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Establishing a Causal Relationship Between Intervention to Promote Self-Determination and Enhanced Student Self-Determination

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Abstract

Promoting the self-determination of adolescents with disabilities has become best practice in secondary education and transition services, but to date there have been no studies establishing a causal relationship between efforts to promote self-determination and enhancement of the self-determination of youth with disabilities. This article reports a randomized trial placebo control group study of 371 high school students receiving special education services under the categorical areas of mental retardation or learning disabilities. Students were randomly assigned to an intervention or control group (by high school campus), with students in the intervention condition receiving multiple instructional components to promote self-determination. Latent growth curve analysis showed that although all students in the study showed improved self-determination over the 3 years of the study, students in the intervention group showed significantly greater growth, though specific intraindividual variables affected this growth. Implications for research and intervention are discussed.

Keywords

self-determination, intervention, randomized trial, causal relationship

Promoting the self-determination of adolescents with disabilities has become a best practice in secondary education and transition services (Field, Martin, Miller, Ward, & Wehmeyer, 1998; Wehmeyer, Abery, Mithaug, & Stancliffe, 2003; Wehmeyer et al., 2007) for several reasons. First, self-determination status has been linked to the attainment of more positive academic (Fowler, Konrad, Walker, Test, & Wood, 2007; Konrad, Fowler, Walker, Test, & Wood, 2007; Lee, Wehmeyer, Soukup, & Palmer, 2010) and transition outcomes, including more positive employment and independent living (Martorell, Gutierrez-Recacha, Pereda, & Ayuso-Mateos, 2008; Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1997) and recreation and leisure outcomes (McGuire & McDonnell, 2008), and more positive quality of life and life satisfaction (Lachapelle et al., 2005; Nota, Ferrari, Soresi, & Wehmeyer, 2007; Shogren, Lopez, Wehmeyer, Little, & Pressgrove, 2006; Wehmeyer & Schwartz, 1998).

Second, research across special education disability categories has established the need for intervention to promote self-determination, documenting that students with intellectual disability (Wehmeyer et al., 2007), learning disabilities (Field, 1996; Field, Sarver, & Shaw, 2003; Pierson, Carter, Lane, & Glaeser, 2008), emotional and behavioral disorders (Carter, Lane, Pierson, & Glaeser, 2006; Pierson et al., 2008) and autism (Ward & Meyer, 1999; Wehmeyer & Shogren, 2008) are less self-determined than their nondisabled peers.

Third, teachers believe that teaching students to become more self-determined is important (Carter, Lane, Pierson, & Stang, 2008; Thoma, Pannozzo, Fritton, & Bartholomew, 2008; Wehmeyer, Agran, & Hughes, 2000), and there are numerous curricular and instructional models identified to enable them to provide this instructional focus (Test, Karvonen, Wood, Browder, & Algozzine, 2000; Wehmeyer et al., 2003; Wehmeyer & Field, 2007; Zhang, 2001). In a

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meta-analysis of single-subject and group design studies, Algozzine, Browder, Karvonen, Test, and Wood (2001) found evidence for the efficacy of instruction to promote component elements of self-determined behavior, including interventions to promote self-advocacy, goal setting and attainment, self-awareness, problem-solving skills, and decision-making skills. Cobb, Lehmann, Newman-Gonchar, and Alwell (2009) conducted a narrative metasynthesis—a narrative synthesis of multiple meta-analytic studies—covering seven existing meta-analyses examining self-determination and concluded that there is sufficient evidence to support the promotion of self-determination as effective. Also, research documents the positive impact of efforts to promote student involvement in educational and transition planning (Martin et al., 2006; Mason, Field, & Sawilowsky, 2004; Test et al., 2004) on more positive transition- and self-determination-related outcomes.

Fourth, research has begun to document the effect of a variety of intraindividual or personal factors and environmental or ecological factors that serve as mediating or moderating variables in efforts to promote self-determination. Multiple studies have shown that individual and environmental factors affect a person's relative self-determination (Nota et al., 2007; Shogren et al., 2007; Stancliffe, Abery, & Smith, 2000; Wehmeyer, & Bolding, 1999, 2001). For example, Shogren et al. (2007) found that student gender, inclusion status, and capacity (e.g., level of intellectual capacity) significantly predicted self-determination status among youth with disabilities. These variables, particularly gender and intellectual capacity or type of disability, consistently emerge as factors that mediate students' self-determination status. Related to capacity, research documents a consistent, significant positive relationship between self-determination and IQ scores (Stancliffe et al., 2000; Wehmeyer & Garner, 2003), though this relationship has, equally consistently, been of marginal practical significance, with correlations around $r = .15$ to $r = .24$. Research examining differences in self-determination by gender has found mixed results. As noted, Shogren et al. found that gender did predict self-determination status, whereas Wehmeyer and Garner (2003) found no differences on overall self-determination scores by gender. Nota et al. (2007) and Shogren et al. (2008) also found that gender significantly affected self-determination, though Nota and colleagues, with an Italian sample, found that males had higher self-determination scores and Shogren and colleagues, with an American sample, identified females as having higher self-determination scores.

Purpose of Study

Despite the substantive literature base pertaining to self-determination and its importance in the education of students with disabilities, there are no studies that have established a causal relationship between interventions to promote self-determination and the outcome that youth with disabilities become more self-determined. Extant studies documenting the efficacy of interventions to promote self-determination, including all of the studies examined in the Cobb et al. (2009) metasynthesis, have used single-subject, correlational, or quasi-experimental designs that did not meet a clear standard for determining causality, and, most relevantly, did not measure self-determination directly as an outcome of intervention, measuring instead component elements of self-determined behavior (e.g., problem-solving skills, choice-making opportunities, goal-setting attainment, etc.). In fact, only one review article in the Cobb et al. meta-synthesis limited the studies in its review to those that measured global self-determination (Chambers et al., 2007), and the majority of studies reviewed in that article were not intervention studies. Intervention research documenting a causal relationship between intervention efforts to promote self-determination and consequent student self-determination outcomes is important for several reasons. The obvious such reason is that if teachers are to be expected to devote part of their limited instructional time to promote self-determination, there should be evidence that such efforts will be fruitful. Second, establishing a causal relationship between interventions designed to promote self-determination and self-determination as an outcome of that instruction provides an indicator of construct validity not currently established for the self-determination construct.

This study implemented a randomized trial placebo control group design study to answer the following research question: Do interventions designed to promote self-determination lead to improvement in the self-determination scores of students with disabilities? We hypothesized that students with disabilities who received interventions to promote self-determination over a 3-year period would show significant differences in their growth trajectory on student self-report measures of self-determination when compared to a placebo control group who did not receive specific interventions. We were also interested in exploring the impact of student variables that have consistently been found, in previous research, to affect self-determination status (i.e., disability label and gender) on the growth trajectory of students in both intervention and control conditions. We selected disability label as a proxy for student level of intelligence because IQ scores were not available for most of the students.

Method

Participants

Study participants were 371 high school students receiving special education services under the categorical areas of mental retardation (MR; 28%) or learning disability (LD;

72%). Participants were recruited from six states (Arkansas, Kansas, Missouri, Nebraska, Oklahoma, and Texas) and 50 school districts. At the start of the study, participants ranged in age from 14 to 20 years (M = 17.0, SD = 1.52). The sample was 43% female and 57% male. The majority of participants were Caucasian (54%), although other race/ethnicities were also represented: Hispanic (25%), African American (16%), Native American or Alaskan Native (1%), Asian or Pacific Islander (1%), and Other (3%). According to teacher reports, 35% of students were eligible for free and/or reduced-price lunch. An additional 29% of students were not eligible for free and/or reduced-price lunch, and teachers reported not knowing the status of the remainder of the students.

Teachers were recruited for participation through the process described subsequently. For the 371 students for whom data were collected, there were a total of 130 teachers from 80 high school campuses (campuses could have more than one special education teacher involved since students on the same campus could have been assigned to different teachers) involved as the student's primary teacher (e.g., special education teacher) from 50 school districts. We had data with regard to teacher age for 105 of those teachers. The mean age was 42.88 (SD = 10.17), and teachers ranged in age from 23 to 63. The mean number of years teaching was 13.52 (SD = 8.65), and teaching experience ranged from 1 to 37 years. Of teachers, 34% (n = 36) held a graduate degree in special education, and an additional 25% (n = 26) held a graduate degree in another field.

Design and Procedures

Participants were recruited for involvement in a 5-year longitudinal study examining the impact of interventions to promote self-determination on student self-determination and postschool outcomes. Project personnel contacted school districts, and districts that agreed to participate (n = 50) identified high school campuses to participate. Each campus was then randomly assigned to an "intervention" or a "control" group. Because many special educators provide instruction to students across multiple classrooms, and because students may receive instruction from several special education teachers across the course of a day, it was not feasible to assign teachers or student to groups, and thus random assignment (without replacement) using a random numbers table occurred at the campus (e.g., high school) level.

Each campus worked with researchers to identify students who met the project criteria, which included (a) receiving special education services under the categorical areas of MR or LD who could reliability complete self-report measures and (b) who would be receiving services for an additional 2 years after project initiation. These two categorical areas were selected because project assessments and most of the interventions used were developed for students in these disability categories. The requirement that students be expected to receive services for an additional 2 years after project implementation was to ensure sufficient time for students to fully participate in the self-determination interventions being implemented on each campus. Informed consent was obtained for each participant from his or her parent or guardian, as was assent from each student.

Table 1. Number of Years Completed by Intervention Status

	1 year		2 years		3 years	
Intervention status	*n*	%	*n*	%	*n*	%
The Arc's Self-Determination Scale						
Control	132	36	107	29	71	19
Intervention	235	63	165	44	110	30
AIR Self-Determination Scale						
Control	130	35	106	29	72	19
Intervention	231	62	165	44	111	30

After consent and assent to participate were obtained, baseline data were collected, including demographic information about the student and his or her educational experiences and data on two measures of self-determination. Training was then provided, based on the group to which the campus was randomly assigned (described subsequently). Data pertaining to self-determination were then collected at the end of both the second and third school years to document changes in student self-determination. As is expected in educational research, there was attrition in the sample. Table 1 provides data on the number of students who completed our two primary assessments, *The Arc's Self-Determination Scale* and the *AIR Self-Determination Scale*, during each year of the project. Preliminary analyses indicated no significant differences between completers and noncompleters on key variables; therefore, all participants who had data from at least one wave of assessment were included in the analyses. This was accomplished through the use of full information maximum likelihood (FIML) in SAS PROC MIXED. FIML is an estimation procedure that makes use of existing data to estimate model parameters in the presence of missing data without the need for imputing unobserved values.

Control group. To minimize attrition typically associated with control groups in longitudinal research, we implemented a placebo control group intervention in which teachers in the control group received training and ongoing supports pertaining to an intervention not expected to

directly affect student scores on dependent variables, specifically how to promote active parental involvement in the educational process. This intervention was intended to control for differential effects occurring as a function of an intervention group receiving training and support from researchers and to provide teachers in the control group something of value for their continued participation and data collection. Then, at the conclusion of the study, teachers in the control group received training on all intervention group programs.

Intervention group. Teachers on high school campuses randomly assigned to the intervention condition selected from a menu of interventions that had been developed to promote self-determination, including interventions to promote student involvement in transition planning. Because our primary research question concerned the impact of interventions, in general, to affect self-determination, we decided to provide teachers with a variety of research-based interventions that they could select based on their personal preferences and the characteristics and needs of their students. We would note, however, that students might receive instruction from multiple programs or models through the course of the instructional period. Each intervention is described, briefly, although Wehmeyer and Field (2007) provides detailed information about each.

The *ChoiceMaker Curriculum* (with the *Self-Directed IEP* materials; Martin, Marshall, Maxson, & Jerman, 1993) consists of three sections: (a) *Choosing Goals*, (b) Expressing Goals, and (c) Taking Action. Each section contains from two to four teaching goals and numerous teaching objectives addressing six transition areas. Included are (a) an assessment tool, (b) *Choosing Goals* lessons, (c) the *Self-Directed IEP*, and (d) *Taking Action* lessons. The program includes a criterion-referenced self-determination transition assessment tool that matches the curricular sections. The *Choosing Goals* lessons enable students to learn the necessary skills and personal information needed to articulate their interests, skills, limits, and goals across one or more self-selected transition areas. The *Self-Directed IEP* lessons enable students to learn the leadership skills necessary to manage their individualized education program (IEP) meeting and publicly disclose their interests, skills, limits, and goals identified through the *Choosing Goals* lessons. The *ChoiceMaker* materials were developed for use with students across disability categories, though principally for use with students with learning disabilities, behavioral disorders, and mild intellectual disability. Of the students in the study, 21% received instruction using the *ChoiceMaker* materials (82% students with LD, 28% students with MR), working through each component at least one time over the course of instruction, returning to the *Choosing Goals* lessons to start additional goals when one was completed.

Self-Advocacy Strategy (Van Reusen, Bos, Schumaker, & Deshler, 2002) was "designed to enable students to systematically gain a sense of control and influence over their own learning and development" (p. 1). Students progress through a series of lesson plans focusing on seven instructional stages. Stage 1, titled *Orient and Make Commitments*, broadly introduces education and transition planning meetings, the program itself, and how participation can increase student power and control in this process. Stage 2, titled *Describe*, defines and provides detailed information about transition and education meetings and advantages students experience if they participate. In this stage the "I PLAN" steps of student participation are introduced. These steps provide a simple algorithm that students can use to chart their participation in planning meetings.

In Stage 3, *Model and Prepare*, the teacher models the I PLAN steps so students can see the process in action. Students complete an Inventory, Step 1 in the I PLAN process, resulting in information they can use at their conference. Stage 4 is *Verbal Practice*, during which students are asked questions to make sure they know what to do during each step of the I PLAN strategy and then verbally rehearse each of the steps. In Stage 5, *Group Practice and Feedback*, once students have demonstrated mastery of the steps in I PLAN, they participate in a simulated group conference. The student receives feedback from the teacher and other students, and the group generates suggestions on where the student might improve. The simulated conference is audio- or videotaped for future reference.

Stage 6, *Individual Practice and Feedback*, allows the student to meet independently with the teacher for practice, feedback, and eventually mastery. The audio- or videotape from the previous stage is reviewed, and students provide a self-evaluation of their performance. The students and instructor work together to improve areas of self-identified need and engage in another simulated conference that is also audio- or videotaped and used to document improvement and reevaluate performance. Stage 7, *Generalization*, is intended to generalize the I PLAN strategy to actual conferences. This stage has three phases: (a) preparing for and conducting the planning conference, (b) preparing for other uses of the strategy, and (c) preparing for subsequent conferences. *Self-Advocacy Strategy* was designed for use principally with students with learning disabilities, though it has been used with students with behavioral disorders and mild intellectual disability as well. Of students, 5% were involved with the *Self-Advocacy Strategy* materials (57% students with LD, 43% students with MR) and worked through the stages, sequentially, through the course of instruction.

Steps to Self-Determination (2nd ed.; Hoffman & Field, 2005) involves lessons using modeling, cooperative and experiential learning, lecture, and discussions through which students complete an hour-long orientation session, a

6-hour workshop, and 16 classroom-based lessons focused on content related to self-determination, including setting and attaining goals, self-advocacy, and decision making. The package includes assessment tools, objectives, preparation guidelines, lesson plans, overhead and handout masters, and teacher information. The materials were primarily designed for students with mild to moderate learning and behavior difficulties, including students with learning disabilities and mild intellectual disability. Of students, 4% received instruction using this curriculum (61% students with LD, 39% students with MR) and completed all 16 classroom-based lessons.

Whose Future Is It Anyway? (2nd ed.; Wehmeyer et al., 2004) consists of 36 sessions introducing students to the concept of transition and transition planning and enabling students to self-direct instruction related to (a) self- and disability-awareness, (b) making decisions about transition-related outcomes, (c) identifying and securing community resources to support transition services, (d) writing and evaluating transition goals and objectives, (e) communicating effectively in small groups, and (f) developing skills to become an effective team member, leader, or self-advocate.

The materials are student directed in that they are written for students as end users. The level of support needed by students to complete activities varies a great deal. Some students with difficulty reading or writing need one-on-one support to progress through the materials; others can complete the process independently. Section 1 (titled *Getting to Know You*) introduces the concept of transition and educational planning, provides information about transition requirements in the Individuals with Disabilities Education Act, and enables students to identify who has attended past planning meetings, who is required to be present at meetings, and who they want involved in their planning process. In the second section (*Making Decisions*) students learn a simple problem-solving process by working through each step in the process to make a decision about a potential living arrangement and then apply the process to make decisions about the three other transition outcome areas. The third section (*How to Get What You Need, Sec. 101*) enables students to locate community resources identified in previous planning meetings that are intended to provide supports in each of the transition outcome areas. Section 4 (*Goals, Objectives and the Future*) enables learners to apply a set of rules to identify transition-related goals and objectives that are currently on their IEP or transition planning form, evaluate these goals based on their own transition interests and abilities, and develop additional goals to take to their next planning meeting. Students learn what goals and objectives are, how they should be written, and ways to track progress on goals and objectives.

The fifth section (*Communicating*) introduces effective communication strategies for small group situations, like the transition planning meetings. Students work through sessions that introduce different types of communication (verbal, body language, etc.) and how to interpret these communicative behaviors, the differences between aggressive and assertive communication, how to effectively negotiate and compromise, when to use persuasion, and other skills that will enable them to be more effective communicators during transition planning meetings. The final session (*Thank You, Honorable Chairperson*) enables students to learn types and purposes of meetings, steps to holding effective meetings, and roles of the meeting chairperson and team members. Students are encouraged to work with school personnel to take a meaningful role in planning for and participating in the meeting. The process was developed for use by students with intellectual disability and learning disabilities. Of students, 43% were involved with this process (65% students with MR and 35% students with LD) and worked on one session per week for 36 consecutive weeks.

The *Self-Determined Learning Model of Instruction* (SDLMI; Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000) is a model of teaching based on the component elements of self-determination, the process of self-regulated problem solving, and research on student-directed learning. It is appropriate for use with students with and without disabilities across a wide range of content areas and enables teachers to engage students in the totality of their educational program by increasing opportunities to self-direct learning and, in the process, to enhance student self-determination. Implementation of the model consists of a three-phase instructional process. Each instructional phase presents a problem to be solved by the student. The student solves each problem by posing and answering a series of four student questions per phase that students learn, modify to make their own, and apply to reach self-selected goals. Each question is linked to a set of teacher objectives. Each instructional phase includes a list of educational supports that teachers can use to enable students to self-direct learning. In each instructional phase, the student is the primary agent for choices, decisions, and actions, even when eventual actions are teacher directed.

The student questions in the model are constructed to direct the student through a problem-solving sequence in each instructional phase. The solutions to the problems in each phase lead to the problem-solving sequence in the next phase. Teachers implementing the model teach students to solve a sequence of problems to construct a means–ends chain—a causal sequence—that moves them from where they are (an actual state of not having their needs and interests satisfied) to where they want to be (a goal state of having those needs and interests satisfied). To answer the questions in this sequence, students must regulate their own problem solving by setting goals to meet needs, constructing plans to meet goals, and adjusting actions to complete

plans. As noted, each instructional phase poses a problem the student must solve (What is my goal? What is my plan? What have I learned?) by, in turn, solving a series of problems posed by the questions in each phase. The four questions differ from phase to phase but represent identical steps in the problem-solving sequence. That is, students answering the questions must (a) identify the problem, (b) identify potential solutions to the problem, (c) identify barriers to solving the problem, and (d) identify consequences of each solution. These steps are the fundamental steps in any problem-solving process, and they form the means–end problem-solving sequence represented by the student questions in each phase and enable the student to solve the problem posed in each instructional phase.

The teacher objectives within the model are just that—the objectives a teacher will be trying to accomplish by implementing the model. In each instructional phase, the objectives are linked directly to the student questions. These objectives can be met by utilizing strategies provided in the educational supports section of the model. The teacher objectives provide, in essence, a road map to assist the teacher to enable the student to solve the problem stated in the student question. For example, regarding the first student question, What do I want to learn? teacher objectives linked to this question comprise the activities in which students should be engaged to answer this question. In this case, it involves enabling students to identify their specific strengths and instructional needs, to identify and communicate preferences, interests, beliefs, and values, and to prioritize their instructional needs. As teachers use the model it is likely that they can generate more objectives that are relevant to the question, and they are encouraged to do so.

The emphasis in the model on the use of instructional strategies and educational supports that are student directed provides another means of teaching students to teach themselves. As important as this is, however, not every instructional strategy implemented will be student directed. The purpose of any model of teaching is to promote student learning and growth. There are circumstances in which the most effective instructional method or strategy to achieve a particular educational outcome will be a teacher-directed strategy. Students who are considering what plan of action to implement to achieve a self-selected goal can recognize that teachers have expertise in instructional strategies and take full advantage of that expertise.

The SDLMI is the one intervention in which every student in the treatment group was engaged. Students worked through each phase of the model, as described here and, when the goal was achieved, worked through the model to focus on additional goals.

NEXT S.T.E.P. Curriculum (Halpern, Herr, Doren, & Wolf, 2000) uses video and print materials developed for specific audiences (students, teachers, family members) to help students become motivated to engage in transition planning, self-evaluate transition needs, identify and select transition goals and activities, assume responsibility for conducting their own transition planning meeting, and monitor the implementation of their transition plans.

The curriculum consists of 16 lessons, clustered into four instructional units, designed to be delivered in a 50-minute class period. These lessons include teacher and student materials, videos, guidelines for involving parents and family members, and a process for tracking student progress. Unit 1 (*Getting Started*) introduces and overviews transition planning, intended to enable students to understand the transition planning process and to motivate them to participate. Unit 2 (*Self-Exploration and Self-Evaluation*) includes 6 lessons that focus on student self-evaluation. Students work through activities that identify unique interests, strengths, and weaknesses in various adult outcome-oriented areas. At the end of this unit, students complete the student form of the *Transition Skills Inventory*, a 72-item rating instrument assessing how well the student is doing in four transition areas: (a) personal life, (b) jobs, (c) education and training, and (d) living on one's own. The student's self-evaluation of these areas are combined with similar evaluations by his or her teacher and a family member to form a basis for future transition planning activities. Students are encouraged to discuss differences of opinion between the teacher or family member evaluations and their own self-evaluation and to resolve these discrepancies either before or during the transition planning meeting.

Unit 3 (*Developing Goals and Activities*) includes five lessons regarding transition goal identification in the four areas composing the *Transition Skills Inventory*. Students identify their hopes and dreams, then select from a range of potential goals in each area, narrowing the total set of transition goals to four or five goals that they prefer. In addition, students choose activities that will help them pursue the goals they have selected. Unit 4 (*Putting a Plan into Place*) includes three lessons preparing students for their transition planning meeting. The lessons emphasize the implementation of their plan and work with students to ensure that they monitor their progress and, if necessary, make adjustments. These materials were developed and evaluated for students across multiple disability categories. Of students, 7% were involved in instruction using these materials (62% students with LD, 38% students with MR) and worked through the lessons in the student materials.

As noted, teachers varied in the number of interventions they implemented, and as such the level of exposure each student had to self-determination-related interventions varied from receiving instruction in one student-involvement program to receiving instruction in one of the student involvement program along with instruction on self-regulated learning or using one of the curricula or models of instruction.

Each teacher received training on the respective interventions he or she selected as well as ongoing support on infusing instruction in student self-directed learning and into academic and functional content instruction. Each teacher was provided all instructional materials related to the intervention(s) he or she implemented, including training materials, intervention manuals, scoring guidelines, and so forth. Teachers were trained to implement the intervention as it was designed to be implemented and as described, briefly, in the previous section.

Fidelity to treatment. Fidelity to treatment for implementation of the interventions was monitored by three types of fidelity measurement (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005): (a) a context fidelity measure that describes the necessary precursors to high-level performance (e.g., completion of training), (b) a compliance fidelity measure that provides an outline of the core intervention components and their use by practitioner, and (c) a competence fidelity measure that illustrates how well the practitioner is performing the core intervention components of an evidence-based program or practice. For the context fidelity indicator, all special education teachers received training from the same group of trainers on the interventions they were to implement. Compliance fidelity was monitored through ongoing support and communication to facilitate teachers to implement the interventions. For this, regular notices to announce important agendas and schedules of implementation were sent via e-mail. All teachers and students followed the same procedures regarding implementation of the respective materials or intervention. Competence fidelity was evaluated, as feasible, by reviewing worksheets and written materials completed by the participating students in relation to each of the interventions.

In addition to the above procedures, we collected data on criterion-referenced measures related to the specific intervention for the sole purpose of examining progress on each curriculum and thus providing at least one quantitative indicator of fidelity to treatment, based on our assumption that progress on criterion-referenced measures would reflect student receipt of the intervention and, to some degree, fidelity. The surveys are discussed in the next section, and the analysis is reported in the results section.

Measures

Participating teachers on each campus and project personnel, after being trained in the appropriate administration protocol, administered measures to participating students in individual or group sessions, depending on the needs of the students and the school district. Completed assessments were returned to the research site, and scoring was done by graduate students trained by project personnel.

The Arc's Self-Determination Scale. *The Arc's Self-Determination Scale* (SDS; Wehmeyer & Kelchner, 1995) is a 72-item self-report measure based on the functional theory of self-determination. A total of 148 points are available on the scale, with higher scores indicating higher levels of self-determination. An overall self-determination score as well as subscale scores for each of the four essential characteristics of self-determined behavior, Autonomy, Self-Regulation, Psychological Empowerment, and Self-Realization (Wehmeyer, 1996a), can be calculated. The SDS was developed and normed with 500 adolescents with cognitive disabilities (Wehmeyer, 1996b). Subsequent research (Shogren et al., 2007, 2008) has verified the proposed theoretical structure of the SDS (i.e., four related, but distinct subscales—Autonomy, Self-Regulation, Psychological Empowerment, and Self-Realization—that contribute to a higher-order self-determination construct). The SDS was demonstrated to have adequate reliability and validity in the measurement of self-determination for adolescents with cognitive disabilities. Construct validity was determined by multiple means, the first of which was a factor structure analysis. The mean overall score from the norming sample was 97.52 (SD = 19.43). The mean score for each subdomain was as follows: Autonomy 63.35 (SD = 15.50), Self-Regulation 9.78 (SD = 4.95), Psychological Empowerment 13.28 (SD = 2.64), and Self-Realization 11.11 (SD = 2.25). In this study, Cronbach's alpha for the SDS was .89.

AIR Self-Determination Scale. The *AIR Self-Determination Scale* (AIR; Wolman, Campeau, Dubois, Mithaug, & Stolarski, 1994) assesses student capacity and opportunity for self-determination. The AIR has Student, Educator, and Parent versions, and the Student self-report version (AIR-S) was utilized in the present study. The AIR-S version has 24 questions and also yields Capacity and Opportunity subscale scores. The Capacity subscale consists of questions related to things students do related to self-determination ("Things I Do" subscale) and how students feel about performing these self-determined behaviors ("How I Feel" subscale). The Opportunity subscale consists of questions regarding students' perceptions of their opportunities to perform self-determined behaviors at home and at school.

The AIR was developed and normed with 450 students with and without disabilities in California and New York (Wolman et al., 1994). The AIR was demonstrated to have adequate reliability and validity in the measurement of capacity and opportunity for self-determination (Mithaug, Campeau, & Wolman, 2003). Reliability was determined using alternative-item correlations, split-half reliability tests, and test–retest measures of stability. For alternative-item tests, correlations ranged from .01 to .98, split-half analysis yielded a reliability of .95, and test–retest over 3 months yielded a correlation of .74. Factor analysis of the

items yielded results that were consistent with the conceptual structure of the scale for both the Opportunity and Capacity sections. Recent research (Shogren et al., 2008) has confirmed the theoretical structure of the AIR (i.e., two related subscales—Capacity and Opportunity—that contribute to a higher-order self-determination construct). This research also confirmed that although the SDS and the AIR-S are related (r = .50), they are measuring distinct aspects of the self-determination construct. Shogren et al. found that combining these two measures into one global, higher-order self-determination construct was not justified by data.

Criterion-referenced measures. The criterion-referenced measures we collected data on for purpose of fidelity included a questionnaire developed from the *Whose Future Is It Anyway?* (Wehmeyer et al., 2004) curriculum, consisting of 20 multiple-choice items linked to specific lesson plans; the *Next S.T.E.P. Survey* (Halpern et al., 2000), presenting 10 multiple-choice items linked to lessons on that curriculum; and a survey from the *Self-Directed IEP* (Martin et al., 1993), consisting of 8 items on which students responded "I never have an opportunity to do this," "I don't know how to do this," "I sometimes do this," or "I do this very well and when needed." Because these are not standardized assessments, data summarizing progress was analyzed using descriptive analyses.

Analysis Plan

To address our primary research question (Does participation in a self-determination intervention group significantly affect the self-reported self-determination of students with disabilities?), we used multilevel latent growth curve modeling (ML-LGM) to examine differences in self-determination scores on the AIR-S and SDS across control and intervention group participants. We chose to use ML-LGM to account for the nested nature of our data. The data on student's self-determination scores had the following hierarchical structure: Data from each of the three observation times (baseline and Years 2 and 3 self-determination scores; Level 1) were nested within each of the 371 students (Level 2), who were nested within each of the 50 campuses (Level 3). As would be expected, there was a fair amount of clustering within students (ρ = .61), with less clustering within campuses (ρ = .19) but still enough to justify inclusion in the model. Therefore, we used SAS PROC MIXED to specify three-level ML-LGMs to control for the detrimental effects of traditional analyses when the nested structure of data is not accounted for (Singer, 1998). SAS PROC MIXED is commonly used for estimating growth curve models in a multilevel model framework (see Singer, 1998).

ML-LGM allows researchers to address two aspects of change—initial status (intercept) and subsequent rate of change (slope). LGM is considered a latent variable approach because of the characteristic conceptualization of initial status and rate of change as random variables, each with a fixed mean and corresponding variance. Furthermore, by specifying ML-LGMs, it is possible to account for the nested structure of the data by specifying random effects that correspond to the nested structure of the data (observations nested within students nested within classrooms). ML-LGM models the average initial status and rate of change for the sample as a whole by estimating average intercept and slope parameters (i.e., fixed effects) while simultaneously modeling individual differences (i.e., random effects) at the student and classroom levels. Because it is reasonable to assume that initial status is related to, or correlated with, subsequent change or growth on that variable (Raykov & Marcoulides, 2000; Snijders & Bosker, 1999), one typically allows for a covariance between the latent intercept and slope constructs at the student and classroom levels. Within-person variability is modeled as a constant residual error variance across the index of time.

As is standard in ML-LGM, the factor weight for the intercept predicting the variable of interest at each time point was fixed at 1, and the regression weights of the slope were fixed at 0 for the first time point (baseline data collection during the 1st year of the project), 1 for the second time point (data collection during 2nd year of project), and 2 for the third time point (data collection during 3rd year of project). Intervention status (i.e., assigned to intervention or control group) was included as a grouping variable in our initial LGMs to allow for between-group comparisons of intercepts, slopes, and variance components. Of primary interest was the intervention group by time interaction, which indicates differences in the rate of development of our dependent variables across the two groups. Thus, the mean of the intercept for the control and intervention groups can be interpreted as the average score on each of our dependent measures at the first time point and the slope can be interpreted as the average change in each of the dependent variables for the intervention and control groups from one time point to the next.

The final step was to add disability and gender to the growth models as Level 1 covariates to explore differences in the intercept and slope based on disability and gender. Of particular interest was the interaction of these variables with study group (e.g., intervention or control) and time, which would indicate differences in the rate of development based on disability, gender, and/or study group. Follow-up contrasts to decompose the differences driving the omnibus effects were conducted, as appropriate.

Results

AIR-S

The original multigroup model suggested a significant overall increase in AIR-S scores over time, $F(1, 446) = 32.10$,

Table 2. Parameter Estimates From Initial Multigroup Latent Growth Curve Models

	SDS				AIR-S			
	Control		Intervention		Control		Intervention	
Models	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*
Fixed effects estimates								
Intercept	99.47**	1.99	97.42	1.22	72.27**	0.74	68.85**	1.16
Slope	4.50**	1.34	5.12	0.95	1.27*	0.50	3.42**	0.82
Random effects estimates								
Student								
Variance intercept	204.94**	44.94	211.79**	36.16	51.51**	13.75	75.93**	12.89
Variance slope	4.27	18.59	53.75**	19.23	9.33	7.46	6.95	5.73
Covariance intercept slope	−5.38	22.12	−31.63	21.58	−2.53	8.24	−12.29	7.11
Classroom								
Variance intercept	0.54**	0.01	6.21**	0.60	0.73**	0.07	0.78**	0.04
Variance slope	0.50**	0.05	0.48**	0.05	0.24**	0.02	0.07*	0.01
Covariance intercept slope	2.33**	0.23	1.34**	0.13	1.05**	0.07	0.72**	0.07
Residual variance	140.53**	22.25	149.10**	18.23	62.43**	9.68	54.69**	6.79
−2LL	6994.0				6093.7			
AIC	7030.0				6127.7			

Abbreviations: SDS = *The Arc's Self-Determination Scale*; AIR-S = *AIR Self-Determination Scale*, Student version; –2LL = −2 log likelihood; AIC = Akaike information criterion.
*$p < .05$. **$p < .01$.

$p < .0001$), a significant intervention group effect, $F(1, 365) = 8.62$, $p < .005$, and a significant intervention group by time interaction, $F(1, 446) = 6.70$, $p = .01$. There were differences between the control and intervention groups in initial status as well as differences in the slope, with the intervention group showing significantly more positive increases on the AIR-S over time. There was a significant random intercept variance for both the control and intervention groups at the student level but a nonsignificant variance for the random slope and covariance estimate for both groups at the student level. This suggests significant individual differences in initial mean level but limited individual differences in the linear slope. At the campus level, the random intercept and slope variance and the covariance estimate were all significant for both groups. Nonsignificant random effect parameters were dropped from further analyses. Parameter estimates are provided in Table 2.

When disability and gender were added to the model, no additional significant effects of disability, gender, or their interaction with each other, time, or intervention group were found. This suggests that the only factor that influenced the latent mean and slope of the AIR-S was assignment to intervention or control group. Figure 1 depicts the growth trajectory for the intervention and control groups on the AIR-S.

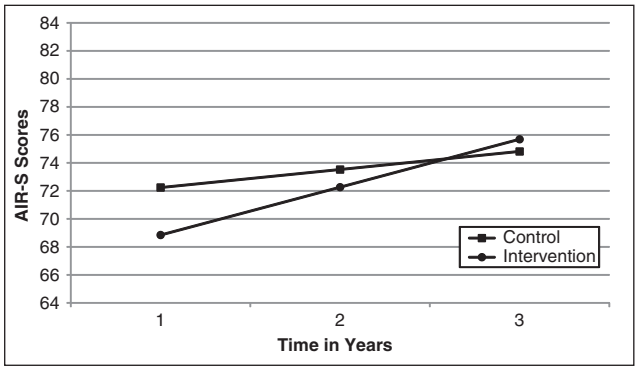

Figure 1. Growth trajectories for the control and intervention groups on the AIR Self-Determination Scale, Student version

The Arc's Self-Determination Scale

Our initial multigroup growth curve model for the SDS suggested a significant overall increase in SDS scores over time, $F(1, 448) = 51.73$, $p < .0001$, but a nonsignificant intervention group effect, $F(1, 368) = 1.05$, $p = .31$, and group by time interaction, $F(1, 448) = 0.21$, $p = .65$. This suggests no initial mean-level differences between the intervention and control groups as well as a consistent pattern of increasing scores on the SDS over time regardless of assignment to intervention or control group. At the student level, there was a significant random intercept variance for both the control and intervention groups and a significant random slope for the control group only. At the campus level, all random effects were significant. Nonsignificant random effect parameters were removed from further analyses. Parameter estimates are provided in Table 2.

Table 3. Parameter Estimates for The Arc's Self-Determination Scale by Disability, Gender, and Intervention Groups

Group	Intercept	*SE*	Slope	*SE*
LD-male control[a]	100.47	1.38	2.57	1.45
LD-male intervention	—		4.42	2.03
LD-female control	109.32**	1.56	2.91	2.24
LD-female intervention	—		4.14	2.27
ID-male control	98.89	2.14	1.78	2.73
ID-male intervention	—		9.80**	2.53
ID-female control	98.65	2.43	4.33	2.98
ID-female intervention	—		9.44*	2.78

Abbreviations: LD = learning disability; ID = intellectual disability
[a]Males with LD in the control group served as the comparison group for all tests of significance.
*$p < .05$. **$p < .01$.

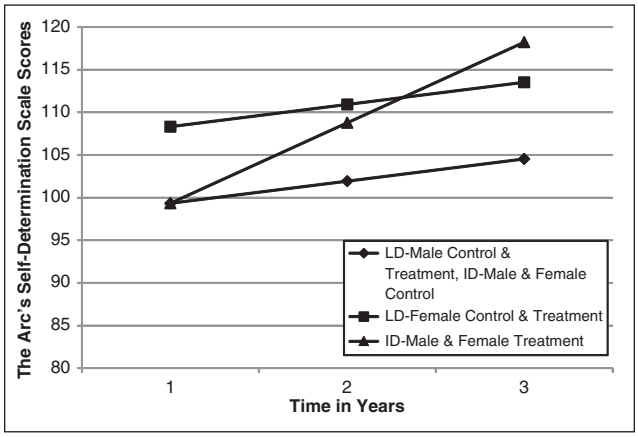

Figure 2. Growth trajectories for participants on The Arc's Self-Determination Scale
Abbreviations: LD = learning disability; ID = intellectual disability

When adding disability and gender to the model, multiple significant fixed effects were found. We interpreted the highest order effect for the intercept and slope. In terms of the intercept, there was a significant gender by disability interaction, $F(1, 362) = 4.90$, $p = .03$. This significant omnibus effect was driven by differences in between males and females with learning disabilities (males with learning disabilities served as the comparison group). There were not significant differences between the initial status of males with learning disabilities and males and females with intellectual disability. The estimates for each group are provided in Table 3.

In terms of the slope, a marginally significant time by disability by gender by intervention group effect was found, $F(2, 442) = 2.96$, $p = .05$. As shown in Table 3, the significant omnibus effect was driven by differences in the slope of males and females with intellectual disability in the intervention group. Interestingly, there were no significant differences in the slope within the LD group based on gender or intervention group. Furthermore, males and females with intellectual disability in the control group did not show significant differences in their slope compared to the LD group. Essentially, the slopes were the same for all participants with learning disabilities and participants with intellectual disability in the control group. However, males and females with intellectual disability in the intervention group showed significantly steeper slopes than all other participants. We did conduct an additional post hoc test to explore the degree to which the slope of males and females with intellectual disability in the intervention group differed from each other. They were not significantly different from each other, $t(362) = 1.03$, $p > .05$. Figure 2 provides a representation of the growth curves for the SDS. As depicted in the graph, females with learning disabilities had a significantly higher initial intercept but had the same slope as all other participants with learning disabilities as well as participants with intellectual disability in the control group. Participants with intellectual disability in the intervention group, however, had a significant increase in their scores over the duration of the project.

Criterion-Referenced Measures

Table 4 presents percentage correct on each item from the *Whose Future Is It Anyway?* and *Next S.T.E.P.* criterion-referenced surveys for measurement Time 1 (baseline) and on completion of instruction (end of Year 3). For the *Whose Future* questionnaire, students improved their percentage of items answered correctly from baseline to Time 3 on 16 of the items, remained the same on 2 items, and decreased on 2 items. Percentage increases ranged from 1% to 30%, and percentage decreases were 2% and 7%, respectively. Overall, students at Time 1 responded to just fewer than 70% of items correctly, while responding to just fewer that 80% of items correctly at Time 3. The performance on the *Next S.T.E.P. Survey* was a bit more sporadic, with increased performance on 5 items, no change on 4, and decreases on 2 items. Overall, however, students answered 5% more correct items postintervention. Finally, with regard to the *Self-Directed IEP* survey, which has a response scale that requires students to answer whether they never have an opportunity to do something, or that they do not know how to do it, or that they do it sometimes, or that they do it well and when needed, as depicted in Table 5, there was a general trend toward more positive responses. For every item, the percentage of responses in the "no opportunity" category was reduced from Time 1 to Time 3, and in 7 of 8 items it was reduced to zero. And, in parallel, there was an increase in percentages of responses at the highest level (do well and when needed) on every item. On average at

Table 4. Percentage Correct and Changes From Time 1 to Time 3 for *Whose Future Is It Anyway?* and *Next S.T.E.P. Criterion*-Referenced Surveys

Instrument	*N*	% correct Time 1	% correct Time 3	% change
WF1	60	72	82	+10
WF2	60	88	96	+8
WF3	60	56	74	+18
WF4	60	70	78	+8
WF5	60	50	78	+28
WF6	60	66	66	0
WF7	60	65	74	+9
WF8	60	73	74	+1
WF9	60	78	92	+14
WF10	60	56	70	+14
WF11	60	82	93	+11
WF12	60	83	93	+10
WF13	60	52	82	+30
WF14	60	70	63	−7
WF15	60	53	53	0
WF16	60	65	89	+24
WF17	60	88	93	+5
WF18	60	87	96	+9
WF19	60	76	74	−2
WF20	60	60	66	+6
WF avg.		69.5	79.3	+9.8
NS1	14	40	40	0
NS2	14	36	80	+44
NS3	14	64	80	+16
NS4	14	60	60	0
NS5	14	79	70	−9
NS6	14	15	15	0
NS7	14	40	40	−0
NS8	14	85	100	+15
NS9	14	50	40	−10
NS10	14	57	60	+3
NS avg.		53.6	58.5	+5.0

Abbreviations: WF = *Whose Future* item; NS = *Next S.T.E.P.* item.

baseline, students answered that they had no opportunity almost 30% of the time and do it well only 12% of the time, whereas at the second time period, that dropped to just more than 1% for the lower response and raised to more than 30% on the highest (do well) response.

Discussion

The results of this study suggest that implementing interventions to promote self-determination results in significant changes in student self-determination. Specifically, on two student self-report measures, students with disabilities who participated in self-determination interventions implemented by their teachers over a 3-year period showed significantly more positive patterns of growth in their self-determination scores than did students not exposed to self-determination interventions during the same time period. However, the specific pattern of differences varied across the two student report measures utilized in this study.

On AIR, *all* participants showed significant increases in their scores over the 3-year of the project. This would be expected, as high school is a time during which adolescents acquire the skills and abilities to enable them to become more autonomous and self-determined. As such, the fact that students in the control group showed an average increase in their AIR-S scores of 1.3 points during each year of the study reflects the influence of typical development on self-determination. Students systematically exposed to self-determination interventions, however, showed a significantly greater increase in scores, gaining, on average, 3.4 points per year, indicating that providing systematic instruction to promote self-determination enhanced the development of self-determination beyond that occurring normally. These increases were offset by initial mean-level differences. Students in the control group had significantly higher initial mean scores on the AIR-S. Initial data screening did not suggest any significant differences across the control and intervention group on key demographic variables, nor did the variables (disability label and gender) examined in later models explain these initial differences. There was, however, significant variability in initial mean scores (indicated by the significant variance intercept in the random effect portion of the model, for both the intervention and control group at the student and campus level) as well as in the change over time at the campus level (indicated by the significant slope at the campus level for the intervention and control group). This suggests that the individual variability was not fully explained by the variables included in the model. However, as shown in Figure 1, even with these differences, there was clearly a more positive trend in scores over time for students in the intervention group that resulted in higher scores than the students in the control group by the end of the project. Further research is needed to understand the background student- and campus-level factors that predict students' initial ratings of their capacity and opportunity for self-determination and the degree to which these factors may affect the efficacy of self-determination interventions.

For example, it is possible that variables not measured in this study predict initial self-determination scores. Previous exposure to self-determination interventions at home and at school is difficult to quantify but may underlie initial differences in self-determination scores as well. And since random assignment occurred at the campus level, it is possible that previous exposure to self-determination content varied based on both individual or familial and campus or district factors that were not fully accounted for in this model, despite including the nesting of students within campuses in the model. Future research should consider ways to

Table 5. Percentage Responses on SDIEP Items at Time 1 and Time 3

		Percentage responses							
SDIEP item	*N*	Response 1, Time 1	Response 1, Time 3	Response 2, Time 1	Response 2, Time 3	Response 3, Time 1	Response 3, Time 3	Response 4, Time 1	Response 4, Time 2
SDIEP 1	12	42	11	17	22	33	33	8	33
SDIEP 2	12	17	0	33	12	17	50	33	38
SDIEP 3	12	25	0	25	25	33	38	17	38
SDIEP 4	12	17	0	42	50	33	38	8	12
SDIEP 5	12	17	0	17	38	58	38	8	25
SDIEP 6	12	17	0	42	50	25	12	16	38
SDIEP 7	12	50	0	17	25	25	50	8	25
SDIEP 8	12	50	0	25	50	25	12	0	38
SDIEP avg. (%)		29.38	1.38	27.25	34.0	31.0	33.88	12.25	30.88

Abbreviation: SDIEP = *Self-Directed IEP*.
Response 1 = *I never have an opportunity to do this*; Response 2 = *I don't know how to do this*; Response 3 = *I sometimes do this*; Response 4 = *I do this very well and when needed*.

collect data that quantifies additional variables that may predict initial differences, particularly data related to familial and campus or district self-determination practices and attitudes. There was not, however, variability in the slope across the control and intervention groups, suggesting that participation in the control and intervention group explained much of the variability in student growth trajectories over the 3 years of the project.

Interestingly, when disability label and gender were added to the AIR-S growth model to explore potential impact and interactions, there were not any significant impacts on model parameters. This suggests that, on the AIR-S, disability label (intellectual disability vs. learning disability) and gender had no significant impact on initial mean ratings of capacity and opportunity for self-determination or changes in these ratings over time.

When looking, however, at the second student self-report measure of self-determination, the SDS, a different pattern of findings emerged. Our initial, baseline model with this measure suggested—as did the initial AIR-S model—that all students increased in their ratings of self-determination over time, by approximately 4.5 points per year. However, there was no significant impact of intervention group status on scores over time, suggesting that all students showed the same pattern of change irrespective of whether or not they participated in the self-determination interventions. Furthermore, there were no significant initial mean-level differences between the control and intervention group on the SDS, as evidenced with the AIR-S, although there still was significant variability in initial mean scores as demonstrated by the significant random intercept variance for both the control and intervention groups at the student and campus levels.

Interestingly there was also a significant variance for the slope in the intervention group at the student level in the initial model, suggesting that other factors could be influencing the trajectory of the intervention group in the initial model. This was confirmed when disability and gender were added to the model—suggesting a more complex relationship than with the AIR-S. Disability and gender affected both initial status and the growth trajectory for students. Females with learning disabilities had significantly higher initial scores on the SDS, compared to males with learning disabilities and males and females with intellectual disability. In addition, when analyzing the pattern of change demonstrated by students over time, it became clear that disability and gender interacted with intervention group and time to produce specific growth trajectories. As shown in Figure 2, males and females with intellectual disability who participated in the self-determination intervention over the 3 years of the project showed a significantly steeper slope than students with intellectual disability not exposed to the intervention. Students with intellectual disability exposed to intervention conditions had the highest self-determination scores of all students during the final year of the project, despite the initial mean-level difference shown by females with learning disabilities.

This suggests a differential response on the SDS to the self-determination interventions based on disability label. This differential pattern of findings on the SDS, as compared to the AIR-S, confirms previous research suggesting that these two assessments are measuring different aspects of the self-determination construct. As we have hypothesized in previous research, the AIR seems to be measuring student capacity and opportunity for self-determination, which logically may be more significantly influenced, for all students, by exposure to self-determination interventions. One of the subscales of the AIR-S measures opportunity for self-determination, and students exposed to self-determination interventions clearly have more opportunities to learn about

and practice skills associated with self-determination. The second subscale on the AIR-S, the Capacity subscale, assesses what students are doing and feeling related to self-determination. The skills and attitudes assessed are typically those taught explicitly in self-determination curricula. Thus, the AIR-S appears to be measuring the precursors (skill development and environmental opportunities) to the development of the essential characteristics of self-determined behavior, which are more explicitly measured by the SDS. As is posited by the functional theory of self-determination (Wehmeyer et al., 2007), the essential characteristics of self-determined behavior develop over time as children and youth learn skills and develop attitudes that enable them to engage in self-determined behavior. The theory holds that capacity development, environmental opportunities, and supports and accommodations across the life span are critical to the development of the essential characteristics of self-determined behavior. As such, the AIR-S may be more sensitive to short-term changes in skills, attitudes, and environmental opportunities for self-determination than is the SDS.

As shown by the results for the SDS, translating skills, attitudes, and environmental opportunities into actual changes in the essential characteristics of self-determined behavior may be a more complicated process. Clearly, for students with intellectual disability exposed to interventions to promote self-determination, highly significant gains in self-determination as measured by the SDS occurred over the course of the project. However, although females with learning disabilities did show initially higher mean levels of self-determination, their growth trajectory was no different than that of other students with learning disabilities. This suggests that females with learning disabilities, in our sample, may have had more opportunities to develop the essential characteristics of self-determination behavior. This finding has been documented in other research (Nota et al., 2007; Shogren et al., 2007); however, the factors that contribute to these differences have not been well explained. Further research is needed to explore gender differences in self-determination and their relationship with disability label.

Furthermore, our finding that males and females with learning disabilities in the intervention group did not show significantly different changes in their self-determination scores over time deserves further attention. It is possible that this is an artifact of this study. However, the significant change demonstrated by the group of students with intellectual disability exposed to the interventions suggests that the interventions were effective for some students. However, on the AIR-S, students with learning disabilities did show the same pattern of significantly greater change over time based on assignment to intervention conditions. Therefore, the degree to which the interventions led to changes in the essential characteristics of self-determined behavior may be different for students with learning disabilities than for students with intellectual disability. It may also be that the interventions had greater efficacy for students with intellectual disability in changing the essential characteristics of self-determination. Despite their initial status being the same as males with learning disabilities, it is possible that increasing the opportunities for self-determination lead to significantly greater gains for students with intellectual disability. Further research is critically needed that examines this finding and explores the best way to promote the essential characteristics of self-determination for students with learning disabilities and translates opportunities created by implementing self-determination interventions into actual opportunities to develop the essential skills associated with self-determination and causal agency.

Limitations of the Study

In interpreting the findings of this study, there are several limitations that must be considered. First, there was attrition in our sample. Although this is not unexpected in longitudinal studies and preliminary data screening did not indicate any significant differences between completers and noncompleters, there were a number of participants who left the study over time, which reduced our sample size. Second, we relied on teachers' reports of students' disability labels, and specific data on students' intelligence and achievement scores were not collected. Because of confidentiality requirements that limited the amount of information many of the participating schools could release, admission to special education and categorical information on students' eligibility for special education were used to assign students to disability groups. Although it can be assumed that this information represents students' true disability status, there was no way to confirm that students included in this study were assigned to the appropriate group. Third, participating students were exposed to different self-determination curricula. The purpose of our study was to examine the influence of self-determination interventions, generally, on student self-determination scores. And all of the curricula available to participating teachers were evidence based and grounded in theoretical frameworks of self-determination. However, it is impossible in the current study to identify differential effects of the diverse curricula available to promote self-determination. Future research is needed that compares curricula to inform teacher selection of instructional materials. Fourth, although we implemented multiple means of ensuring fidelity to treatment for the respective interventions, we were not able to directly measure fidelity to the intervention. We did, however, show that students performed better, on average, across items on criterion-referenced assessments linked to three of the interventions, suggesting that they gained the

skills and knowledge taught in the curriculum and providing evidence of the delivery of the intervention. Also, since lack of fidelity would principally limit the efficacy of the intervention, we believe that the absence of such direct measures does not adversely affect the findings from the study.

Finally, multiple variables contribute to student self-determination. We chose to construct our models based on previous research that consistently suggests the influence of gender and disability label on self-determination scores. We wanted to clarify the impact of these variables over time when interventions to increase self-determination were implemented by teachers. However, other factors may also affect student self-determination, and future research is needed to explore the factors that contribute to initial self-determination status of students who are participating in school-based interventions to provide guidance for future research on the effectiveness of self-determination interventions. For example, the significant random intercept variance that was present in all models suggests the need to more critically attend to both the impact of interventions to promote self-determination as well as the environmental factors that support the development of self-determination.

Implications for Practice

Promoting self-determination has become best practice in the education of students with disabilities. This study is the first such study to examine the causal impact of such interventions on student self-determination and supports previous studies indicating that if provided explicit instruction to promote student self-determination and student involvement in educational planning, students with disabilities can benefit and enhance their self-determination and related skills. Since positive self-determination status has been linked to more positive adult and postsecondary outcomes, this study documents the importance of efforts to promote student self-determination. The study opted to utilize a multicomponent approach to intervention; all students participated in at least one of the student-involvement intervention packages or programs, and all students learned to self-regulate learning using the SDLMI. We believe such multicomponent models of intervention are important, as students need to learn and practice a wide array of skills and have myriad experiences pertaining to areas such as goal setting, problem solving, and decision making if they are to become self-determined. There are now a wide array of instructional programs and models, most highlighted here, that can address the instructional needs of a wide range of students, and although there is always a need for more such intervention strategies, it is safe to say that this study shows that the tools that teachers need to effectively promote self-determination are available to them.

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