

The Self-Determined Learning Model of Instruction: Promoting Implementation Fidelity

Karrie A. Shogren

Sheida K. Raley

Graham G. Rifenbark

Kathleen Lynne Lane

Erin K. Bojanek

University of Kansas

Arun Karpur

Carol Quirk

Maryland Coalition for Inclusive Education

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Abstract

There has been an increased focus on the tenets of implementation science in special education research, namely on the degree to which interventions are implemented as intended (i.e., fidelity of implementation) and factors that influence fidelity of implementation. For complex interventions, such as the *Self-Determined Learning Model of Instruction* (SDLMI), there is an ongoing need to refine conceptualizations of fidelity of implementation the factors that influence it in inclusive educational contexts. Therefore, the purpose of this paper is two-fold: (a) to describe a framework for conceptualizing fidelity of implementation factors that influence fidelity when evaluating a complex intervention like the SDLMI and (b) to present initial content validity and internal consistency of a new measure designed to assess specific aspects of fidelity of implementation of the SDLMI in inclusive, general education classrooms. Implications and future directions for research in implementation science, special education, and self-determination interventions are described.

Keywords: fidelity of implementation, Self-Determined Learning Model of Instruction

The Self-Determined Learning Model of Instruction: Promoting Implementation Fidelity

The *Self-Determined Learning Model of Instruction* (SDLMI; Shogren et al., 2018d; Wehmeyer et al., 2000) is an evidence-based intervention to promote self-determination and post-school outcomes (National Technical Assistance Center on Transition, 2016). The SDLMI is unique as it was not designed to be a curriculum, but instead a model of instruction (Joyce & Weil, 1980; Shogren et al., 2018d). Models of instruction provide a framework to organize curriculum and instruction. The SDLMI provides trained facilitators (e.g., general and special educators) with a structured process to engage students in learning to self-direct the goal setting and attainment process across curricular areas. As such, the SDLMI was designed to be overlaid on any curricular content (e.g., mathematics, science, art, transition planning) to support students to self-direct the process of setting and attaining goals, building key 21st century and career and college readiness skills (Morningstar et al., 2017; National Research Council, 2012) while also enhancing engagement in content-based learning (Shogren et al., 2015c).

Implementation of a model of instruction like the SDLMI introduces complexity as it necessitates problem solving and flexibility on the part of the facilitator (e.g., general or special educator) to customize to their particular curricular area and classroom context as well as the delivery of specific supports for students to generalize learning outside of targeted instruction. In the case of the SDLMI, educators must devote instructional time to teaching the goal setting and attainment process defined by SDLMI implementation protocols, aligning this instruction with the focus of their curriculum and supporting students to apply taught goal setting and attainment skills as they are engaged in the curriculum (Burke et al., 2019; Raley et al., 2018).

The SDLMI is divided into three distinct phases - Phase 1: Set a Goal, Phase 2: Take Action, and Phase 3: Adjust Goal or Plan – of implementation that are repeated over time.

Facilitators are trained to use the SDLMI to support students in answering a set of 12 Student Questions (four per phase) to guide themselves through a process of setting individualized goals for learning and then implementing self-identified steps to achieve those goals. The targeted outcome of SDLMI instruction is enhanced student self-direction and self-regulation in the goal setting and attainment process, and the teacher facilitator shapes learning experiences to lead to desired outcomes. In inclusive, general education SDLMI implementation, teacher facilitators are trained to embed brief and explicit instruction (i.e., 15-minute “mini-lessons”) on the SDLMI Student Questions, targeting a specific class-related goal (e.g., academic skills, self-management skills, learning preparatory skills) at least twice a week. Teacher facilitators then prompt and support students to implement strategies they have learned during SDLMI “mini-lesson” instruction throughout the rest of learning activities in a class period to promote generalization and use of the self-regulated goal-setting and problem-solving skills. Therefore, teaching the 12 Student Questions, which is guided by standardized Teacher Objectives and Educational Supports, drive the instruction delivered (see Raley et al., 2018 for further information).

This delicate balance between structured yet flexible implementation introduces unique considerations for assessing fidelity as well as documenting factors influencing fidelity to SDLMI instruction, consistent with any complex intervention (Graham et al., 2016; Harn et al., 2013). The field of implementation science has provided guidance for utilizing evidence-based interventions in natural contexts (e.g., school systems) to illustrate how interventions or programs are put into practice to produce valued outcomes (Fixsen et al., 2005). However, in order to fully and effectively use interventions in natural contexts, leaders in implementation science stress a need for increased focus on (a) documenting if interventions are implemented as intended (i.e., implementation fidelity) and (b) operationalizing factors that influence

implementation and accounting for these factors both in planning for and analyzing implementation and its impact on outcomes (Cook & Odom, 2013; Fixsen et al., 2010).

The critical role of documenting, planning, and accounting for fidelity of implementation and the factors that influence it have been noted in several efficacy trials of the SDLMI (Shogren et al., 2018a; Shogren et al., 2012; Wehmeyer et al., 2012). For example, differential outcomes have been noted across disability groups and across different content-area implementations (i.e., academic versus transition planning goals for students with intellectual disability versus students with learning disabilities; Shogren et al., 2012). The noted differences in outcomes suggest student characteristics such as (e.g., disability label, gender, age) and implementation factors (e.g., teacher training, classroom characteristics) likely interact to influence outcomes. Other research has documented that teacher self-reported fidelity of the SDLMI influences not only student self-determination outcomes, but is also influenced by students' baseline levels of self-determination (Shogren et al., 2019a), suggesting an interaction of student, teacher, and implementation factors. Given the consistent finding that there is variability in outcomes of SDLMI intervention that is unexplained, there is a need for ongoing attention to analyzing fidelity of implementation and factors that influence it.

Given these areas of need, the purpose of this paper is two-fold. Building on a review of existing fidelity frameworks that describe implementation considerations related to fidelity and the factors that influence it, we first describe a broad framework for conceptualizing fidelity of implementation and influencing factors for the SDLMI. Next, we build on one aspect of the framework – directly assessing the fidelity of implementation of the SDLMI by teachers in inclusive, general education classrooms – and finally describe the development, initial content validity and internal consistency of the *SDLMI Fidelity Measure: Inclusive, General Education*

Version. We conclude with future directions for conceptualizing fidelity of implementation broadly, and highlight implications for designing, implementing, and evaluating the impact of complex interventions like the SDLMI on student outcomes.

Understanding Fidelity: Existing Frameworks

The question of whether or not an intervention was implemented as intended can initially seem to be a simple concept to define, measure, and integrate into analyses of the impacts of interventions on outcomes. However, there is no consensus definition of fidelity, elements of fidelity to be measured in intervention research, or the most appropriate way to integrate information on fidelity and factors that influence it into (a) planning for implementation and (b) analyses of intervention efficacy or effectiveness. Multiple frameworks have been introduced in disability, education, and related fields (Harn et al., 2013). There is growing consensus that multidimensional approaches are necessary, particularly for complex interventions (Graham et al., 2016; Harn et al., 2013), but there remains substantial lack of agreement on how to define the fidelity construct and how to differentiate factors influencing fidelity from observable, measurable aspects of implementation in a classroom.

Dane and Schneider (1998) identified five dimensions of fidelity that have been widely used to guide the development of fidelity of implementation measures and indices: (1) adherence, (2) dose, (3) quality, (4) participant responsiveness, and (5) program differentiation. These five elements, perhaps with the exception of program differentiation, can be aligned with the other frameworks that adopt a structural (adherence and dose) and process (quality and responsiveness) dimensions to conceptualize fidelity (O'Donnell, 2008). Other frameworks, however, are broader and focus not only on observing fidelity of implementation – although, this remains one critical element – but also conceptualizing factors that influence implementation

outside of the actual instructional process. Arguments for broader frameworks center around the need for more robust understandings of implementation to enhance the internal and external validity of the conclusions drawn about the relationship between the intervention as implemented and outcomes. For example, the National Institutes of Health (NIH) Behavior Change Consortium (Bellg et al., 2004) suggested fidelity should be conceptualized as an essential part of study design and planning and should be monitored throughout the course of an intervention. Bellg et al. (2004) described five areas of fidelity and influencing factors to be measured: (a) study design (e.g., the design enables testing of the hypotheses, which is aligned with theoretical foundations; the intervention can be delivered at the same dose to each participant), (b) training of implementers (e.g., training implementers and measuring skill acquisition to ensure that skills do not drift over time across implementers), (c) delivering treatment (e.g., monitoring implementation and adherence to the implementation protocol, controlling for non-treatment effects, minimizing contamination), (d) quantifying receipt of treatment (e.g., monitoring how able participants are to perform intervention-related skills), and (e) enactment of treatment skills (e.g., how well do skills generalize to non-treatment settings).

Carroll et al. (2007) attempted to further differentiate fidelity and influencing factors, defining adherence as the key aspect of the measurement of fidelity stating, “if an implemented intervention adheres completely to the content, frequency, duration, and coverage prescribed by its designers then fidelity can be said to be high” (p. 4). Carroll et al. (2007) asserted other factors often included in fidelity assessment are instead moderators of the relationship between the intervention and adherence, including intervention complexity, facilitation strategies (i.e., supports used to standardize implementation such as manuals or trainings), quality of delivery (i.e., extent to which the intervention is delivered in a way to achieve the intended results), and

participation responsiveness (i.e., participants' views on relevance of the intervention to them). These factors could be referred to as process elements or more broadly related to study design and implementation as defined by the NIH Behavior Change Consortium. Carroll et al. (2007) asserted these factors should be utilized to explore the reasons why an intervention was not implemented as intended (e.g., adherence was low) to inform future implementation and support strategies, thereby necessitating their measurement.

Highlighting that there are unique issues to consider in defining fidelity and factors that influence it for complex interventions, Graham et al. (2016) defined three elements to guide a review of the literature to inform their development of fidelity measures for a self-management intervention for adults with disabilities. They focused on content of the intervention (e.g., topics or components covered), delivery details (e.g., formats used, contact with interventionists), and intervention quality/competence of delivery (e.g., training, supervision). They also highlighted the role of individualization to the needs of participants. Graham et al. (2016), unlike Carroll et al. (2007), specifically included issues related to quality/competence of delivery to their definition of fidelity as assessed, not simply as factors that influenced fidelity, given the criticality of this dimension in complex interventions necessitating changes both in facilitators and participants. In reviewing the research, they found that studies tended to describe content relatively well, but there was limited measurement of delivery beyond basic adherence (e.g., number of intervention sessions delivered). Quality/competence were also frequently described in research reviewed by Graham et al. (2016) by detailing training provided for implementers, but few formal measures of quality of delivery or alignment with protocols were included. Findings from Graham et al. (2016) also suggest fidelity measures rarely address issues related to complex interventions that are influenced not only by intervention delivery by facilitators (e.g.,

teachers) but also by participant adherence, responsiveness, and use of taught strategies.

Fidelity and the Self-Determined Learning Model of Instruction

The conceptualizations of fidelity described in the previous section highlight variability in how fidelity is conceptualized and the need for a clear framework of how to assess fidelity in the classroom and document/plan for the factors that influence it. We posit that a framework for a complex intervention like the SDLMI should be multidimensional and address factors that influence fidelity as well as the direct assessment of fidelity of implementation. We aligned key dimensions from multiple frameworks to develop a fidelity framework for the SDLMI when it is implemented in inclusive, general education classrooms. We identified six key dimensions; see the left column of Table 1. The framework encompasses (a) factors that influence fidelity (e.g., study design, training providers), (b) elements that could be specifically measured through fidelity observations (e.g., adherence, quality of delivery, participant responsiveness), and (c) factors related to the enactment of treatment skills and program differentiation. We considered how each dimension in the framework specifically applied to SDLMI implementation, drawing on information from SDLMI implementation protocols developed to enable implementation in inclusive, general education classes (Shogren et al., 2019c).

Program Differentiation

The first dimension relates to how the intervention is differentiated from other interventions and practices adopted in the context, which are similarly referred to as study design and intervention complexity across other fidelity frameworks. With regards to study or intervention complexity, when SDLMI fidelity is assessed as part of an efficacy or effectiveness trial or in the context of implementation evaluation in inclusive, general education settings, there are several critical factors to consider. One is the degree to which there is a clearly aligned

theoretical framework that informs a theory of change that defines process and outcome measures. The SDLMI was designed to align with Causal Agency Theory (Shogren et al., 2015c), which provides a theoretical framework for the development of self-determination in supportive contexts. As such, the SDLMI has a theoretical foundation that leads to a clear theory of change, namely that when skills associated with self-determination (i.e., executive processes including goal setting, self-regulation, inhibitory control, and behavioral flexibility) are taught in contexts (e.g., inclusive, general education classrooms) that are supportive of the development of student autonomy, growth in self-determination and goal attainment will occur in the short term, with longer-term benefits across diverse life domains (e.g., academic learning, postschool employment, community participation). Given that these areas can be assessed using reliable measures (see subsequent receipt of treatment/enactment of treatment skills section) in the short-term during implementation, hypotheses about the development of student self-determination can be meaningfully assessed.

The SDLMI has clear distinctions from other interventions to enhance academic progress (e.g., class benchmarks, unit accrual) and postschool transition-related outcomes (e.g., employment skill development and experiences) and as a complex intervention, it requires teacher facilitators to problem solve throughout implementation, aligning with the curriculum they are teaching. To ensure the core components of the model (i.e., Student Questions, Teacher Objectives, Educational Supports) are taught; teacher facilitators build Implementation Schedules for SDLMI content, planning for how to deliver targeted lessons on skills associated with self-determination as well as how to infuse learning throughout other instruction. A standardized Implementation Schedule format is utilized to document adherence and ensure that the core components of the SDLMI are delivered throughout content instruction in a systematic

way, again differentiating this from other curriculum-driven models.

We have also developed and are utilizing in large-scale randomized controlled trials (RCTs) of the SDLMI, a School Profile Form that allows us to capture other interventions that are implemented in schools. The research team collaborates with participating school members (e.g., administrators, teachers) to complete the School Profile Form during a structured interview. Items on the School Profile Form ask school members about other school initiatives that might have similar activities to those associated with the SDLMI. Thus, the Implementation Schedule, which is continually updated as teacher schedules change, and the annual School Profile Form can be used in studies to ensure adherence and program differentiation.

Training Providers

Similarly, systematically training SDLMI facilitators is also critical to ensure that SDLMI implementation occurs as intended. As shown in Table 1, several steps have been taken to create standardized training materials to promote adherence to the SDLMI. First, standardized three-day training materials have been developed to prepare general and special education teachers for SDLMI implementation in inclusive, general education classrooms, informed by training and implementation supports for other complex interventions (Cheney et al., 2010; Lane et al., 2018; Shogren et al., 2015a). The SDLMI Teacher's Guide (Shogren et al., 2018d) and associated mini-lessons (i.e., one semester's worth of bi-weekly 15-minute lessons targeting specific Student Questions) have been developed and a set of online modules that can be shared twice a month with facilitators to guide implementation and troubleshoot problems are available for implementing schools. Each tool defines the parameters of SDLMI implementation and standardizes both the training and ongoing supports and resources to promote fidelity.

Additionally, the Teacher Self-Determination Knowledge, Skills, and Use Survey (SD-

KSU) (Shogren et al., 2018b) was adapted from the Knowledge, Confidence, and Use Surveys used in other professional learning series (Lane et al., 2015; Oakes et al., 2018), and the SDLMI Professional Development Survey (Shogren et al., 2018c) was created to evaluate teacher learning during standardized SDLMI professional development training and over the course of implementation. For example, in a current RCT, teacher facilitators complete the SD-KSU and the SDLMI Professional Development Survey before annual trainings to provide a baseline of teacher knowledge, skills, and use of the SDLMI. Teachers then complete the SD-KSU at an additional timepoint at the end of the implementation year to explore changes that occur as a result of the training and experience implementing the SDLMI over an academic year. Preliminary analyses have suggested teachers improve in their knowledge of self-determination and associated after the professional development training (Bojanek et al., 2020).

Adherence

Beyond the Implementation Schedules already described and the SD-KSU which is utilized to document changes in teacher use of the SDLMI after training and following implementation, it is necessary to have a standardized tool to support (a) teachers in self-monitoring their implementation, (b) SDLMI coaches in reporting observations and providing feedback to teachers, and (c) external observers in documenting fidelity of the implementation of the SDLMI. A standardized fidelity tool that can be used to collect, report, and analyze the degree to which the intervention is implemented as intended is one of the most widely recognized and evaluated indices of fidelity. Reporting on fidelity of implementation is a best practice in intervention research (Gersten et al., 2005). For this reason, the *SDLMI Fidelity Measure: Inclusive, General Education Version* (Shogren et al., 2018f) was developed to be used by SDLMI coaches conducting classroom observations of implementation and/or by external,

blinded observers to document fidelity. This tool, its development, and preliminary psychometrics will be described in later in this manuscript; however, it is important to note that the tool provides data on three of the dimensions of fidelity described in Table 1: adherence, quality of program delivery, and participant responsiveness.

We developed a parallel version, the *SDLMI Teacher Fidelity Measure: Inclusive, General Education Version*, that provides teachers with an opportunity to self-monitor and report their perceptions of their fidelity with the research and SDLMI coaching team. Utilizing the *SDLMI Fidelity Measure: Inclusive, General Education Version* in conjunction with the *SDLMI Teacher Fidelity Measure* can, for example, allow for examination of the congruence of perceptions of implementation by the coach/external observer and the implementing teacher, particularly when the observation is part of the SDLMI Coaching Model.

Quality of Program Delivery

As mentioned, quality of program delivery as well as degree of individualization are both central to SDLMI implementation, particularly as the intervention should be individualized to student and class learning needs. In addition to data collected from the teacher, coach, and/or observer using the *SDLMI Fidelity Measure* and *SDLMI Teacher Fidelity Measure*, quality of program delivery data can also be collected from the SDLMI Coaching Conversation Notes, which is part of the standardized SDLMI Coaching Model (Hagiwara et al., 2020). The SDLMI Coaching Model includes standardized processes for classroom observations and coaching conversations. The SDLMI Coaching Conversation Notes outlines the topics to review during the coaching session and includes a place for coaches to record important information for future reference, such as the goals and action steps decided upon to ensure a productive and meaningful conversations with teachers during subsequent coaching sessions. Further, discrepancies that

emerge between SDLMI fidelity observers and teacher self-report of fidelity can be discussed. Additionally, the Use ratings from the Teacher SD-KSU survey can be used to indicate enhanced quality in program delivery as changes in teacher use of components of self-determination are observed over time. Questions about growth in teacher skills over time and its association with additional implementation experiences can be examined, as well as the relationship between quality of program delivery/degree of individualization and outcomes.

Participant Responsiveness

The responsiveness of participants is also critical to assess as part of the implementation of the SDLMI, as students must engage in the self-regulated, problem-solving and goal-setting process that is taught by teachers using the SDLMI. If participants are not engaged in the process, they cannot move through the process and utilize the skills taught to engage in goal-directed action and ultimately enhance self-determination and postschool outcomes. Therefore, this dimension is directly rated on the teacher, coach, and observer versions of the *SDLMI Fidelity Measure: Inclusive, General Education Version* and *SDLMI Teacher Fidelity Measure* with items that directly assess student responsiveness during SDLMI lessons. For example, using a five-point rating scale, observers and coaches rate the degree to which students respond to the teacher's questions or prompts during the SDLMI lessons and the content instruction. These items, in addition to the teacher-reported information from the *SDLMI Teacher Fidelity Measure*, provide information on fidelity as it relates to participant responsiveness. Gathering information directly from students using the Self-Determination Inventory: Student Report (SDI:SR) (Shogren & Wehmeyer, 2017) documents the changes resulting from the intervention.

Receipt of Treatment

Beyond looking at participant responsiveness to the intervention, it is also important to

monitor the degree to which students are using the skills taught throughout the intervention, thereby creating direct linkages between fidelity and outcomes. This both relates to the ability of students to immediately use the skills targeted for change in the short-term, as well as generalization across contexts. For example, the *Access Survey* (Shogren et al., 2018e) can be used to measure changes in access to the general education curriculum of students with disabilities, which is a hypothesized outcome of SDLMI instruction that has been demonstrated in previous trials (Shogren et al., 2012). To measure distal student outcomes, data on postschool outcomes is utilized, as research has shown that enhanced self-determination for students with disabilities leads to enhanced postschool outcomes (Shogren et al., 2015d). Additionally, the *SDLMI Fidelity Measure: Inclusive, General Education Version*, *SDLMI Teacher Fidelity Measure*, and Teacher SD-KSU provide information on changes in teachers' implementation as they develop fluency with the SDLMI. Given that the SDLMI is a model of instruction that is intended to change the way that teacher facilitators deliver instruction to their students, measuring changes in teacher knowledge, skills, use, and fidelity of implementation also serve as indicators of receipt of treatment from facilitators.

SDLMI Fidelity Measure: Inclusive, General Education Version

As noted, direct observations of implementation of a complex intervention like the SDLMI are central to any fidelity framework and reporting data on fidelity is necessary to contextualize the relationship between an intervention and outcomes. Based on the literature, we identified dimensions that should be assessed through objective, external observations of implementation of the SDLMI in inclusive, general education contexts, namely: adherence, quality of program delivery, and participant responsiveness. To develop the *SDLMI Fidelity Measure: Inclusive, General Education Version*, we began with previous fidelity measures,

including a measure developed with the National Research Implementation Network to assess SDLMI implementation in transition planning with students with disabilities, the *SDLMI Fidelity Measure: Transition Planning* (Shogren, Wehmeyer, Antosh, et al., 2015b) as well as emerging guidelines for developing measures for examining implementation of complex interventions (Martinez et al., 2014). The *SDLMI Fidelity Measure: Transition Planning* focused on two dimensions of fidelity (adherence and quality of program delivery) and yielded an overall fidelity score that has been reported in previous research (Shogren et al., 2019b). The measure was also slightly adapted to enable teachers to self-monitor their fidelity of implementation (Shogren et al., 2019a). Ratings on the measure suggested similarities in teacher self-report and external observers' ratings (which ranged from 75% to 82% fidelity across the three phases of the SDLMI) (Shogren et al., 2019b).

To extend the use of the SDLMI to inclusive, general education classrooms with students with and without disabilities and learn from the application of the measure in transition planning, several issues were identified. First, it became apparent that it may be useful to take a dimensional approach to fidelity by specifically exploring adherence, quality of program delivery, and participant responsiveness. This dimensional approach allows for more nuanced examination of the relationship between dimensions and student outcomes as well as for enhanced precision in providing coaching supports. Additionally, implementation in inclusive, general education contexts, which necessitates targeted SDLMI instruction as well as supports for the generalized use of SDLMI skills during core content instruction (Raley et al., 2018), required consideration of ways to examine fidelity during SDLMI instruction as well as during other instructional times when SDLMI skills were to be applied (which had not been considered in previous measures). To modify the measure, we consulted with an expert in implementation

evaluation, who helped us refine our overall fidelity framework and guided modifications. The refinement process began with considering when fidelity observations would occur in inclusive, general education settings per SDLMI implementation protocols, which resulted in two main sections of the *SDLMI Fidelity Measure: Inclusive, General Education Version*: Part B - SDLMI Lesson Observation (when targeted SDLMI mini-lessons are being delivered) and Part C - Content Instruction Observation (when SDLMI content is infused into content instruction). Part A simply collects background information from the teacher before the SDLMI lesson to clarify what will be observed, including targeted Student Question(s) and Teacher Objective(s).

Table 2 provides excerpts from each section. The SDLMI mini-lesson observation (Part B) includes 12 items and the content instruction observation (Part C) includes 7 items in which the observer assesses the degree to which the teacher embeds opportunities for students to work toward their goals during content instruction without direct SDLMI instruction. Parts B and C each initially included questions targeting the three dimensions of fidelity: adherence, quality of program delivery, and participant responsiveness; however, analyses (described subsequently) ultimately led to adherence items being dropped from Part C: Content Instruction Observation as teacher facilitators did not necessarily use specific SDLMI core components (e.g., Student Questions, Teacher Objectives) during content instruction as the focus was on infusing opportunities for student use of these skills during this time. This distinction highlights the factors related to complex interventions that must be considered in assessing fidelity, as creating opportunities to enact skills may occur outside of explicit instruction.

In Part B, adherence is measured with four items that assess the degree to which the teacher facilitator demonstrates core components of the SDLMI during the 15-minute lesson, including posing targeted Student Question(s), meeting Teacher Objective(s), using Educational

Support(s). Quality of program delivery includes five items that provide information on the teacher's facilitation of student-directed instruction during the lesson. One of the items in the quality of program delivery dimension of Part B represents an overall assessment of the degree to which the SDLMI lesson instruction was student-directed as opposed to teacher-directed. The participant responsiveness dimension in Part B is comprised of three items that provide data on the extent to which students are engaged by and involved in the SDLMI during the lesson.

Quality of program delivery is measured in Part C based on four items that assess the quality of the integration of the SDLMI into the content instruction, including the degree to which the teacher provides Educational Support(s) to enable students to work on goals, action plans, and/or evaluation strategies related to core content. Participant responsiveness or use of SDLMI strategies during the content instruction observation is assessed based on three items that focus on students' generalization and use of strategies learned during the SDLMI lesson into the content instruction. After careful consideration regarding the rating scale for items, we opted to utilize different scales across items to accurately reflect how they could be assessed by an observer or coach. For example, the items related to adherence in Part B (four items) are rated on a three-point Likert-type scale (*No, Partially, Yes*) and items in the quality of program delivery and participant responsiveness dimensions across both sections are rated on a five-point Likert-type scale (in which 1 = *Not at all*, 2 = *A little*, 3 = *Somewhat*, 4 = *Mostly*, and 5 = *Definitely*). Utilizing different rating scales allowed for observers and coaches to rate items in a way that aligned with the associated dimension and the context in which they are measured.

After developing the framework for the measure and potential items, several rounds of iterative feedback from experts in the use of the SDLMI and implementation evaluation were collected and used to refine the measure. One major suggestion was to incorporate open-ended,

written responses per item so observers can provide insight into the rating to allow us to explore factors that might impact reliability of ratings, as well as to inform coaching or feedback provided to teacher facilitators. We included question prompts in each open-ended section to provide observers and coaches with an idea of what they might write in the section; however, observers are not required to answer the specific question prompts provided for each item.

Preliminary Data on the *SDLMI Fidelity Measure: Inclusive, General Education Version*

Data were collected using the *SDLMI Fidelity Measure: Inclusive, General Education Version* by trained, blinded external observers during the first semester of implementation of the SDLMI in inclusive, general education classrooms as part of a large, three-year RCT currently being conducted in six high schools across in the Mid-Atlantic. During the semester when data was collected, the SDLMI was implemented by 12 general and special education teacher facilitators who taught English Language Arts (ELA; $n = 20$) or Science ($n = 16$) classes with 899 students (class size ranged from 13 to 29 students, and approximately 16% [$n = 144$] of students had Individualized Education Programs). Three observations using a paper-and-pencil version of the tool were collected per teacher for 36 total observations. Fidelity data were collected by three trained observers who were retired school administrators with numerous years of experience conducting classroom observations in inclusive, general education classrooms. All fidelity observers attended a two-day training prior to the start of the school year that provided a comprehensive overview of self-determination and the SDLMI as well as an in-depth training on applying the *SDLMI Fidelity Measure: Inclusive, General Education Version* to example classroom videos of SDLMI instruction. All primary and secondary observers were required to reach 90% reliability across rating scale responses in order to successfully complete SDLMI fidelity observer training. We examined interrater reliability of 30% of observations by having a

secondary observer also complete the *SDLMI Fidelity Measure: Inclusive, General Education Version* simultaneously in the same classroom. Kappa ranged from 0.62 to 0.95, and using the criteria put forward by What Works Clearinghouse where 0.50 or greater is deemed acceptable (What Works Clearinghouse; WWC, 2017), we focused on the primary observers responses on the *SDLMI Fidelity Measure: Inclusive, General Education Version* in isolation in data analyses.

Data Analysis

Using the items from the three dimensions of fidelity described previously (i.e., adherence, quality of delivery, participant responsiveness), we estimated Pearson correlations to examine the relation among items across the sections of the *SDLMI Fidelity Measure: Inclusive, General Education Version* (i.e., Part B: SDLMI Lesson Observation, Part C: Content Instruction Observation). We collapsed the data across SDLMI Phase 1, 2, and 3 observations. This allowed us to determine if the functioning of the items depended on whether the observation was made from a dedicated SDLMI lesson or during the content instruction observation, exploring if our division of items into Parts B and C was justified. Prior to estimating the item level correlations, one item in the adherence dimension of Part B (“*Did the teacher provide students with Educational Support(s)? If so, which of the following Educational Supports did the teacher provide?*”) was dichotomously coded to indicate whether the teacher provided any Educational Supports (0 = *No*, 1 = *Yes*). In the event item functioning depended on section of the measure (i.e., Part B or C), the plan was to create dimension scores (i.e., adherence, quality of program delivery, participant responsiveness) within each Part by taking the sum across the relevant items and report them as percent of maximum (POM) scores. We then examined scale scores across dimensions within Parts B and C as well as broken down by the three phases of the SDLMI to look for differences across Parts or Phases.

Results

When examining item-level correlations for the *SDLMI Fidelity Measure: Inclusive, General Education Version*, a clear pattern emerged. Across fidelity dimensions, items had stronger relations within sections compared with between sections. In response to this finding, we decided to retain the organization of the scale into Parts B and C, and moved forward with examining scale scores by Part, fidelity dimension, and phase of SDLMI instruction. As shown in Table 3, with respect to the adherence dimension in Part B, mean fidelity was 77.14 percent of the maximum score ($SD = 22.44$). With respect to the quality of program delivery dimension associated with Part B, mean fidelity was 65.22 with a standard deviation of 18.77. In terms of participant responsiveness during the SDLMI lesson (i.e., Part B), mean fidelity was 61.52 with a standard deviation of 19.94. Due to content instruction (Part C) being independent of explicit instruction on the SDLMI (Part B), no Part C items were hypothesized to be part of the adherence dimension, as previously mentioned. In terms of Part C quality of delivery, mean fidelity was 40.29 with a standard deviation of 19.63. In terms of Part C participant responsiveness, mean fidelity was 37.14 with a standard deviation 21.16. We then examined correlations among the scale scores, finding significant positive associations with the exception of the association between the adherence dimension of Part B and the participant responsiveness dimension of Part C ($r = 0.31, p = 0.07$). The largest associations were observed between quality of program delivery and participant responsiveness: 0.87 in Part B and 0.84 in Part C. Table 4 contains a correlation matrix for all scale scores across all phases of the SDLMI.

As shown in Table 5, when further breaking down fidelity scores across SDLMI Phases 1, 2, and 3 for Part B, the percent of maximum points available was highest for adherence and ranged from 74.29 to 84.17, followed by quality of program delivery which ranged from 60.87 to

70.29; and finally, participant responsiveness which ranged from 58.52 to 63.89 across SDLMI phases. When examining the fidelity dimensions of Part C: Content Instruction Observation, the percent of maximum was highest for quality of program delivery which ranged from 37.50 to 45.00; whereas, participant responsiveness ranged from 32.59 to 44.44. Regardless of the dimension or Part B or C, scores were highest during Phase 2.

Implications

Overall, preliminary analyses of the data collected over one semester of implementation using the *SDLMI Fidelity Measure: Inclusive, General Education Version* suggest that, with training, blinded classroom observers can use the tool reliably to observe adherence, quality of program delivery, and participant responsiveness during targeted, 15-minute SDLMI lessons (Part B) as well as observe the quality of program delivery and participant responsiveness when the SDLMI content is embedded throughout other non-SDLMI instruction (Part C). The results suggest items used to assess fidelity are best grouped separately in Parts B and C, suggesting differences in what is being observed across SDLMI and non-SDLMI instruction, as might be expected but is useful to confirm for a complex intervention like the SDLMI. As also anticipated, the data in Table 3 suggest that quality and responsiveness are rated as higher during Part B than Part C instruction. Given that other instruction is occurring during Part C, the degree to which SDLMI concepts and learning are emphasized during a Part C observation is likely to vary as well as likely be lower than during targeted instruction. Additionally, it should be noted teacher facilitators in the referenced RCT were in their first semester of implementing the SDLMI and it is possible their scores on Part C will increase over time as they gain fluency with the model and integration in content instruction and associated activities. Further research is needed to more fully examine these relationships, as well as the relationship between dimensions

of fidelity over time, as there was a stronger correlation between quality of program delivery and participant responsiveness in Part B and Part C, but a slightly lower correlation in Part B of quality of program delivery and participant responsiveness with adherence. This suggests there may be more overlap in quality of program delivery and participant responsiveness than with either of these dimensions and adherence, but the degree to which these patterns hold over time and with larger samples has yet to be examined.

There is also a need for ongoing research to establish the necessary and expected levels of fidelity for implementing complex interventions, as well as the level of fidelity across dimensions that will impact student outcomes. For example, Borrelli et al. (2005) defined studies with “high treatment fidelity” in the field of health behavior research as those studies that had 80% or greater adherence. Therefore, the level of adherence found during Part B instruction with the SDLMI approached this standard (77%); however, levels of quality of program delivery and participant responsiveness were lower in Part B observations (65 and 62%, respectively) and much lower in Part C (40 and 37%, respectively). Limited work, however, has focused on expected levels of quality of program delivery and participant responsiveness, compared to adherence. The values in this study, particularly for adherence and quality of program delivery are similar to our previous work assessing the fidelity of the SDLMI in the context of transition planning, where an overall fidelity score comprised of questions of adherence and quality ranged from 75% to 82% across the three phases of the SDLMI (Shogren et al., 2019b). Further, in previous work, we established that higher teacher self-monitoring of fidelity scores were associated with higher self-determination outcomes, although initial student self-determination also influenced fidelity (Shogren et al., 2019a). Future work is needed that examines the impact of level of fidelity across dimensions on student outcomes, particularly examining differences

that might emerge over time. Additionally, other factors that might influence fidelity, including the other areas of our framework shown in Table 1 that are not included in the fidelity measures should be further examined and added to ongoing analyses.

Also of interest was the finding depicted in Table 5. Specifically, across the three SDLMI Phases, which occur in temporal order over the course of a semester, there were differences in the ratings of adherence, quality of program delivery, and participant responsiveness. This is consistent with previous work that has suggested variability across SDLMI phases, particularly early in teacher implementation (Shogren et al., 2019b); however, the pattern in this study (highest in Phase 2) will require further research. For example, if there was a steady increase across the three Phases (i.e., over time and implementation) this may suggest increased teacher fluency over time. Or, if there was initially high fidelity, followed by lower fidelity, there may be challenges with sustaining the intervention. However, these data suggest there may be factors associated with the SDLMI phases or timing. For example, is Phase 2 is more complicated to implement than Phase 3? Or is the timing of Phase 3 at the end of the semester is more challenging than the timing of Phase 1 at the start of the semester? More research is needed, particularly longitudinal analysis that will be possible as the RCT within which this preliminary data was collected, that directly examines factors that influence fidelity as well as outcomes.

Finally, a limitation of these preliminary fidelity findings is the absence of outcome data to (a) inform the relationship between fidelity and student and teacher outcome data and (b) explore the degree to which the fidelity dimensions targeted (adherence, quality of program delivery, and participant responsiveness) are related to student and teacher outcomes. Although data on student and teacher outcomes are collected within the larger research project, integrating

the current fidelity findings with outcome data was beyond the scope of the present analysis. Further research is needed that explores the relationship between implementation fidelity and outcome data to guide the development of SDLMI implementation supports and identify key areas to emphasize in teacher training and coaching.

Overall Conclusions and Future Directions in Fidelity of Implementation

As noted, while measuring whether an intervention was implemented as intended seems like a simple problem, it is much more complex than often acknowledged, particularly for interventions like the SDLMI that require (a) changes in teacher and student behaviors and (b) targeted instruction as well as supports for generalization. As such, rooted in an extensive review of the literature, we identified a framework for conceptualizing fidelity that focused on not only the direct assessment of implementation but also the analysis of factors that influence fidelity. Building on this framework, we developed a measurement tool to be used by trained observers as well as by trained coaches called the *SDLMI Fidelity Measure: Inclusive, General Education Version*. This measure focused on three dimensions of fidelity: adherence, quality of program delivery, and participant responsiveness. We found that the measure could be reliably utilized by trained observers both during targeted SDLMI instruction (Part B) and during other content instruction where the expectation was that concepts associated with the SDLMI would be embedded (Part C). The preliminary findings from the use of the tool in the first semester of a large RCT confirms the importance at looking at the three dimensions of fidelity as scores varied across these dimensions and across three phases of the SDLMI.

While the findings are informative for ongoing work on the SDLMI, they also raise broader issues to consider with the implementation field, particularly in relation to complex interventions and supporting coaches and implementers of the SDLMI. First, what is the

expected level of fidelity across differing dimensions? Or perhaps, more accurately, what is the necessary level of fidelity for influencing student and teacher outcomes and do – as other research has suggested – contextual factors influence this? Second, what is the best way to ensure the complexity of fidelity is recognized in such a way that we can meaningfully report on fidelity to inform analytic models and present to diverse stakeholders during, for example, a coaching process? Third, how can information gathered from multiple sources (e.g., teachers, coaches, blinded observers) be meaningfully integrated? Are all sources of information needed? Does high congruence exist between different raters, and if so, can we rely on teacher or coach report under some circumstances? Fourth, how can we account for influencing factors in fidelity assessment and implementation? For example, the SDLMI can and has been utilized in other contexts including transition planning and adult support services in addition to inclusive, general education classrooms. Can the same fidelity framework be utilized if contextual factors are documented? How can this information be integrated into analytic models? And, how can and should factors that influence fidelity of a complex intervention (e.g., program differentiation, training of facilitators) be integrated into models and used to contextualize not only assessed fidelity, but the relationships between the intervention, assessed fidelity, and outcomes? Lastly, how does fidelity and the factors that influence it change over time? Does fidelity increase or are there other patterns and influencing factors that emerge over time? There is a critical need for ongoing research that systematically addresses these issues, and collects longitudinal data on fidelity and the factors that influence it enabling robust implementation evaluation to further delineate the “black box” that has up until this point characterized our understanding of whether interventions are delivered *and* received as intended (Grant et al., 2013).

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Table 1

Fidelity Framework and Associated Methods

Component	Definition	How it is Assessed
Study design/ Intervention Complexity	Ensures that a study can test hypotheses in relation to underlying theory. Detailed or specific interventions have been found to be more likely to be implemented with high fidelity– it is also easier to achieve high fidelity of a simple rather than a complex intervention	<ul style="list-style-type: none"> • Intervention closely aligned with theoretical foundations • Implementation Schedule with clearly defined implementation and evaluation schedule
Training Providers	Assessing and providing training of treatment providers to ensure that they have been training to deliver the intervention to study participants. All providers should be trained in the same manner.	<ul style="list-style-type: none"> • Standardized SDLMI training • SDLMI Coaching Model • SDLMI Teacher’s Guide, Mini-Lessons, and Supplemental Materials • SDLMI Online Modules • Teacher Knowledge, Skills, and Use Survey • SDLMI Professional Development Survey
Adherence to the program/Content/ Dose	Identification of critical elements of an effective program as well as the amount of program content received by participants. The active ingredients of the intervention include the drug, treatment, skills or knowledge that the intervention seeks to deliver to its recipients.	<ul style="list-style-type: none"> • SDLMI Fidelity Measure and Teacher Fidelity Measure • Implementation Schedules • School Profile Form
Quality of program delivery/Degree of individualization	Ratings of provider effectiveness which assess the extent to which a provider approaches a theoretical ideal in terms of delivering program content. This could mean the use of inclusion and exclusion criteria to define the sample from the target population to whom the intervention is delivered, or modifications of elements of the intervention to suit the needs of the individuals within the sample.	<ul style="list-style-type: none"> • SDLMI Fidelity Measure and Teacher Fidelity Measure • Coaching Conversation Notes • Teacher Self-Determination Knowledge, Skills, and Use Survey
Participant responsiveness	Ratings of the extent to which participants are engaged by and involved in the activities and content of the program	<ul style="list-style-type: none"> • SDLMI Fidelity Measure and Teacher Fidelity Measure
Receipt of treatment/ Enactment of treatment skills	Monitoring how the patients are able to understand and perform treatment-related skills throughout the treatment delivery. This can be measured through pre- and post-tests, setting achievement objects and reviewing intervention homework assignments. This also includes monitoring and improving the ability of the patients to perform treatment-related skills in real life	<ul style="list-style-type: none"> • SDLMI Fidelity and Teacher Fidelity Measure • Self-Determination Inventory: Student Report • Goal Attainment Scaling – Student Version • Goal Attainment Scaling – Teacher Version • Access Survey
Program differentiation	Identifying unique features of different components or programs so that these can be reliability differentiated from one another	<ul style="list-style-type: none"> • School Profile Form

Table 2

SDLMI Fidelity Measure: Inclusive, General Education Version Sample Items

Part	Dimension of fidelity	Example item
B	Adherence	<i>Did the teacher meet the targeted Teacher Objective(s)?</i>
B	Quality of Program Delivery	<i>Did the teacher support the students to take steps in solving the problem targeted in the specific phase (e.g., setting a goal, creating an action plan)?</i>
B	Participant Responsiveness	<i>Did the students demonstrate knowledge of their goals and/or the process to achieve them?</i>
C	Quality of Program Delivery	<i>Did the teacher reference students' goals, action plans, and evaluation strategies?</i>
C	Participant Responsiveness	<i>Did the students respond to teacher's questions or prompts?</i>

Note. Part C does not include an adherence dimension as skills targeted in the SDLMI are intended to be embedded in the content instruction during this part of the fidelity observation in inclusive, general education settings.

Table 3

Scale Score Descriptive Statistics – Overall

Scale	Raw			Percent of Maximum	
	<u>n</u>	<u>mean</u>	<u>SD</u>	<u>mean</u>	<u>SD</u>
B. Adherence	35	7.71	2.24	77.14	22.44
B. Quality of Program Delivery	35	15.00	4.32	65.22	18.77
B. Participant Responsiveness	35	9.23	2.99	61.52	19.94
C. Quality of Program Delivery	35	8.06	3.93	40.29	19.63
C. Participant Responsiveness	35	5.57	3.17	37.14	21.16

Note. SD = Standard deviation; Range of scores per scale: Adherence (0-10), Quality of Program Delivery (0-23), Participant Responsiveness (0-15)

Table 4

Scale Score Correlations

		Part B		Part C	
	<u>Adherence</u>	<u>Quality of delivery</u>	<u>Participant responsiveness</u>	<u>Quality of delivery</u>	<u>Participant responsiveness</u>
B. Adherence	1				
B. Quality of delivery	0.759	1			
B. Participant responsiveness	0.707	0.865	1		
C. Quality of delivery	0.356	0.512	0.42	1	
C. Participant responsiveness	0.309*	0.481	0.435	0.835	1

Note. * = not statistically significant.

Table 5

Scale Score Descriptives – By Phase

Phase	Scale	<u>Raw</u>		<u>Percent of Maximum</u>	
		mean	sd	mean	sd
Phase 1	B. Adherence	7.43	2.41	74.29	24.09
	B. Quality of Program Delivery	14.64	4.34	63.66	18.88
	B. Participant Responsiveness	9.21	2.99	61.43	19.94
	C. Quality of Program Delivery	7.50	4.57	37.50	22.85
	C. Participant Responsiveness	5.07	2.95	33.81	19.65
Phase 2	B. Adherence	8.42	1.44	84.17	14.43
	B. Quality of Program Delivery	16.17	3.41	70.29	14.81
	B. Participant Responsiveness	9.58	2.94	63.89	19.58
	C. Quality of Program Delivery	9.00	3.54	45.00	17.71
	C. Participant Responsiveness	6.67	3.11	44.44	20.76
Phase 3	B. Adherence	7.22	2.82	72.22	28.19
	B. Quality of Program Delivery	14.00	5.41	60.87	23.51
	B. Participant Responsiveness	8.78	3.35	58.52	22.31
	C. Quality of Program Delivery	7.67	3.50	38.33	17.50
	C. Participant Responsiveness	4.89	3.55	32.59	23.67

Note. SD = Standard deviation.