). Notably, increasing understanding about how implementation strategies work has been identified as an important research priority within the field of dissemination and implementation science (Akiba et al., 2021; Powell et al., 2019).

Despite the importance of examining implementation strategy fidelity, fidelity to implementation strategies has rarely and limitedly been assessed, as the focus of research has often been only on fidelity to the EBPs being implemented (Berry et al., 2021; Slaughter et al., 2015). Indeed, Slaughter et al. (2015) 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, only one recent study has used a theoretical framework to evaluate fidelity to an implementation strategy (Berry et al., 2021).

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 (Crowe et al., 2011). Examining implementation strategy fidelity can provide insight into the overall potential for ASD community agencies to use the toolkit as planned and ultimately report greater use of EBPs. Further, examination of implementation strategy fidelity can inform which of the ACT SMART toolkit's specific components may be most needed or most adaptable in relation to its desired outcome of EBP use in ASD community agencies. This can increase implementation strategy sustainability by informing which toolkit components should be prioritized for completion and which aspects may be beneficial but not critical (i.e., demand optimization). This information may be particularly useful for ASD community agencies given potential competing priorities and identified contextual barriers to completing the toolkit in its entirety (Sridhar et al., 2021).

Moreover, fidelity to the ACT SMART toolkit can reflect its potential for other desired outcomes such as acceptability, appropriateness, and feasibility (Proctor et al., 2011; Weiner et al., 2017). This will be critical information for further development of the ACT SMART Toolkit as an implementation strategy supporting delivery of EBPs in ASD community agencies. Further, the process of assessing implementation strategy fidelity will also provide one of the first models of assessing fidelity to a comprehensive implementation strategy. This model may then inform a broader understanding of implementation strategy fidelity and contribute to underlying theory.

We addressed two key questions:

1. What was fidelity to the ACT SMART Toolkit according to adherence, dose, and participant responsiveness during its pilot study?
2. Does implementation strategy fidelity to the toolkit predict direct provider reported EBP use in ASD community agencies after controlling for pre-use reports? It is hypothesized that increased adherence, dose, and participant responsiveness will each significantly predict an increase in the proportion of direct provider reported EBP use in an exploratory analysis.

METHOD

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 ASD community agency was an ABA and Mental Health Organization, and one ASD community agency was a Speech and Language Pathology organization. Five of the six ASD community agencies chose to adopt the EBP of Video Modeling and complete all phases of the ACT SMART toolkit and one ASD community agency, which was an ABA organization, 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. The eligibility criterion for all members of each implementation team was commitment to providing feedback about the feasibility, acceptability, and utility of the ACT SMART Toolkit.

Table 1. Demographic and discipline information across implementation teams

	Agency Leaders	**Supervisors**	**Direct Providers**
	(*n*=7)	(*n*=8)	(*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%	-

In addition to the implementation teams, direct providers within each of the ASD community agencies were surveyed about their use of EBPs pre- and post- implementation of the ACT SMART Toolkit (*n*=79 pre-implementation, *n*=80 post-implementation, see Table 2 for direct provider demographic and discipline information).

Table 2. Demographic and discipline information across direct providers

	Agency 1		**Agency 2**		**Agency 3**		**Agency 4**		**Agency 5**		**Agency 6**	
	Pre-	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**
	n=21	*n=13*	*n*=8	*n*=18	*n*=12	*n*=11	*n*=10	*n*=8	*n*=6	*n*=6	*n*=22	*n*=24
Sex Assigned at Birth (Females)	60%	84.6%	100%	83.3%	83.3%	81.8%	100%	100%	100%	83.3%	86.4%	87.5%

Table 2 (cont'd)

Ethnicity												
Spanish/Hispanic/Latinx	30%	38.5%	25%	22.2%	25%	27.3%	10%	-	16.7%	-	72.7%	58.3%
Not Spanish/Hispanic/Latinx	60%	38.5%	75%	72.2%	75%	72.7%	90%	100%	83.3%	100%	22.7%	25%
Prefer Not to Answer	10%	15.4%	-	5.6%	-	-	-	-	-	-	4.5%	16.7%
Missing	-	7.7%	-	-	-	-	-	-	-	-	-	-
Race												
White	76.2%	46.2%	50%	44.4%	58.3%	54.5%	90%	100%	83.3%	100%	63.6%	45.8%
Black or African American	6.3%	-	-	-	8.3%	9.1%	-	-	-	-	-	4.2%
Asian	-	7.6%	25%	33.3%	8.3%	18.2%	-	-	-	-	-	-
American Indian or Alaskan Native	-	-	-	-	-	-	-	-	-	-	-	-
Native Hawaiian or Pacific Islander	6.3%	-	-	5.5%	-	-	-	-	-	-	4.5%	
Mixed Race	-	-	-	-	-	-	10%	-	16.7%	-	-	8.3%
Prefer Not to Answer	12.5%	30.8%	25%	16.8%	33.3%	27.3%	-	-	-	-	27.3%	29.2%
Missing	-	15.4%	-	-	-	-	-	-	-	-	-	12.5%
Education Level												
Some College	10%	23.1%	12.5%	27.8%	-	-	-	-	-	-	9.1%	8.3%
Associate's Degree	30%	15.4%	-	-	-	-	-	-	-	-	4.5%	12.5%
Bachelor's Degree	5%	38.5%	50%	50.0%	83.3%	72.7%	30%	12.5%	-	-	77.3%	62.5%
Master's Degree	50%	15.4%	25%	11.1%	-	27.3%	60%	75.0%	50%	50%	4.5%	8.3%
Doctorate	5%	-	12.5%	5.6%	-	-	-	-	50%	50%	-	-
Other	-	-	-	5.6%	16.7%	-	10%	12.5%	-	-	4.5%	8.3%

Table 2 (cont'd)

Missing	-	7.7%	-	-	-	-	-	-	-	-	-	-
Discipline												
Psychology	47.4%	46.2%	50%	55.6%	58.3%	54.5%	-	-	66.7%	66.7%	50%	62.5%
Education	-	7.7%	25%	22.3%	-	-	10%	12.5%	-	-	-	-
Behavior Specialist	42.1%	23.1%	-	5.6%	33.3%	27.3%	-	-	33.3%	33.3%	9.1%	16.7%
Speech/Language/Communication	5.3%		-	-	8.3%	9.1%	90%	87.5%	-	-	-	-
Social Work	-		-	-	-	-	-	-	-	-	13.6%	8.3%
Marriage and Family Therapy	-		-	-	-	-	-	-	-	-	4.5%	-
Other	5.3%	15.4%	12.5%	16.7%	-	9.1%	-	-	-	-	22.7%	12.5%
Missing	-	7.7%	12.5%	-	-	-	-	-	-	-	-	-

Materials & Procedure. As part of the pilot study, a research assistant served as an independent observer and evaluated implementation teams' fidelity using the ACT SMART Implementation Milestones form, adapted with permission from the Stages of Implementation Completion (Chamberlain et al., 2011; See Appendix A), and the ACT SMART Activity Fidelity form that was created by the toolkit developers (See Appendix B). The ACT SMART Implementation Milestones form required the independent observer to record a Yes or No answer for whether activities during pre-implementation and phase 1 through phase 4 of the ACT SMART Toolkit were completed. In addition, the form also required the independent observer to note the date initiated and date completed for each activity. The ACT SMART Activity Fidelity form presented more detailed questions regarding completion of activities during Phase 2: Treatment Selection and Adoption Decision; Phase 3: Planning for Implementation; and Phase 4:

Implementation. The independent observer recorded a Yes or No answer for whether implementation teams completed the form for 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 (See Appendix C). 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 will use the operational definitions from Dusenbury (2003) and an overall scoring rubric for implementation strategy fidelity developed in Slaughter et al. (2015) 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.

To assess EBP use, direct providers within the ASD community agencies self-reported EBP use via the ASD Strategies and Interventions Survey (ASD-SIS; Pickard et al., 2018) both before and after their agency used the ACT SMART toolkit (See Appendix D). Providers were

asked to rate the extent to which they agreed with the following statement, "I feel competent in my delivery of this practice," for each practice and strategy they reported to utilize from a list of 55 intervention practices and strategies commonly used with youth on the autism spectrum. Providers were also asked to list any additional practices or strategies they currently used with their clients and to again rate the extent to which they agreed with the statement, "I feel competent in my delivery of this practice." Agreement was rated on a 5-point Likert scale where 1 = "Disagree Strongly", 2 = "Disagree", 3 = "Uncertain", 4 = "Agree", and 5 = "Agree Strongly." Developers of the ASD-SIS determined whether intervention practices and/or strategies were EBPs based on service reviews from the National Standards Project and the National Professional Development Center on Autism Spectrum Disorders at the time of the study (National Autism Center, 2009; Pickard et al., 2018; Wong et al., 2015).

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. 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, by phase, and by activity adherence, dose, and participant responsiveness separately 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. Additionally, only three of the remaining five ASD community agencies had engagement ratings collected during phase 4 of the toolkit.

Second, we conducted an exploratory analysis to determine whether adherence, dose, and participant responsiveness for the ACT SMART Toolkit each significantly predicted direct provider reported use of implementation team selected EBP (i.e., video modeling). We conducted analysis both at the agency level and the level of direct providers nested within agencies. For analysis at the agency level, we used a series of beta regressions to evaluate whether adherence, dose, or participant responsiveness predicted the proportion of direct providers reportedly using video modeling post-toolkit beyond the proportion of direct providers reportedly using video modeling pre-toolkit.

For analysis at the level of direct providers within agencies, there was one binary observation of video modeling use post-toolkit per direct provider and direct providers were nested within each of the ASD community agencies participating in the pilot study. Due to the multilevel, and therefore potentially correlated, data, a multilevel logistic generalized estimation equation (GEE) was modeled for each implementation strategy variable (i.e., adherence, dose, and participant responsiveness) with pre-toolkit reported video modeling use as a covariate. An exchangeable correlation structure was specified based on prior research (Teerenstra et al., 2010) and a Firth-type penalization was added to address data separation (Heinze & Schemper, 2002; Mondol & Rahman, 2019).

RESULTS

Overall Fidelity to the ACT SMART Toolkit. Agency implementation teams adhered to an overall average of 87% (*SD* = 6%) of required ACT SMART toolkit activities. Average adherence ranged from 72% (*SD* = 27%) completion of required toolkit activities during the planning for implementation phase of the toolkit to 92% (*SD* = 10%) completion of required toolkit activities during the treatment selection and adoption decision phase of the toolkit (See Table 3). 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 evaluating a benefit-cost estimator, gathering treatment materials, developing an adaptation plan, and carrying out an implementation and sustainment plan compared to higher average completion rates for activities related to treatment evaluation, funding, and training.

Table 3. Adherence, dose, and participant responsiveness to the ACT SMART toolkit calculated overall, by phase, and by activity across ASD community agency implementation teams

	Adherence ***M(SD)*** **(0-100%)**	**Dose** ***M(SD)*** **(0-3)**	**Participant Responsiveness** ***M(SD)*** **(1-5)**
Overall	**87 (6.00)**	**2.42 (.50)**	**3.91 (.56)**
Pre-Implementation *Recruitment*	100 (0.00)	-	-
Agency first contacted	100 (0.00)	-	-
Agency interest indicated	100 (0.00)	-	-
Agency recruitment Meeting	100 (0.00)	-	-
Orientation workshop	100 (0.00)	-	-
Phase 1 *Agency Exploration*	83 (18.00)	-	3.79 (0.71)
Meeting at agency to recruit for agency assessment	83 (40.82)	-	-

Table 3 (cont'd)

Emails sent to agency staff for agency assessment	100 (0.00)	-	-
ACT SMART agency assessment (75% staff response rate)	67 (51.64)	-	-
Phase 2 *Treatment Selection and Adoption Decision*	92 (10.00)	2.48 (0.60)	2.33 (1.03)
Treatment selection	100 (0.00)	-	-
Evaluate treatment fit	100 (0.00)	3.00 (0.00)	-
Evaluate treatment feasibility	100 (0.00)	3.00 (0.00)	-
Evaluate clinical value and research validity	83 (40.82)	2.50 (1.22)	-
Evaluate training requirements	100 (0.00)	2.33 (1.00)	-
Evaluate funding source	100 (0.00)	2.33 (1.03)	-
Evaluate benefit-cost estimator	60 (54.78)	1.75 (1.50)	-
Make an adoption decision	83.33 (40.82)	2.00 (1.55)	-
Phase 3 *Planning for Implementation*	72 (27.00)	1.72 (0.59)	3.50 (1.87)
Gather treatment materials	60 (54.78)	0.60 (0.55)	-
Evaluate prospective treatment adaptations	80 (44.72)	2.40 (1.34)	-
Develop an adaptation plan	25 (50.00)	1.00 (1.73)	-
Develop a training plan	100 (0.00)	2.60 (0.89)	-
Develop an implementation and sustainment plan	80 (44.72)	1.60 (1.14)	-
Phase 4 *Implementation*	83 (24.00)	2.98 (0.05)	3.33 (1.63)
Carry out adaptation plan	100 (0.00)	-	-
Carry out training plan	100 (0.00)	-	-
Carry out implementation and sustainment plan	60 (55.00)	-	-

In terms of dose, the independent observer gave agency implementation teams an overall average rating falling between "Moderately Completed" to "Mostly/All Completed" (M = 2.42, SD = .50). The lowest average dose rating was between "Minimally Completed" to "Moderately Completed" (M = 1.72, SD = .59) during the planning for implementation phase whereas the highest average dose rating was between "Moderately Completed" to "Mostly/All Completed" (M = 2.98, SD = .05) 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 evaluating a benefit-cost estimator, gathering treatment materials, developing an adaptation plan, and developing an implementation and sustainment plan compared to higher average completion rates for activities related to treatment evaluation, funding, and training. 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.

For participant responsiveness, ACT SMART facilitators gave agency implementation teams an overall average rating between "Moderately Engaged" to "Very Engaged" (M = 3.91, SD = .56). The lowest average participant responsiveness rating was between "Slightly Engaged" and "Moderately Engaged" (M = 2.33, SD = 1.03) during the treatment selection and adoption decision phase of the toolkit. The highest average participant responsiveness rating was between "Moderately Engaged" to "Very Engaged" (M = 3.79, SD = .71) during the agency exploration phase (See Table 3). For facilitation meetings with multiple ACT SMART facilitators present, there was a 90.74% average agreement on participant responsiveness ratings.

Spearman correlations among the implementation strategy fidelity variables and video modeling use variables are presented in Table 4. We found the only significant correlation to be

between dose and participant responsiveness, $r(4) = .83$, $p < .05$, indicating that as dose increased so too did participant responsiveness.

Table 4. Means, standard deviations, and spearman correlations with 95% confidence intervals for implementation strategy fidelity and proportion of direct providers using video modeling

	Proportion of Direct Providers Using Video Modeling Pre-Toolkit	**Adherence**	**Dose**	**Participant Responsiveness**	**Proportion of Direct Providers Using Video Modeling Post-Toolkit**
Proportion of Direct Providers Using Video Modeling Pre-Toolkit	-	.15 [-0.75, 0.86]	-.29 [-0.89, 0.68]	-.44 [-0.92, 0.58]	.09 [-0.78, 0.84]
Adherence		-	.60 [-0.41, 0.95]	.54 [-0.48, 0.94]	.43 [-0.59, 0.92]
Dose			-	.83* [0.05, 0.98]	.49 [-0.54, 0.93]
Participant Responsiveness				-	.77 [-0.11, 0.97]
M	22.0	87.0	2.42	3.91	42.0
SD	22.0	6.0	0.50	0.56	36.0

Note. *$p < .05$

By Agency Fidelity to the ACT SMART Toolkit. Across agencies, there was generally high adherence to toolkit activities, with the agency implementation team with the lowest overall adherence rating adhering to an average of 76% (*SD* = 17%) of required toolkit activities (See Table 5). 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 planning for implementation phase appeared to have the lowest adherence ratings across agencies.

Table 5. Adherence to the ACT SMART toolkit calculated overall, by phase, and by activity for each ASD community agency implementation team

	Adherence *M(SD)* (0-100%)					
	Agency 1	**Agency 2**	**Agency 3**	**Agency 4**	**Agency 5**	**Agency 6**
Overall	**84.17 (16.77)**	**93.33 (14.91)**	**91.67 (14.43)**	**92.00 (17.89)**	**88.00 (26.83)**	**76.17 (16.86)**
Pre-Implementation *Recruitment*	100 (0.00)	100 (0.00)	100 (0.00)	100 (0.00)	100 (0.00)	100 (0.00)
Agency first contacted	100	100	100	100	100	100
Agency interest indicated	100	100	100	100	100	100
Agency recruitment meeting	100	100	100	100	100	100
Orientation workshop	100	100	100	100	100	100
Phase 1 *Agency Exploration*	66.67 (57.74)	66.67 (57.74)	100 (0.00)	100 (0.00)	100 (0.00)	66.70 (57.74)
Meeting at agency to recruit for agency assessment	100	0	100	100	100	100
Emails sent to agency staff for agency assessment	100	100	100	100	100	100
ACT SMART agency assessment (75% staff response rate)	0	100	100	100	100	0
Phase 2 *Treatment Selection and Adoption Decision*	87.50 (35.36)	100 (0.00)	75.00 (46.29)	100 (0.00)	100 (0.00)	87.50 (35.36)
Treatment selection	100	100	100	100	100	100
Evaluate treatment fit	100	100	100	100	100	100

Table 5 (cont'd)

Evaluate treatment feasibility	100	100	100	100	100	100
Evaluate clinical value and research validity	100	100	0	100	100	100
Evaluate training requirements	100	100	100	100	100	100
Evaluate funding source	100	100	100	100	100	100
Evaluate benefit-cost estimator	0	100	0	-	100	100
Make an adoption decision	100	100	100	100	100	0
Phase 3 *Planning for Implementation*	100.00 (0.00)	100 (0.00)	-	60.00 (54.77)	40.00 (54.77)	60.00 (54.77)
Gather treatment materials	100	100	-	0	0	100
Evaluate prospective treatment adaptations	100	100	-	100	0	100
Develop an adaptation plan	100	-	-	0	0	0
Develop a training plan	100	100	-	100	100	100
Develop an implementation and sustainment plan	100	100	-	100	100	0
Phase 4 *Implementation*	66.67 (57.74)	100 (0.00)	-	100 (0.00)	100 (0.00)	66.67 (57.74)
Carry out adaptation plan	100	-	-	-	-	100
Carry out training plan	100	-	-	100	100	100
Carry out implementation and sustainment plan	0	100	-	100	100	0

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 adoption decision phase of

the toolkit (See Table 6). Like the ratings of adherence by agency, there was variability in dose ratings but no consistent identifiable patterns. Further, the planning for implementation phase had the lowest dose ratings across agencies.

Table 6. Dose to the ACT SMART toolkit calculated overall, by phase, and by activity for each ASD community agency implementation team

	Dose *M(SD)* (0-3)					
	Agency 1	**Agency 2**	**Agency 3**	**Agency 4**	**Agency 5**	**Agency 6**
Overall	2.69 (0.43)	2.65 (0.38)	1.50 (0.00)	2.48 (0.76)	2.27 (1.27)	2.25 (0.66)
Phase 2 *Treatment Selection and Adoption Decision*	3.00 (0.00)	2.71 (0.76)	1.50 (1.64)	2.83 (0.41)	3.00 (0.00)	2.00 (1.29)
Treatment selection	-	-	-	-	-	-
Evaluate treatment fit	3	3	3	3	3	3
Evaluate treatment feasibility	3	3	3	3	3	3
Evaluate clinical value and research validity	3	3	0	3	3	3
Evaluate training requirements	-	3	-	2	-	3
Evaluate funding source	3	1	3	3	3	1
Evaluate benefit-cost estimator	-	3	0	-	3	1
Make an adoption decision	3	3	0	3	3	0
Phase 3 *Planning for Implementation*	2.20 (1.10)	2.25 (0.96)	-	1.60 (1.52)	0.80 (1.30)	1.75 (1.50)

Table 6 (cont'd)

Gather treatment materials	1	1	-	0	0	1
Evaluate prospective treatment Adaptations	3	3	-	3	0	3
Develop an adaptation plan	3	-	-	0	0	-
Develop a training plan	3	3	-	3	1	3
Develop an implementation and sustainment plan	1	2	-	2	3	0
Phase 4 *Implementation*	2.89 (0.44)	3.00 (0.00)	-	3.00 (0.00)	3.00 (0.00)	3.00 (0.00)
Carry out adaptation plan	-	-	-	-	-	-
Carry out training plan	-	-	-	-	-	-
Carry out implementation and sustainment plan	-	-	-	-	-	-

Consistent with both observations of adherence and dose ratings across agencies, all agencies also had relatively high ratings of participant responsiveness (See Table 7). The agency with the lowest average participant responsiveness rating was rated between "Moderately Engaged" to "Very Engaged" (M = 3.33, SD = 0.11). However, in contrast to observations of adherence and dose ratings, agencies did not appear to have lower participant responsiveness during the planning for implementation phase compared to other toolkit phases.

Table 7. Participant responsiveness to the ACT SMART toolkit calculated overall and by phase for each ASD community agency implementation team

	Participant Responsiveness *M(SD)* (1-5)					
	Agency 1	**Agency 2**	**Agency 3**	**Agency 4**	**Agency 5**	**Agency 6**
Overall	**3.75 (0.25)**	**4.63 (0.48)**	**3.33 (0.11)**	**3.75 (0.29)**	**4.47 (0.39)**	**3.37 (0.32)**
Phase 1 *Agency Exploration*	4	4	3.25	3.5	5	3
Phase 2 *Treatment Selection and Adoption Decision*	3.5	5	3.40	3.50	4.50	3.50
Phase 3 *Planning for Implementation*	3.75	4.50	-	4.0	4.13	3.60
Phase 4 *Implementation*	-	5.0	-	4.0	4.25	-

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, and participant responsiveness) across phases revealed a significant main effect of toolkit phase for dose ($F(2,8) = 11.38$, $MSE = .190$, $p = .005$, $\eta^2 = .74$, 95% CI [.16, .84]). However, there was not a significant main effect of toolkit phase for either adherence ($F(3,12) = 1.11$, $MSE = .041$, $p = .384$, $\eta^2 = .22$, 95% CI [0, .43]) or participant responsiveness ($F(3,6) = .19$, $MSE = .211$, $p = .902$, $\eta^2 = .09$, 95% CI [0, .25]).

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 planning for implementation phase (phase 3) of the toolkit was significantly lower than the

average dose rating during the implementation phase (phase 4) of the toolkit (d = 3.98, 95% CI [1.05, 6.88].

Fidelity-EBP Use Relationships. After conducting our exploratory beta regressions and series of exploratory Firth-type multilevel logistic GEE models with exchangeable correlation structures to examine the relationship between implementation strategy fidelity, and EBP use, we found uninterpretable results due to the limited sample size available. To ensure a full report, these results can be found in the Appendix E.

DISCUSSION

Fidelity to the ACT SMART Toolkit. Our present 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 and explored whether greater implementation strategy fidelity could predict increases in the desired outcome of EBP use within ASD community agencies. Our evaluation provided one of the first models of assessing fidelity to a multi-faceted implementation strategy and important insights into both the potential for ASD community agencies to use the toolkit most effectively and implementation strategy fidelity more broadly. Given that EBPs for ASD are often inconsistently or not implemented in community settings despite their potential to improve outcomes for a growing clinical population, understanding effective use of the toolkit could contribute to addressing an important research-to-practice gap (Drahota et al., 2020; Paynter et al., 2016; Pickard et al., 2017; Wong et al., 2015; Wood et al., 2015).

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. We also found a significant positive correlation between dose and participant responsiveness, which may indicate that completing a greater amount of the toolkit allows for greater engagement. Consistent with this observation, researchers evaluating intervention fidelity have found that increased dose may influence the quality of participant responsiveness, as completing more of an intervention leads to higher frequency of interaction and greater engagement (Hulleman & Cordray, 2009; Knoche et al., 2010). However, the significant positive correlation between dose and participant responsiveness may also reflect the existence of a latent variable. Carroll and colleagues (2007) highlight the concept of "reaction

evaluation," or the judgments made by recipients about the relevance and outcomes of an intervention, as important in considering intervention fidelity. If more positive reactions lead to a greater willingness to complete more components and engage more with an intervention or implementation strategy, "reaction evaluation" could potentially underly both dose and participant responsiveness in intervention fidelity and implementation strategy fidelity.

Although we found adherence, dose, and participant responsiveness to the ACT SMART Toolkit 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 planning for implementation 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 planning for implementation phase required gathering materials, evaluating prospective adaptations, and developing training, adaptation, and sustainment 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 and sustainment plans compared to toolkit activities related to evaluating treatments, funding, and training. Thus, the lower dose in the planning for implementation phase may reflect the need to lower the amount or intensity of toolkit activities required to better align with ASD community agency's ability to plan for implementation. Considering recently identified context-specific barriers and facilitators to the ACT SMART Toolkit would also likely be critical to enhancing the planning for implementation phase (Powell et al., 2020; Sridhar et al., 2021).

Another potential rationale for significantly lower dose during the planning for implementation 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 planning for implementation 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 (Leal Filho et al., 2019). Thus, the ACT SMART Toolkit may also benefit from incorporating a greater focus on the practical importance of planning for implementation of EBPs.

Our present investigation was able to adequately assess overall implementation strategy fidelity to the ACT SMART Toolkit and consider implications for effective use of the toolkit within ASD community agencies. However, our exploratory analysis was ultimately unequipped to evaluate the relationship between increased fidelity and increased EBP use given the limited sample size of the pilot study (See Appendix E). While the present findings from our exploratory analysis cannot be interpreted with certainty, we contend that they highlight potential for significant effects of dose and participant responsiveness on EBP use, while the relationship between adherence and EBP use remains non-significant.

Assuming these findings can be replicated and interpreted in future investigations, there may be the possibility that the ACT SMART Toolkit is composed of both core and peripheral components (Damschroder et al., 2009; Stirman et al., 2012, 2019). Specifically, adherence to all toolkit activities may not be necessary to achieve a preliminary impact on increasing direct provider reported EBP use. Given that the lowest adherence was observed during the planning for implementation phase (phase 3), it may be particularly likely to include activities peripheral to the core components of the ACT SMART Toolkit. However, lower adherence during this

phase may also simply reflect fatigue with the toolkit and preparing to implement the chosen EBP. In addition, having found that dose is also the lowest during the planning for implementation phase but still has a potential significant effect on provider reported EBP use, adjustment of the demands during the planning for implementation phase may nonetheless be of importance to enhance feasibility and potential impact on provider reported EBP use.

Another potential explanation for the lack of an identified linear relationship between adherence to the toolkit and EBP use may be that a curvilinear relationship exists instead, such that modest adherence is associated with the greatest EBP use. Consistently, researchers have suggested curvilinear relationships between intervention adherence and desired outcomes (Barber et al., 2006; Hogue et al., 2008; McHugo et al., 2007). Thus, assessing both linear and curvilinear relationships between adherence and provider reported EBP use could allow for greater insight into whether both core and peripheral components of the ACT SMART Toolkit exist.

To sufficiently evaluate each of these hypotheses regarding core and peripheral components of the ACT SMART Toolkit, larger sample sizes in future studies will be required. This is consistent with the phases of intervention implementation studies proposed by Hamilton & Mittman (2018). They propose that initial studies evaluate implementation programs during a pilot study to develop preliminary evidence surrounding feasibility, acceptability, and potential effectiveness of implementation strategies and subsequent studies focus on fidelity and adaptation in efficacy oriented small-scale trials (Hamilton & Mittman, 2018).

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 (Berry et al., 2021; Slaughter et al., 2015). Further, Slaughter et al. (2015) have 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 (2021) recently used an adapted 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 (Akiba et al., 2021; Haynes et al., 2015; Moore et al., 2015; Powell et al., 2019). High fidelity to an implementation strategy may be reflective of other important implementation outcomes, such as high acceptability, appropriateness, and feasibility (Proctor et al., 2011; Weiner et al., 2017). Further, implementation strategy fidelity can 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 (Kirk et al., 2019; Mihalic, 2004; Perez Jolles et al., 2019). In turn, this knowledge can 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 multi-faceted implementation strategy difficult (Sridhar et al., 2021).

From our instrumental case study of fidelity to the ACT SMART toolkit, we have demonstrated that fidelity to multi-faceted, 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 planning for implementation versus components focusing on implementation itself. We have 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. Taken together, these findings suggest that a next step to further understand implementation strategy fidelity may be researching its potential dynamic 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 multi-faceted, 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 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, we may have been capturing a latent variable underlying dose and participant responsiveness given their significant positive correlation. Further, Berry and colleagues (2021) 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 standard measures specific to implementation strategy fidelity have not yet been developed (Lewis & Dorsey, 2020). 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 (Ibrahim & Sidani, 2015).

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 still been found to be more accurate than collecting reports directly from participants (Ibrahim & Sidani, 2015). Further, when two facilitators independently gave ratings for participant responsiveness, there were high rates of agreement.

Despite the strength of assessing implementation strategy fidelity to a multi-faceted, multi-phased implementation strategy, there were also some notable limitations. 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., website versus facilitation meetings). Thus, we are unable to make conclusions about all activities and the impact of the multi-faceted 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 the aforementioned factors may be moderators of the relationship between implementation strategy fidelity to the ACT SMART toolkit and increased EBP use (Hasson et al., 2012).

Conclusion & Future Directions. In summary, using an instrumental case study approach, we increased 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 agencies. However, we also found that there was some variability in fidelity among toolkit phases, which points to possible adaptations to improve the potential for the toolkit to be used in ASD community agencies even further. Although we were not able to fully evaluate the relationship between fidelity to the ACT SMART Toolkit and the desired outcome of EBP use, our findings highlighted that further investigation of this relationship with larger samples may provide important insight into the existence of potential core and peripheral components of the toolkit (Damschroder et al., 2009; Stirman et al., 2012; Stirman et al., 2019). In turn, this understanding may also be able to guide selection of specific adaptations to the toolkit. Considering such adaptations may be critical as these findings may reflect that fidelity to multi-faceted, multi-

phased implementation strategies is dynamic and affected by both strategy content and context.

Future research would benefit from the exploration of both linear and curvilinear relationships between adherence and EBP use, consideration of potential moderators of implementation strategy fidelity, and use of both standard measures and independent raters (Barber et al., 2006; Hasson et al., 2012; Hogue et al., 2008; Ibrahim & Sidani, 2015; Lewis & Dorsey, 2020; McHugo et al., 2007). In addition, future studies may benefit from a design intended to systematically evaluate fidelity to all components and facets of a strategy. These lines of research may provide further insight into both effective use of the ACT SMART Toolkit as well as the inner workings of implementation strategy fidelity more broadly.

Taken together, our findings and suggestions for future research are critically important given the strong need for consistent implementation of EBPs for ASD in community settings to improve care for autistic youth. Moreover, our findings advance the field of implementation science by providing a systematic evaluation of implementation strategy fidelity that may inform the theory of evaluation of discrete as well as multi-faceted implementation strategies within other mental and behavioral service systems. By increasing the use of and fidelity to effective implementation strategies facilitating EBP adoption, utilization and sustainment within community-based settings, there is potential to increase overall public health.

APPENDICES

Appendix A. ACT SMART Implementation Milestones Form

Phase	ACT SMART Phase	Activity	Date Initiated	Completed (Yes/No)	Date Completed
Pre-Implementation	Recruitment	Agency first contacted			
		Agency interest indicated			
		Agency recruitment meeting			
		Orientation workshop			
Implementation	Phase 1 Date initiated:	Meeting at agency to recruit for agency assessment			
		Emails sent to agency staff for agency assessment			
		ACT SMART agency assessment (75% staff response rate)			
	Phase 2 Date initiated:	Treatment selection (Phase 2, Step 1, Activity 1)			
		Evaluate treatment fit (Phase 2, Step 2, Activity 1)			
		Evaluate treatment feasibility (Phase 2, Step 2, Activity 2)			
		Evaluate clinical value and research validity (Phase 2, Step 2, Activity 3)			
		Evaluate training requirements (Phase 2, Step 2, Activity 4)			
		Evaluate funding source (Phase 2, Step 2, Activity 5)			
		Evaluate benefit-cost estimator (Phase 2, Step 2, Activity 6)			
		Make an adoption decision (Phase 2, Step 3, Activity 1)			
	Phase 3 Date initiated:	Gather treatment materials (Phase 3, Step 1, Activity 1)			
		Evaluate prospective treatment adaptations (Phase 3, Step 1, Activity 2)			
		Develop an adaptation plan (Phase 3, Step 1, Activity 3)			
		Develop a training plan (Phase 3, Step 2, Activity 1)			
		Develop an implementation and sustainment plan (Phase 3, Step 3, Activity 1)			
	Phase 4 Date initiated:	Carry out adaptation plan (Phase 4, Step 1, Activity 1)			
		Carry out training plan (Phase 4, Step 2, Activity 1)			
		Carry out implementation and sustainment plan (Phase 4, Step 3, Activity 1)			

Agency ID:
Start Date: _____
AS Facilitator: _____

Appendix B. ACT SMART Activity Fidelity Form

ACT SMART Activity Fidelity

Phase 2: Treatment Selection and Adoption Decision			
Treatment Fit (6 items; 1 area) Phase 2, Step 2, Activity 1			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed (1-2 items)	2 Moderately Completed (3-4 items)	3 Mostly/All Completed (5-6 items)
Treatment Feasibility (6 items; 1 area) Phase 2, Step 2, Activity 2			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed (1-2 items)	2 Moderately Completed (3-4 items)	3 Mostly/All Completed (5-6 items)
Clinical Value and Research Validity (10 items; 2 areas) Phase 2, Step 2, Activity 3			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed (1-3 items)	2 Moderately Completed (4-7 items)	3 Mostly/All Completed (8-10 items)
c. How many areas were attended to?			
0 None	1 Some (1 area)	2 All (2 areas)	
Training Requirements (25 items; 9 areas) Phase 2, Step 2, Activity 4			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed? If no training requirements identified, circle N/A here			
0 Nothing Completed	1 Minimally Completed (1-10 items)	2 Moderately Completed (11-19 items)	3 Mostly/All Completed (20-25 items)
c. How many areas were attended to? If no training requirements identified, circle N/A here			
0 None	1 Minimal (1-3 areas)	2 Some (4-7 areas)	3 Mostly or All (8-9 areas)
Funding Source (1-3 items; 1 area) Phase 2, Step 2, Activity 5			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed? *Use judgment if fewer sections were completed*			
0 Nothing Completed	1 Minimally Completed (e.g., 1 item)	2 Moderately Completed (e.g., 2 items)	3 Mostly/All Completed (e.g., 3 items)
Benefit-Cost Estimator (46 items; 7 areas) Phase 2, Step 2, Activity 6			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
c. How many areas were attended to?			
0 None	1 Minimal (1-2 areas)	2 Some (3-5 areas)	3 Mostly or All (6-7 areas)
Adoption Decision (7 items, 2 areas) Phase 2, Step 3			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed?			

0 Nothing Completed	1 Minimally Completed (1 items)	2 Moderately Completed (2-3 items)	3 Mostly/All Completed (4-5 items)
c. How many areas were attended to? 0 None	1 Some (1 area)	2 All (2 areas)	
Phase 3: Planning for Implementation			
Gathering Materials (1 items; 0 areas) Phase 3, Step 1, Activity 1			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed? 0 Nothing Completed		1 All Completed (1 item)	
Evaluating Prospective Adaptations (17 items; 2 areas) Phase 3, Step 1, Activity 2			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed? 0 Nothing Completed	1 Minimally Completed (1-5 items)	2 Moderately Completed (6-12 items)	3 Mostly/All Completed (13-17 items)
c. How many areas were attended to? 0 None	2 Some (1 areas)	3 All (2 areas)	
Adaptation Plan (Variable items; 5 areas) Phase 3, Step 1, Activity 3			
a. Was the form completed?			Yes(1) No(0) N/A (2)
b. How many areas were attended to? 0 None	1 Minimal (1 area)	2 Some (2-3 areas)	3 Mostly or All (4-5 areas)
c. How detailed were the Agency Leader/Team's comments, when made? 0 No Comments	1 Minimal Detail	2 Some Detail	3 Very Detailed
Training Plan (Variable Items; 7 areas) Phase 3, Step 2, Activity 1			
a. Was the form completed?			Yes(1) No(0)
b. How many areas were attended to? 0 None	1 Minimal (1-2 areas)	2 Some (3-5 areas)	3 Mostly or All (6-7 areas)
c. How detailed were the Agency Leader/Team's comments, when made? 0 No Comments	1 Minimal Detail	2 Some Detail	3 Very Detailed
Implementation and Sustainment Plan (5 areas) Phase 3, Step 3, Activity 1			
a. Was the form completed?			Yes(1) No(0)
b. How detailed were the Agency Leader/Team's comments, when made? 0 No Comments	1 Minimal Detail	2 Some Detail	3 Very Detailed
Phase 4: Implementation			
Evaluation Survey 1			
a. Was the form completed?			Yes(1) No(0)
b. How much of the worksheet was completed? 0	1	2	3

Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 2			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 3			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 4			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 5			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 6			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 7			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 8			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0	1	2	3
Nothing Completed	Minimally Completed	Moderately Completed	Mostly/All Completed

Evaluation Survey 9			
a. Was the form completed?		Yes(1)	No(0)

b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 10			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Phase 4: Implementation			
Evaluation Survey 11			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 12			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 13			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 14			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 15			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 16			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed

Evaluation Survey 17			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 18			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 19			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed
Evaluation Survey 20			
a. Was the form completed?		Yes(1)	No(0)
b. How much of the worksheet was completed?			
0 Nothing Completed	1 Minimally Completed	2 Moderately Completed	3 Mostly/All Completed

Appendix C. ACT SMART Implementation Team Engagement Rating Scale

ACT SMART Facilitation Meeting

Implementation Team Engagement Rating Scale – Facilitator Report

Provide the following engagement ratings for the period of time from last facilitation meeting to the current facilitation meeting:

5 Extremely Engaged

- The implementation team displays great willingness to discuss progress on the ACT SMART toolkit and upcoming goals with the facilitator (i.e., team fully initiates discussion topics and/or appears fully open to discussing progress and goals).
- The implementation team contributes detailed information to identify meeting agenda topics; there is a sense of true collaboration with the facilitator
- The implementation team is extremely willing and capable of implementing the ACT SMART toolkit based on the phase they are in and topics from facilitation meeting

4 Very Engaged

- The implementation team displays much willingness to discuss progress on the ACT SMART toolkit and upcoming goals with the facilitator (i.e., team mostly initiates discussion topics and/or appears mostly open to discussing progress and goals)
- The implementation team contributes much information to identify meeting agenda topics; there is a sense of collaboration with the facilitator
- The implementation team is very willing and capable of implementing the ACT SMART toolkit based on the phase they are in and topics from facilitation meeting

3 Moderately Engaged

- The implementation team displays some willingness to discuss progress on the ACT SMART toolkit and upcoming goals with the facilitator (i.e., team is responsive to discussion topics and appears somewhat open to discussing progress and goals).
- The implementation team contributes adequate information to identify meeting agenda topics; there is a sense of consultation with the facilitator rather than collaboration.
- The implementation team is somewhat willing and capable of implementing the ACT SMART toolkit based on the phase they are in and topics from facilitation meeting

2 Slightly Engaged

- The implementation team displays minimal willingness to discuss progress on the ACT SMART toolkit and upcoming goals with the facilitator (i.e., team is minimally responsive to discussion topics and appears minimally open to discussing progress and goals).
- The implementation team contributes minimally to identifying meeting agenda topics; there is a sense of indifference with facilitation meetings
- The implementation team appears indifferent and minimally capable of implementing the ACT SMART toolkit based on the phase they are in and topics from facilitation meeting

1 Not at all engaged

- The implementation team is not willing to discuss progress on the ACT SMART toolkit and upcoming goals with the facilitator (i.e., team is not responsive to discussion topics and not open to discussing progress and goals).
- The implementation team does not contribute to identifying meeting agenda topics; there is a sense of not wanting to participate in facilitation meetings.
- The implementation team is not willing and capable of implementing the ACT SMART toolkit based on the phase they are in and topics from facilitation meeting

Appendix D. ASD Strategies and Interventions Survey

Practice/ Strategies Assessment (ASD-SIS)

Practices/Strategies Currently Used

1. Think about the intervention practices and strategies that you use with all of your clients, from the following list, please check mark all that you use. In addition, please rate the extent to which you agree with the following statement for each intervention strategy, "I feel competent in my delivery of this practice."

	Disagree Strongly	Disagree	Uncertain	Agree	Agree Strongly
☐ Academic interventions	1	2	3	4	5
☐ Addressing parent/family issues	1	2	3	4	5
☐ Alternative Communication System	1	2	3	4	5
☐ Articulation/Phonology-based Therapy (e.g. *PROMPT*)	1	2	3	4	5
☐ Assigning or reviewing homework	1	2	3	4	5
☐ Augmented and Alternative Communication Device	1	2	3	4	5
☐ Case management	1	2	3	4	5
☐ Cognitive Behavioral Therapy (CBT)	1	2	3	4	5
☐ Cognitive restructuring	1	2	3	4	5
☐ Delivering positive reinforcement/Rewards	1	2	3	4	5
☐ Delivering punishment	1	2	3	4	5
☐ Developmental Relationship-based treatment (e.g. *Denver Model, DIR/Floortime*)	1	2	3	4	5
☐ Dietary Changes	1	2	3	4	5
☐ Differential reinforcement	1	2	3	4	5
☐ Discrete Trial Technique	1	2	3	4	5
☐ Emotion identification and regulation	1	2	3	4	5
☐ Establishing/reviewing treatment goals or agenda	1	2	3	4	5
☐ Exercise	1	2	3	4	5
☐ Exploring client/family past	1	2	3	4	5
☐ Exposure (with or without response modification)	1	2	3	4	5
☐ Expressive language based therapy (e.g., *HANEN*)	1	2	3	4	5
☐ Extinction	1	2	3	4	5
☐ *Facilitated Communication*	1	2	3	4	5
☐ Functional Behavior Assessment	1	2	3	4	5
☐ Identifying/addressing client's strengths	1	2	3	4	5
☐ Imitation-based intervention/ Reciprocal imitation training	1	2	3	4	5
☐ Independent work systems	1	2	3	4	5
☐ Joint-attention intervention/instruction	1	2	3	4	5
☐ Limit-setting	1	2	3	4	5

☐ Massage/Touch Therapy	1	2	3	4	5
☐ Modeling	1	2	3	4	5
☐ Modifying antecedents	1	2	3	4	5
☐ Music Therapy	1	2	3	4	5
☐ Naturalistic intervention/ Naturalistic teaching strategies (e.g. *pivotal response training*)	1	2	3	4	5
☐ Parent-implemented intervention	1	2	3	4	5
☐ Peer Mediated Instruction	1	2	3	4	5
☐ *Picture Exchange Communication System*	1	2	3	4	5
☐ Play Therapy	1	2	3	4	5
☐ Positive Behavior Support (PBS)	1	2	3	4	5
☐ Problem solving	1	2	3	4	5
☐ Prompting	1	2	3	4	5
☐ Psychoanalysis	1	2	3	4	5
☐ Response interruption/ Redirecting	1	2	3	4	5
☐ Schedules (e.g., visual supports, structured work systems)	1	2	3	4	5
☐ Scripting	1	2	3	4	5
☐ Self-management	1	2	3	4	5
☐ Sensory Diet	1	2	3	4	5
☐ Sensory Integration (e.g., *auditory integration*)	1	2	3	4	5
☐ Social Communication Intervention (e.g. *SCERTS*, *Project ImPACT*)	1	2	3	4	5
☐ Social Skills Training	1	2	3	4	5
☐ Social Stories/ Narratives	1	2	3	4	5
☐ Structured play groups	1	2	3	4	5
☐ Task analysis	1	2	3	4	5
☐ Theory of Mind Training	1	2	3	4	5
☐ Video modeling	1	2	3	4	5

2. List any additional practices or strategies that you currently use with clients. In addition, please rate the extent to which you agree with the following statement for each intervention strategy, "I feel competent in my delivery of this practice."

	Disagree Strongly	Disagree	Uncertain	Agree	Agree Strongly
☐	1	2	3	4	5
☐	1	2	3	4	5
☐	1	2	3	4	5
☐	1	2	3	4	5

Appendix E. Exploratory Analysis of Implementation Strategy Fidelity and EBP Use

Table 8. Beta regression results predicting proportion of direct providers using video modeling post-toolkit

	β	***se***	***Pseudo R^2***
Model 1:			
Intercept	-11.82	5.96*	
Proportion of Direct Providers Using Video Modeling Pre-Toolkit	0.77	1.61	
Adherence	13.02	6.76 ·	.45
Model 2:			
Intercept	-4.43	2.02*	
Proportion of Direct Providers Using Video Modeling Pre-Toolkit	0.25	1.54	
Dose	1.69	0.81*	.54
Model 3:			
Intercept	-10.22	2.61***	
Proportion of Direct Providers Using Video Modeling Pre-Toolkit	3.49	1.35**	
Participant Responsiveness	2.35	0.60***	.80

Note. .p<.10, *p <. 05, **p < .01., ***p<.001

Table 9. Firth-type multilevel logistic GEE results predicting odds of direct providers using video modeling post-toolkit

	b	***se***	***Wald***
Model 1:			
Intercept	-14.81	12.90	1.31
Direct Provider Use of Video Modeling Pre-Toolkit	0.85	1.10	0.60
Adherence	16.07	13.90	1.34
Model 2:			
Intercept	-14.13	3.11	20.72***
Direct Provider Use of Video Modeling Pre-Toolkit	1.40	0.89	2.48
Dose	5.32	1.15	21.46***
Model 3:			
Intercept	-18.28	8.22	4.95*
Direct Provider Use of Video Modeling Pre-Toolkit	3.30	1.69	3.82
Participant Responsiveness	4.12	1.84	5.02*

Note. $p < .10$, *$p <. 05$, **$p < .01.$, ***$p < .001$

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