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Original Research

Paths 2 the Future: Evidence for the Efficacy of a Career Development Intervention for Young Women With Disabilities

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Abstract

Young women with disabilities face unique barriers in the transition from school to adulthood, yet very few studies have examined the effectiveness of gender-specific career interventions. Using an intent-to-treat analysis, this study tested the efficacy of the Paths 2 the Future (P2F) career development curriculum to produce beneficial impacts as compared to business-as-usual career and transition services within a clustered, school-randomized trial. The sample included 366 young women with disabilities enrolled in 26 high schools. Controlling for student and school characteristics, multilevel growth models showed that young women in the P2F intervention schools grew in career development skills at a greater rate relative to those in the control schools. Findings suggest that P2F was effective in promoting individual student differences in career development skills for young women with disabilities and support the need for further research examining effectiveness of gender-specific career interventions in special education.

Although the Individuals With Disabilities Education Act (2006) states that the fundamental purpose of a free appropriate public education is to prepare all students with disabilities for "further education, employment, and independent living" (20 U.S.C. § 1400[d][1][A]), youth with disabilities consistently experience lower rates of employment and are less likely to enroll in or complete postsecondary education than their nondisabled peers (Butterworth & Migliore, 2015; U.S. Bureau of Labor Statistics, 2020). Young women with disabilities, in particular, face unique challenges in accessing postsecondary education, gaining employment, living independently, and fully participating in their communities (Hogansen et al., 2008; Lindsay et al., 2017). After leaving high school, females with disabilities are more likely than males to be employed part-time and earn lower wages and are less likely to work in high-skill or high-wage jobs (Doren et al., 2011). The persistence of these inequities over time suggests that women with disabilities are more likely to experience poverty in adulthood (Fins, 2019).

The process of career development for young women with disabilities is impacted by both individual and structural barriers. Individual attributes, such as low self-esteem, limited self-efficacy, and a lack of self-advocacy skills can restrict the ability to fully explore a wide range of career options. In addition, young women with disabilities often have limited opportunities for career exploration activities during high school (Ferri & Conner, 2010; Lindstrom et al., 2012), are less likely than their male peers to enroll in vocational courses or participate in community work experiences, and may face discrimination related to both

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gender and disability identities (Lindsey et al., 2017; Noonan et al., 2004). This restricted set of opportunities and experiences translates to a narrow range of career interests and aspirations, ultimately resulting in poor long-term educational and employment outcomes (Doren et al., 2011; Lindsey et al., 2017).

Despite the complex combination of barriers faced by young women with disabilities as they transition from school to adult roles, relatively few career development interventions have been developed to specifically focus on ameliorating these gender gaps. One of the few exceptions is Career Connections, a 24-lesson curriculum designed to improve prosocial and career development outcomes for young women with disabilities. This weekly program aims to improve participants' knowledge about self-advocacy, gender equity, leadership, and workforce issues and provides opportunities to investigate a variety of career options. A pretest-posttest study showed that immediately after participating in Career Connections, female students with disabilities who participated ($N = 102$) had a range of improved outcomes, including (a) more positive relationships with adults, (b) increased ability to advocate for themselves in difficult situations, (c) increased participation in school and community activities, and (d) more proactive communication skills (Lindstrom et al., 2008).

Despite the complex combination of barriers faced by young women with disabilities as they transition from school to adult roles, relatively few career development interventions have been developed to specifically focus on ameliorating these gender gaps.

Another such intervention, Girls at Work, developed by Wehmeyer and colleagues (2009), utilized a self-determined career development model to improve career outcomes for young women with intellectual and developmental disabilities. Girls at Work is a web-based, student-driven, transition-oriented curriculum that includes a set of eight action steps designed to promote self-determination and encourage gender awareness. Initial field test data indicated improved employment rates and enrollment in postsecondary education for the young women ($N = 54$) who completed the Girls at Work program (Parent & Tanis, 2011).

More recently, the Post-School Achievement Through Higher Skills (PATHS) curriculum was developed to promote social cognitive career and self-determination outcomes and address the unique learning needs of young women with disabilities (Lindstrom et al., 2013). Lesson topics, derived from special education and career development literature, include self-determination and strengths, gender identity, disability knowledge, and career exploration. Participants in PATHS were young women identified by school personnel as either eligible for special education services or at risk for dropping out of school (e.g. chronic absenteeism, credit deficient, unstable family situations). A pretest-posttest control group design with 110 young women found that that participation in this curriculum resulted in significant gains in autonomy and disability and gender-related knowledge (Doren et al., 2013). The Paths 2 the Future (P2F) curriculum used in the current study is an extension of the PATHS curriculum, with updated content and language to reflect current career- and college-readiness standards.

Overall, the reviewed literature highlights the potential benefits of gender-specific career and transition interventions; however, to date, there have been no randomized controlled studies targeting improved career outcomes for young women with disabilities receiving special education services. The current study builds on previous research to test the efficacy of a fully developed gender-specific career development intervention (i.e., P2F) using a randomized controlled trial.

Social Cognitive Career Theory (SCCT)

The P2F intervention utilizes SCCT as a framework for understanding the career development processes for young women with disabilities. SCCT is an integrated career development model that describes how people, their behavior, and environments influence each other to shape occupational and academic interests, choices,

and attainment of career goals (Lent, 2005). SCCT takes into account the influence of individual and contextual variables, such as race-ethnicity, gender, disability, and socioeconomic status, as well as self-efficacy and expectations for the future while at the same time accounting for the importance of significant learning experiences in shaping career behaviors and educational outcomes. A key tenet of SCCT is that *self-efficacy* (beliefs about a person's capabilities to achieve their goals) and *outcome expectations* (imagined consequences of actions) have important effects on the formation of career interests, choices, and aspirations. Aspirations for the future, in turn, are a significant predictor of employment in adulthood (Ashby & Schoon, 2010). Self-efficacy and outcome expectations predict career interests and work outcomes for students with academic learning challenges and intellectual disabilities (Nota et al., 2010; Ochs & Roessler, 2001), and previous interventions designed to enhance self-efficacy beliefs have been demonstrated to be successful for adolescents with disabilities (Lindstrom et al., 2019; Sheftel et al., 2014). Thus, we posit that self-efficacy and outcome expectations are crucial concepts for understanding and promoting career development outcomes among young women with disabilities.

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Thus, we posit that self-efficacy and outcome expectations are crucial concepts for understanding and promoting career development outcomes among young women with disabilities.

Study Purpose

The purpose of this study was to determine whether the P2F curriculum produces a beneficial impact on career development outcomes for young women with disabilities relative to a counterfactual (e.g., typical high school career and transition services). P2F is a fully developed and pilot-tested curriculum designed to address the unique career development and transition needs of young women with disabilities (Lindstrom et al., 2019). Developed and field-tested initially as PATHS (Lindstrom et al., 2013), the P2F curriculum includes 75 lessons divided into four modules: (a) self-awareness, (b) disability knowledge, (c) gender identity, and (d) career and college readiness. The modules are designed to build individual skills and attributes and expose young women to a wide range of career options. Lessons are taught in sequence within a group or classroom setting in the course of the school day. (For more details on the P2F curriculum, see Lindstrom et al., 2019.)

Guided by the SCCT framework and prior findings, we hypothesized that young women in the P2F intervention schools would exhibit greater rates of increased career development skills relative to those in the control schools. Hypotheses were tested using an intent-to-treat (ITT) approach. That is, effectiveness of a treatment relies on comparison of assigned groups regardless of dropout, changes in school protocol, variation in implementation or noncompliance of teachers, or any other unobserved factors that occur after random assignment (DeGarmo & Gewirtz, 2019). Thus, the randomization and ITT evaluation provide causal inference and unbiased estimates of intervention effects due to group assignment within real-world conditions.

Method

Study Procedures

After receiving institutional review board approval, students were recruited from 26 public high schools in the northwestern region of the United States to participate in an efficacy trial of an intervention designed to improve career outcomes for young women with disabilities. Special education teachers and school counselors at each school were asked to identify a sample of young women in their schools to participate in the study based on the following inclusion criteria: (a) identified as female;

(b) currently enrolled in Grades 9 through 12 in a participating high school; (c) determined eligible for special education services with a high-incidence disability, including learning disability, other health impairment (including attention deficit hyperactivity disorder), speech or language disability, and emotional disability; and (d) demonstrated fourth- to fifth-grade reading, writing, and language skills. Students with more significant cognitive or intellectual disabilities were not included.

Schools were randomly assigned to intervention and control conditions using propensity score matching (PSM) procedures. PSM is recommended for group randomized trials of 20 or fewer or correlations of .30 and above on matching factors (Diehr et al., 1995; Luellen et al., 2005; Murray, 1998). Over half of the matching factor correlations were above .30. Schools were matched on data extracted from the Department of Education on school size (number enrolled), percentage special education, percentage Black, percentage White, percentage Hispanic, and percentage receiving free and reduced lunch. The propensity score (PS) was defined as the conditional probability of a subject being assigned to the treatment group given the observed covariates and where the log odds of assignment to treatment was

$$\ln\left(\frac{\mathrm{PS}}{1-\mathrm{PS}}\right)=\beta_0+\beta_i\mathrm{School\ Size}+\beta_2\%\mathrm{SPED}+\beta_3\%\mathrm{EA}+\beta_4\%\mathrm{AA}+\beta_5\%\mathrm{HA}+\beta_6\%\mathrm{FRL},$$

where covariates were the size of the school and the percentage of students enrolled who were receiving special education, were white, were Black, were Hispanic, and were eligible for free or reduced lunch. The matching tolerance was set to .2, and paired scores were randomly allocated to either treatment or control. Participants in the control condition received "business-as-usual" career and transition services within their high school. A total of 156 participants from 13 schools were randomized to the intervention condition, and 230 participants from 13 schools were randomized to the control condition.

Parent consent and student assent were obtained prior to the study onset. Teachers were trained in the data collection instruments and procedures to be used during the study. Students in both control and intervention groups completed a web-based survey at four time points: (a) preintervention (T1), (b) midway through the academic year (for schools implementing a full-year schedule; T2), (c) postintervention (T3), and (d) 6-month follow-up (T4). The P2F survey was administered individually or in groups. Each student was provided with a unique login code. Students took between 15 and 60 min to complete the survey. Research team members were available for the entire duration to answer any questions the students had about survey items or complex vocabulary. Teachers separately provided information about each participating student's diagnosis qualifying them to receive special education services as well as information on academic, family, health, work, and other barriers that often limit educational attainment and may influence postschool outcomes.

P2F intervention. Prior to the start of the intervention and data collection activities in each school, all P2F instructors received one full day of professional development from the program developers and research team. This included an explanation of the P2F logic model, an overview of the content of the four program modules, and modeling of procedures for implementing the standard daily lesson plans. Once appropriate consent and assent processes were complete, intervention teachers began implementing the lessons and activities as outlined in the P2F curriculum guide (Lindstrom & Post, 2015). Lessons included small- and large-group discussions, role-plays to practice key skills, guest speakers, and field trips to explore a wide range of college and career options. Young women attended the class daily (or on alternate days for those on block schedules) and received high school credit upon completing the 75 lessons.

The research team used multiple measures to observe and document fidelity of implementation for the P2F study. First, we collected information on student dosage through tracking student attendance and lesson completion at each school. Curriculum dosage was calculated

at a school level as the number of lessons delivered divided by the total number of curricular lessons (75). Second, we conducted a minimum of eight classroom observations in each of the intervention sites and completed a five-item teacher adherence observation protocol and six-item quality-of-instruction observation protocol. Both the adherence and quality observation rubrics were completed by P2F research personnel during the same classroom observation. Across the 13 intervention schools, lesson dosage ranged from 49% to 100% (mean dosage = 87.8%), with average observer-rated quality at 79.7% and overall adherence to lesson components measured at 81.7%.

Sample. The current study sample comprised 366 participants (mean baseline age = 16.54 ± 1.12 years) who had baseline data available on all outcome variables. The study sample (N = 366) included 61.5% non-Hispanic White and 19.4% Latina youth, enrolled in Grades 9 (14.5%), 10 (33.9%), 11 (30.1%), and 12 (21.6%). Most participants were receiving special education services under the categories specific learning disability (55%) or other health impairment (14.8%). (See additional disability demographics in Table 1.) Teachers were asked to indicate whether each student was experiencing any additional risk factors or barriers in five areas, including academics, family or living, work, at-risk behaviors, and health challenges. Most common teacher-reported barriers included difficult family circumstances (43.7%), mental health issues (42.6%), chronic absences (27.6%), no prior work or volunteer experience (25.1%), or being behind in completing credits toward graduation (16.4%). According to teacher reports, 83 participants (22.7%) did not experience any barriers, but the majority of participants (53.6%) experienced more than one barrier.

Table 1. Paths 2 the Future Student Demographics.

Demographic	*n*	%
Grade		
9	53	14.5
10	124	33.9
11	110	30.1
12	79	21.6
Missing	20	5.2
Hispanic or Latina		
Yes	71	19.4
Missing	20	5.2
Race-ethnicity		
White	225	61.5
Black or African American	17	4.46
American Indian or Alaskan Native	16	4.4
Asian or Pacific Islander	8	2.2
Other	44	12.0
More than one race	49	13.4
Missing	7	1.9
IDEA classification		
Specific learning disability	202	55.2
Other health impairment	54	14.8
Emotional disturbance	22	6.0
Intellectual disability	22	6.0
No disability specified	21	5.7
Speech or language impairment	14	3.8
Other	25	6.8
Missing	6	1.6

Note. N = 366. IDEA = Individuals With Disabilities Education Act.

Measures. We developed a web-based survey that included a compilation of validated measures. The survey was originally developed and validated through a pilot study (Doren et al., 2013) and was augmented for the current assessment. The survey included between 107 and 128 questions, depending on responses to items with branching. In addition to demographic questions (14 items), the survey contained questions on future goals (four items), career and technical education course enrollment (one to three items), work experience (one to 20 items), and 87 scale items. Eight previously validated scale measures were used to compute the focal career development score.

Two scales were from the Arc's Self-Determination instrument (Wehmeyer & Kelchner, 1995). The Autonomy scale included 14 items rated from 1 (*not even if I had a chance*) to 4 (*every time I have the chance*). Sample items were "I work on schoolwork that will improve career chances," "I keep my appointments and meetings," and "I volunteer for things I am interested in." Cronbach's alpha for internal

consistency was .74, .85, .82, and .83 for T1, T2, T3, and T4, respectively. The Self-Realization scale included 15 items rated from 1 (*never agree*) to 4 (*always agree*). Sample items were "It is better to be yourself than popular," "I feel free to be angry at people I care for," and "I don't accept my own limitations" (reversed) (α = .78, .78, .80, and .79 for T1 through T4, respectively).

The Self-Advocacy scale was from the College Students With Disabilities Campus Climate Survey (Lombardi et al., 2011) and included five items rated from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items were "I know about my rights and responsibilities as a student with a disability" and "I feel comfortable advocating for myself and my needs at this school" (α = .79, .82, .84, and .80 for T1 through T4, respectively).

Two scales employed in the pilot study were adapted from McWhirter et al. (2000), the Vocational Skills Self-Efficacy scale and the Vocational Outcome Expectancy scale. Vocational Skills Self-Efficacy included 29 items measuring confidence in job preparation skills, time management, and goal setting rated from 1 (*no confidence at all*) to 5 (*complete confidence*). Sample items were "Know what to wear for a job interview," "State my general career interests," and "State my educational goals" (α = .97, .97, .97, and .98 for T1 through T4, respectively). The Vocational Outcome Expectancy scale included six items rated from 1 (*strongly disagree*) to 4 (*strongly agree*). Sample items were "My career planning will lead to a satisfying career for me" and "My talents and skills will be used in my career/occupation" (α = .88., .92, .91, and .89 for T1 through T4, respectively).

Two scales were from the Student Engagement Instrument (Appleton et al., 2006). Future Aspirations and Goals included 5 items rated from 1 (*strongly disagree*) to 4 (*strongly agree*). Sample items were "Going to school after high school is important" and "I plan to continue my education following high school" (α = .88, .91, .91, and .91 for T1 through T4, respectively). Peer Support for Learning included six items. Sample items were "Other students here like me the way I am," "Students at my school are there for me when I need them," and "Students here respect what I have to say" (α = .90, .91, .93, and .92 for T1 through T4, respectively).

Finally, Disability and Gender Awareness (Doren et al., 2013) was a six-item scale rated from 1 (*no confidence at all*) to 5 (*complete confidence*). Sample items were "Identify different types of disabilities," "Describe how being female can impact career choices," and "Identify key characteristics of women leaders" (α = .79, .87, .89, and .91 for T1 through T4, respectively).

After factor analyses (see next section), an overall career development construct was computed as a mean total score of the eight subscales drawn from above. Each component score was rescaled 1 to 5 and reflected to assess career skills and then averaged to compute the overall career development score (Cronbach's alpha was .82, .82, .86, and .87 for T1 through T4, respectively).

Analytic Strategy

Analyses were conducted in two stages. The first stage focused on the measurement of the criterion outcome construct of career development. In this preliminary stage, we conducted factor analysis, more specifically, principal components analysis (PCA) to evaluate the configural structure of the career development construct over time as measured by the constituent scale scores. The second phase of the analyses focused on evaluation of the P2F efficacy hypothesis, which involved multilevel latent growth curve analyses to address the repeated-measures structure of the data and to address the nonindependence of data observations due to the clustering of the data within students and schools.

Career development construct factor analysis. We used several related approaches to build the career development construct score. First, we conducted exploratory factor analysis (EFA) of the scale score indicators. Specifically, we used PCA across T1 through T4 using the following recommended criteria for determining the factor structure of the focal construct outcome score (Henson & Roberts,

2006; Thompson & Daniel, 1996): (a) PCA was conducted with oblimin rotation allowing exploratory factors to be potentially correlated, (b) eigenvalues of unrotated factors were greater than 1, and (c) each factor accounted for greater than 5% of the total variance.

Second, to best determine the optimal number of factors we conducted both parallel analysis (PA) and Velicer's minimum average partial correlation analysis (MAP) (O'Connor, 2000). The PA directly compares eigenvalues for the ranked ordered PCA loadings with eigenvalues generated from randomly ordered data (O'Connor, 2000). Criteria for meaningful factors are those with higher eigenvalues from those randomly generated (i.e., eignevalues greater than the random parallel 95% quantile are retained), and thus meaningful variance is obtained above chance. The rationale underlying MAP is that the average of the squared partial correlations should be minimum when an adequate number of factors are partialed or extracted.

Finally, for tests of measurement invariance, we conducted a replicability test recommended by Osborne and Fitzpatrick (2012) in which the standardized structure item loadings from wave to wave are compared using a longitudinal panel design. Squared differences less than .04 represent replication; differences greater in magnitude do not replicate.

Multilevel P2F efficacy analyses. This study used a clustered randomized control trial to test the efficacy of the intervention (Murray, 1998; Raudenbush, 1977). The clustering, or nesting of data, involved longitudinal data nested within students and students nested within schools. The P2F efficacy hypotheses were tested with structural equation modeling (SEM) specified as latent growth models (LGM) using Mplus 8.2 (Muthén & Muthén, 1998–2018). We employed multilevel SEM (MLSEM) to estimate the two-level growth model at the within and between school levels (Heck & Thomas, 2015). The MLSEM growth model statistically addresses the nonindependence of the clustered data and partitions variance in participants' growth trajectories across student- and school-level effects.

LGM provide advantages for testing developmental changes in student outcomes within randomized trials (Brown et al., 2008) because they more reliably estimate within- and between-student differences in change compared to repeated-measures ANOVA. In LGM, a two-level growth model is a special case of an SEM measurement model, with repeated-measures observations specified as the measurement indicators of a latent variable intercept and latent growth rate or slope factor. The first step of LGM is to estimate a series of sequential unconditional models to determine the optimal pattern of growth. Using fixed chronometric time weights, we compared three models: a random intercept-only model (i.e., no mean growth but individual differences or variance in intercepts), a linear growth model (i.e., mean increases or decreases and variance in individual trajectories), and finally, accelerated or quadratic growth to capture curvature in the mean trajectories. The intercept-only model is specified by fixing repeated waves at 1, 1, 1, and 1 for T1 through T4. The linear growth slope model adds a latent factor with loadings fixed at 0, 1, 2, and 3, representing variation in linear trajectories. Finally, a quadratic model adds a latent factor allowing for acceleration in growth in trajectories, or nonlinear curvature, by fixing loadings at 0, 1, 4, and 9.

As in SEM, the MLSEM model fit was evaluated using recommended fit indices (Byrne, 2011; McDonald & Ho, 2002) of a chi-square minimization p value greater than .05, a comparative fit index (CFI) greater than .95, a chi-square ratio (χ^2/df) less than 2.0, and a root mean square error of approximation (RMSEA) less than .08. Data were also modeled using full-information maximum likelihood (FIML), which uses all available information from the observed data in handling missing data. FIML estimates were computed by maximizing the likelihood of a missing value based on observed values in the data. Any individual who had baseline data only and no follow-up data contributed nothing to the likelihood of estimates and was effectively excluded from change analyses (Brown et al., 2008). Compared to mean-imputation, listwise, or pairwise models,

FIML provides more statistically reliable standard errors.

Within-school two-level growth Level 1. The within-school growth model, or student-level growth model, for career development was specified as the following:

$$\text{Level 1 DC}_{ijt} = \eta_{0ij} + \eta_{1ij}\text{Time}_{tij} + \eta_{2ij}\text{Time}^2_{tij} + \varepsilon_{tij},$$

where the Level 1 career development outcome variable is a function of the repeated-measures random intercepts (η_0) for student *i* in school *j* and is a function of time as linear growth (η_1) and time squared as accelerated or quadratic growth (η_2) for student *i* in school *j*, plus the time-specific errors of measurement nested within individuals and schools (ε_{tij}). Thus Level 1 includes the time-varying repeated measures of the outcome score with linear time weighted 0, 1, 2, and 3 for the respective outcome scores and time squared weighted 0, 1, 4, 9.

Within-school growth Level 2. The estimated time-varying random intercepts and growth trajectories for each student are then summarized for students representing the within-school but "between-student" effects specified as the following:

$$\text{Level 2 CD Random Intercept } \eta_{0ij} = \alpha_{0j} + \zeta_{0ij}$$

$$\text{Level 2 CD Linear Growth } \eta_{1ij} = \alpha_{1j} + \gamma_{1ij}\text{Grade}_{ij} + \gamma_{2ij}\text{Ethnicity}_{ij} + \gamma_{3ij}\text{SES}_{ij} + \zeta_{1ij}$$

$$\text{Level 2 CD Accelerated Growth } \eta_{2ij} = \alpha_{2j} + \gamma_{4ij}\text{Grade}_{ij} + \gamma_{5ij}\text{Ethnicity}_{ij} + \gamma_{6ij}\text{SES}_{ij} + \zeta_{2ij}$$

where η_{0ij} is the summary of individual differences in student intercepts at Wave 1 for the full sample, η_{1ij} is the predicted growth rate for the sample, α_{1j} is the mean adjusted growth rate, and γ_{1ij} through γ_{3ij} are the student-level covariate effects of girls' grade, ethnicity, and family socioeconomic status, respectively, as predictors of growth in career development. The residual errors for initial status, linear and quadratic growth (ζ_{0ij}, ζ_{1ij}, and ζ_{2ij}) are each assumed to be normally distributed.

Between-school model Level 3. The between-school growth model estimates the proportion of variation in latent intercepts and latent growth factors that is attributable to school-level variables. The latent growth model is identical to the specification of time weights at the within-school student level, and the growth indicators are latent estimates based on the summary of the estimated observed data for students in the within model. All school-level covariates predicting growth are entered in the between-school model. More importantly, because randomization occurred at the school level, the ITT P2F effect is estimated in the between model as

$$\text{Level 3 CD Intercept } \eta_{0j} = \alpha_{0j} + \zeta_{0j}$$

$$\text{Level 3 CD Linear Growth } \eta_{1j} = \alpha_{1j} + \beta_{1j}P2F_j + \beta_{2j}\text{SchoolSize}_{ij} + \beta_{3j}\%\text{FRL}_{ij} + \zeta_{1j}$$

$$\text{Level 3 CD Accelerated Growth } \eta_{2j} = \alpha_{2j} + \beta_{4j}P2F_j + \beta_{5j}\text{SchoolSize}_{ij} + \beta_{6j}\%\text{FRL}_{ij} + \zeta_{2j}$$

where β_{1j} is the ITT effect of the P2F intervention on growth in girls' career development scores, controlling for the effects of school-level variables, such as school size (β_{2j}) and percentage of free and reduced lunches served (β_{3j}). The P2F efficacy hypothesis in the form of an MLSEM growth model is summarized graphically as a two-level within-school portion and a two-level between-school portion of variance, shown in Figure 1. For clarity's sake, model specification is illustrated with linear growth parameters only. The observed data or manifest variables are represented as squares. All unobserved latent variables are represented by circles, such as Level 2 and Level 3 growth factors and the between-school latent estimates of career development repeated-measurement indicators.

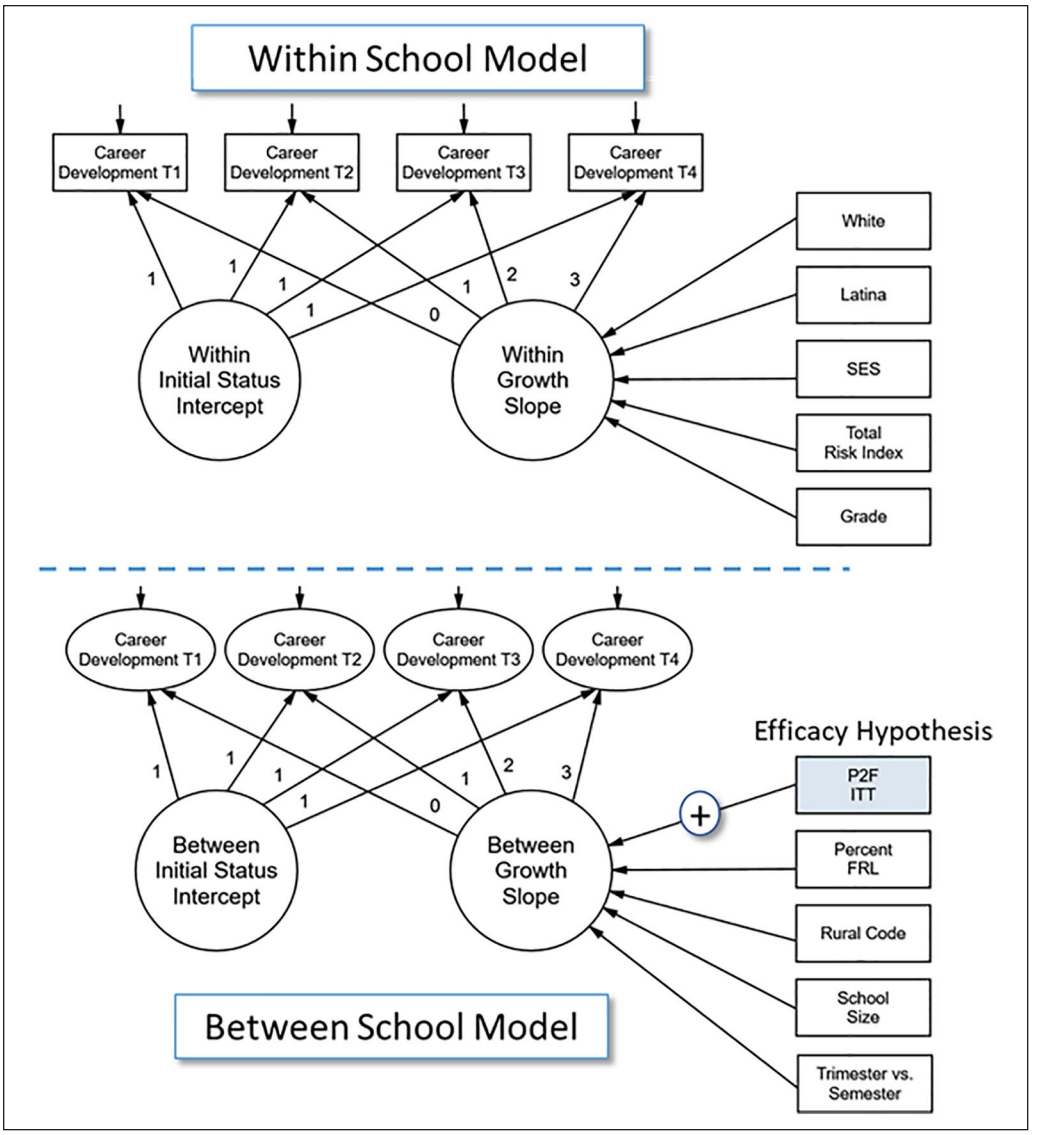

Figure 1. Multilevel structural equation modeling analytic specification for test of the Paths 2 the Future efficacy hypothesis predicting growth in young women's career development outcomes.

Results

Career Development Construct

The means and standard deviations for the career development indicator scale scores are presented in Table 2 by group condition across time. In the first step of the analyses, we subjected each of the candidate scale score outcomes to a PCA, followed by the PA and the MAP focusing on the optimal number of factor dimensions. Results of the PCA, PA, and MAP each indicated that a single-factor solution was the optimal configural structure for the career development construct. Loadings for the obliquely rotated PCA solution are shown in Table 3 for T1 through T4.

For T1, T3, and T4, the PCA obtained a single-factor solution and no second factor was extracted meeting criteria. At T2, the assessment wave with partial data, the PCA

Table 2. Means and Standard Deviations for Career Development Indicators by Group Condition.

	Control condition				Paths 2 the Future intervention			
Scale	Time 1 (n = 213)	Time 2 (n = 41)	Time 3 (n = 192)	Time 4 (n = 165)	Time 1 (n = 153)	Time 2 (n = 46)	Time 3 (n = 136)	Time 4 (n = 102)
Autonomy	2.66 (0.41)	2.66 (0.51)	2.73 (0.47)	2.72 (0.50)	2.66 (0.46)	2.86 (0.54)	2.78 (0.47)	2.78 (0.49)
Self-Realization	2.73 (0.42)	2.72 (0.45)	2.72 (0.46)	2.74 (0.43)	2.68 (0.48)	2.73 (0.39)	2.79 (0.44)	2.76 (0.480
Self-Advocacy	3.53 (0.72)	3.51 (0.77)	3.51 (0.72)	3.50 (0.67)	3.38 (0.76)	3.34 (0.72)	3.52 (0.79)	3.55 (0.74)
Vocational Skills Self-Efficacy	3.39 (0.80)	3.49 (0.80)	3.36 (0.80)	3.39 (0.83)	3.37 (0.85)	3.61 (0.84)	3.69 (0.80)	3.70 (0.79)
Vocational Outcome Expectancy	3.17 (0.48)	3.10 (0.60)	3.14 (0.51)	3.10 (0.54)	3.12 (0.59)	3.17 (0.56)	3.29 (0.53)	3.23 (0.56)
Disability and Gender Awareness	2.88 (0.74)	2.83 (0.74)	2.94 (0.85)	2.99 (0.87)	2.95 (0.85)	3.28 (0.86)	3.55 (0.89)	3.49 (0.91)
Student Engagement	3.14 (0.47)	3.15 (0.56)	3.09 (0.54)	3.07 (0.50)	3.04 (0.50)	3.09 (0.46)	3.10 (0.52)	3.06 (0.50)

Table 3. Loadings for Principal Components Exploratory Factor Analysis With Oblimin Rotation, Parallel Analyses, and MAP Analyses of Career Development Construct Indicators.

Variable	Wave 1 (n = 365)		Wave 2 (n = 87)		Wave 3 (n = 328)		Wave 4 (n = 268)	
Scale	Factor 1		Factor 1	Factor 2	Factor 1		Factor 1	
Autonomy	.734	—	.617	−.376	.744	—	.777	—
Self-Realization	.772	—	.742	.365	.793	—	.777	—
Self-Advocacy	.695	—	.542	.706	.742	—	.696	—
Vocational Skills Self-Efficacy	.804	—	.861	−.326	.854	—	.871	—
Vocational Outcome Expectancy	.747	—	.828	−.116	.776	—	.821	—
Disability and Gender Awareness	.635	—	.723	−.354	.705	—	.685	—
Student Engagement	.612	—	.608	.347	.698	—	.751	—
PCA								
EV	3.600	0.937	3.546	1.138	4.047	0.874	4.159	0.898
Explained variance	51.43%	—	50.65%	16.25%	—		59.41%	—
Parallel analyses								
EV	3.035	0.326	3.088	0.586	3.572	0.391	3.718	0.459
Random data EV (RDEV)	1.198	1.118	1.429	1.237	1.211	1.125	1.237	1.136
EV > RDEV criterion	Keep	Drop	Keep	Drop	Keep	Drop	Keep	Drop
MAP analyses								
EV	3.600		3.546		4.047		4.159	
Minimum squared partial r	.048		.076		.058		.063	
Meaningful factors	1		1		1		1	

Note. PCA = principal components analysis; EV = eigenvalue; MAP = Velicer's minimum average partial test.

Table 4. Means and Standard Deviations for Career Development Indicators by Group Condition.

	Control condition			P2F intervention		
Survey administration	*n*	*M*	*SD*	*n*	*M*	*SD*
Time 1	213	3.43	0.45	153	3.38	0.57
Time 2	41	3.44	0.57	46	3.53	0.48
Time 3	192	3.44	0.53	136	3.62	0.57
Time 4	165	3.43	0.56	102	3.59	0.56

Note. Scale score indicators were rescaled 1 to 5 and averaged to compute career development construct score.

obtained two factors; however, only the first factor represented meaningful variance according to the PA test, in which the first factor eigenvalue was the only factor higher than randomly ordered variables. That is, the second factor was not meaningful variance above chance. Similarly, Velicer's MAP test indicated that only the first factor had adequately minimized squared partial correlations. That is, when comparing component variance relative to error variance, the partial correlations will be small; as more component variability is removed or partialed out, the error variance will be larger and the partial correlations rapidly increase.

In the last step of the factor analyses, we examined the replicability of the factor structure over time (i.e., configural invariance). Results of the Osborne and Fitzpatrick (2012) replicability indicated that none of the squared PCA loadings differed among study waves across time. That is, when using the loadings shown in Table 3, comparing the squared absolute difference for all possible paired comparisons revealed that none of the differences were greater than .04.

P2F Efficacy Hypothesis

The first step of the efficacy hypothesis was to determine the optimal pattern of change in the focal career development construct for the sample. We first inspected the means and standard deviations by group condition presented in Table 4. The data in Table 4 indicated that young women in the control schools exhibited a rather flat trajectory over time, whereas those in the P2F intervention schools exhibited increases in means across time.

We next estimated an unconditional multilevel growth curve analysis of the repeated-measure career development scores (see Figure 1). We examined a random intercept model only, a model adding in a linear slope factor, and finally, a model adding a nonlinear quadratic factor. The best-fitting model was the latter model including both a linear slope and a quadratic slope. Mean factor scores are estimated at the between-school level, and individual student variation in slope trajectories are estimated at the within-school level. The means and variances for the unconditional model are presented in Table 5. For the between-school means, the initial status intercept was significantly different from zero ($M = 3.408$, $p < .001$) as were the mean linear growth rate ($M = .107$, $p < .01$) and the mean quadratic growth ($M = -.027$, $p < .05$). The negative mean for the accelerated growth factor indicated the shape of the curvature was a downward-cupped shape meaning that on average, the sample increased in the first year and then leveled off or decelerated by the second school year. The unconditional quadratic growth model obtained excellent fit to the data, $\chi^2(1) = .274$, $p = .601$, CFI = 1.00, RMSEA = .00; $\chi^2/df = .45$. Inspection of the within-school variances showed that there were individual differences in initial-status career development ($\sigma^2 = 2.15$, $p < .001$); however, the variance for the linear and quadratic factors were not different from zero, meaning that students grew in similar linear trajectories and similar patterns of nonlinear trajectories. To illustrate the dependent criterion factors for the efficacy hypothesis, the observed and estimated means from the multilevel SEM growth curve model are plotted in

Table 5. Unconditional Latent Factor Means and Variances for Multilevel Growth in Career Development.

	Career development			
	Between school		Within school	
Model	*M*	*SE*	Variance	*SE*
Random intercept	3.408***	.026	.215***	.050
Linear growth slope	0.107**	.040	.059	.039
Quadratic growth slope	−0.027*	.012	.004	.006

Note. Model fit, $\chi^2(1) = .274$, $p = .601$, comparative fit index = 1.00, root mean square error of approximation = .00; $\chi^2/df = .45$.
*$p < .05$. **$p < .01$. ***$p < .001$.

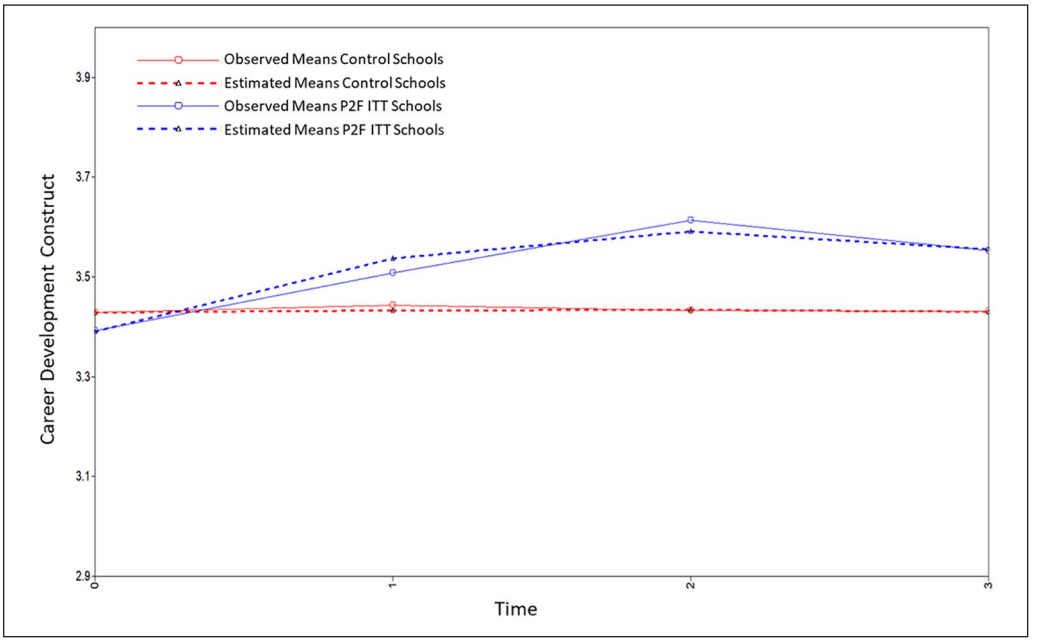

Figure 2. Observed mean trajectories and estimated mean trajectories by group condition for best-fitting multilevel structural equation modeling latent growth model including a random intercept, linear growth, and quadratic or accelerated growth factors, $\chi^2(1) = .274$, $p = .601$, comparative fit index = 1.00, root mean square error of approximation = .00; $\chi^2/df = .45$.

Figure 2 for the control and P2F intervention schools. The plot indicates that a linear growth trend adequately fits the control schools, whereas a linear increase with a negative quadratic, or decelerated leveling off, best describes the observed and fitted data for the intervention schools. Because there was no significant variation in linear or quadratic growth, the variance for the between-school growth factors are fixed at zero (Heck & Thomas, 2015), whereas the intercept factor variance is freely estimated.

In the final step of the analyses, we tested the ITT efficacy hypothesis specifying the effect of the randomized group contrast at the between-school level controlling for school characteristics of size, rurality, percentage free and reduced lunch, and type of academic term implementation of the curriculum (e.g., trimester, semester,

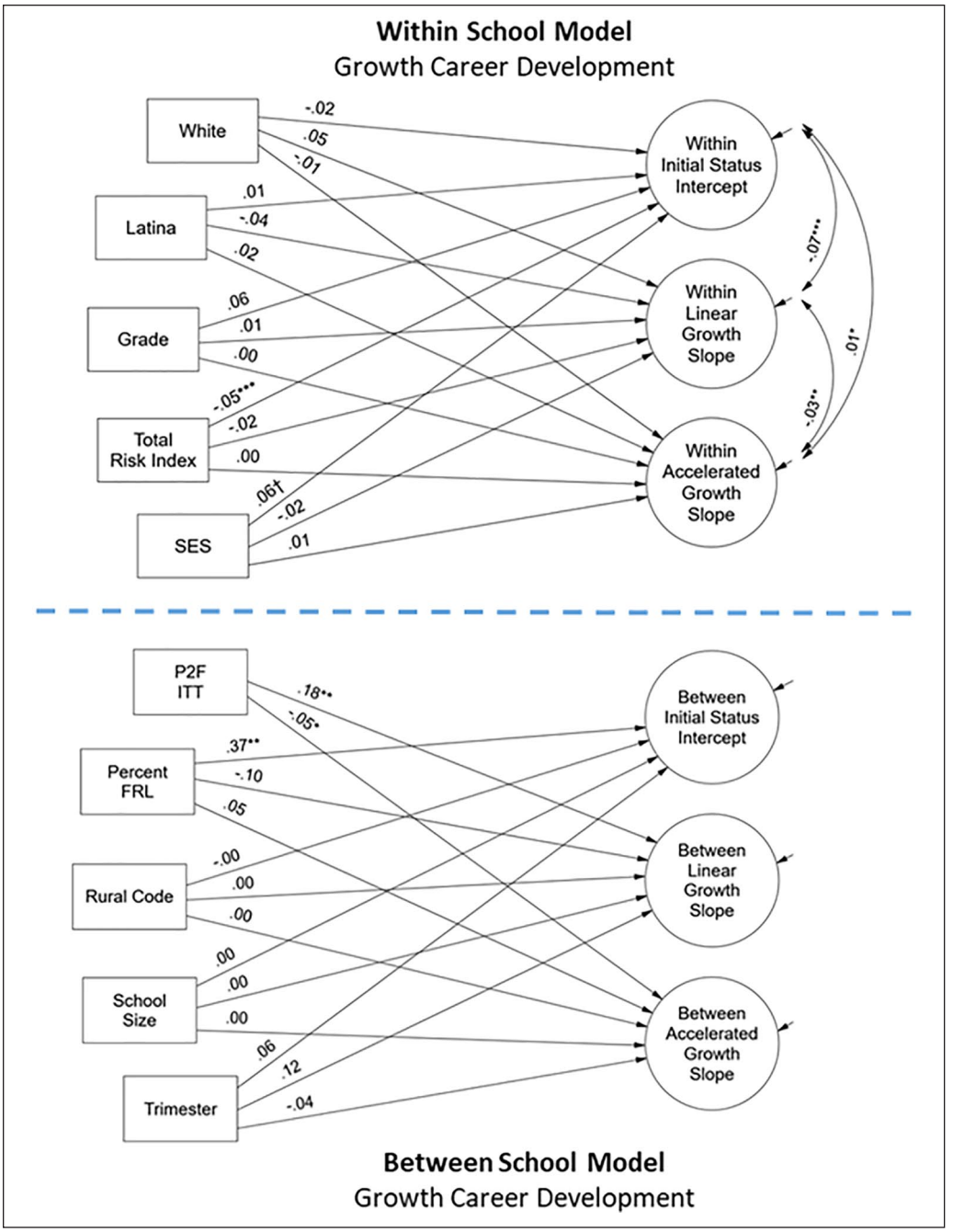

Figure 3. Career development multilevel latent growth model test of Paths 2 the Future intent-to-treat efficacy hypothesis. Estimates are unstandardized coefficients; $\chi^2(21) = .004$, $p = 1.00$, comparative fit index = 1.00, root mean square error of approximation = .00; $\chi^2/df = .00$.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

full-year block schedule). Student-level covariates were entered at the within-school level. Results of the conditional MLSEM growth model are presented in Figure 3 in the form of unstandardized regression coefficients. As suggested in the mean plots, the efficacy hypothesis was supported. Controlling for student and school characteristics, we found that young

women in the P2F intervention schools grew in career development skills at a greater rate relative to those in the control schools ($\beta = .18$, $p < .01$). The P2F ITT contrast was also associated with greater deceleration relative to the controls ($\beta = -.05$, $p < .05$). Among the school-level covariates in the between-school model, free and reduced lunches were associated with higher levels of career development at preintervention baseline T1 ($\beta = .37$, $p < .01$). Because the growth factor variances are fixed at zero, covariances (correlations) of the latent factors are not estimated at the between-school level.

Among the student-level predictors of growth, the teacher-rated student risk index was associated with lower levels of career development skill at baseline ($\gamma = -.05$, $p < .001$), and socioeconomic status was marginally associated with higher levels of career development skill ($\gamma = .06$, $p < .07$). Among the growth factors, initial status was negatively associated with linear growth and positively associated with accelerated growth, meaning those students lower in career development at baseline were more likely to increase, and those initially higher grew at a slower rate. In other words, findings suggest that participants with higher levels of teacher-reported barriers had lower career development scores at baseline, and those with lower baseline scores showed more improvement over time. Overall, the MLSEM model obtained excellent fit to the data, $\chi^2(21) = .004$, $p = 1.00$, CFI = 1.00, RMSEA = .00; $\chi^2/df = .00$.

In sum, data reduction of the primary career development scale scores indicated that scale scores adequately defined a single-factor solution for the career development construct. Furthermore, the factor structure was consistent over time. The ITT analyses supported effectiveness of the P2F intervention for young women with identified disabilities. Effect size of the P2F intervention was calculated using Cohen's *d* and from the Y standardized effects in a single-level growth model to obtain student-level effect size. Using the means in Table 5, Cohen's *d* was .33 at T3 and .29 at T4, indicating a moderate effect. Cohen (1988) characterizes a *d* of .2 as small, .5 as medium, and .8 and above as large. The student-level effect size from a Y standardized solution was a medium effect of the intervention predicting growth (effect size [ES] = .56). The effect is larger because of the increased reliability in estimating change over time as compared with cross-sectional mean comparisons. Finally, the between-school ES was large (ES = 1.7) according to the Y standardized solution from Figure 3. The between-school effect is very large due to the large number of schools (26) relative to the 366 young women at the student level.

Discussion

This study tested the efficacy of the P2F career development curriculum, designed to address the unique barriers faced by young women with disabilities in transition from high school to college and careers. Data reduction of the primary scale scores adequately defined a single-factor solution for the multifaceted career development construct that included self-efficacy, outcome expectations, and disability and gender awareness scales, among others. The factor structure was also consistent over time, suggesting that the construct mean change between groups represented reliable and valid differences attributed to the P2F intervention. In a unique contribution to the literature, we tested the efficacy hypothesis through an ITT analysis of this gender-specific intervention. Controlling for student and school characteristics, we found that young women in the P2F intervention schools grew in career development skills at a greater rate relative to those in the control schools. The student-level effect size was medium, and the between-school effect size was large. Together, the data suggest that P2F was effective in promoting individual student differences in career development outcomes for young women with disabilities who participated in this study.

Together, the data suggest that P2F was effective in promoting individual student differences in career development outcomes for young women with disabilities who participated in this study.

Young women with disabilities face multiple complex barriers during the transition from high school to adulthood, and their career options and opportunities are often influenced by the confluence of gender stereotypes and disability barriers (Lindstrom et al., 2012; Hogansen et al., 2008). Despite the well-documented gaps in career expectations and outcomes for this population, P2F is one of very few comprehensive curricula designed and tested to provide specific instruction in career development concepts for young women with disabilities, including lessons on topics of self-awareness, disability knowledge, gender identity, and career and college readiness.

Although other career and transition programs include instruction on self-determination or disability awareness (e.g., Sheftel et al., 2014; Wehmeyer et al., 2009), P2F is unique in that participants are introduced to both disability and gender content to inform career awareness and expand career exploration. After exploring their personal strengths, young women in P2F participate in a set of lessons and activities focused on disability knowledge, educational rights and responsibilities, self-disclosure, and accommodations. With a clearer understanding of disability identity, participants are then exposed to lessons exploring gender roles, expectations, and stereotyping and learn about barriers and opportunities for women in the workplace. We believe that the unique combination of disability and gender lessons in the P2F curriculum influenced increases in disability and gender awareness for intervention participants and also impacted the overall career development outcomes in this study. Our findings regarding improvements in gender and disability awareness also confirm and extend an earlier quasiexperimental study of the PATHS curriculum, a precursor to P2F (Doren et al., 2013).

Utilizing SCCT as a guiding theoretical framework (Lent, 2005), we were also able to examine important individual variables, such as self-efficacy and outcome expectations, across our sample. Previous studies have found that young women with disabilities in high school often have low self-esteem and feel less confident than their male peers about entering high-wage or nontraditional occupations (Ferri & Connor; 2010; Lindstrom et al., 2012). In a survey of adolescents with disabilities and their families, Powers and colleagues (2008) found that females were more likely than males to indicate that people expect less of them based on their disability, and both females and parents of daughters reported constrained expectations due to gender. Despite the persistent and pervasive low expectations for this population, young women participating in P2F were exposed to new content that led to important gains in outcome expectations and vocational skills self-efficacy, essential constructs that have been shown to influence the formation of career aspirations and choices (Lent, 2005).

Finally, we were also interested in understanding the influence of a gender-specific curriculum (P2F) on individual attributes and skills, such as autonomy, self-realization, and self-advocacy. Previous studies have documented the importance of these core components of self-determination in promoting the school- and career-related adjustment of adolescent girls with disabilities or other risk factors (Doren et al., 2013). Researchers who have examined the impact of mixed-gender career development programs have found that targeted career development instruction can lead to significant increases in self-realization and autonomy for both high school students and adults with disabilities (e.g., Sheftel et al., 2014; Shogren et al., 2016); however, these programs did not also attend to gender or disability. Our findings documenting growth in career development skills for young women participating in the gender-specific P2F curriculum extend the literature and add to the limited body of research that considers both gender and disability in the context of career development.

Limitations

There following limitations should be taken into consideration when interpreting the results. First, teachers and school counselors in the intervention schools referred young women to participate in the study, which may have introduced some selection bias. Second, teachers and data collectors were not blind to their assignment to intervention versus control condition, which could

have resulted in potential performance bias. However, research team members were present at the time of all survey data collection and conducted fidelity observations on random occasions while the intervention was being delivered. Participants in the intervention condition were also aware of their assignment, and given our study design, we were unable to control for such placebo effects. Finally, although our outcome variables were assessed using self-report measures, our use of individual web-based surveys as opposed to face-to-face interviews should have minimized self-report bias.

Notwithstanding these limitations, this study adds to the sparse body of literature focused on career development for young women with disabilities enrolled in high school. Although previous studies have used quasiexperimental designs or mixed-gender career interventions, this was the first randomized controlled trial testing the efficacy of a gender-specific career development curriculum for young women with disabilities. Moreover, the school randomized clustered trial involved PSM of school characteristics prior to randomization. Therefore, in addition to randomizing schools, matching procedures further reduced threats to group comparisons and internal validity of the study design. In addition, we used latent growth models as described earlier. Growth models have become more standard in assessing multiple-wave data because they more reliably assess change than do pretest-posttest change models only (Duncan et al., 2006; Singer & Willett, 2003). An advantage of the multilevel structure is that individual student differences in trajectories is modeled as variance predicted, not just group means of randomly assigned conditions. Furthermore, the trajectories account for nonlinearity in the data, providing greater reliability than linear assumptions alone. Brown et al. (2008), among others, have shown the advantages of this approach over repeated-measures ANOVA models in testing the efficacy of ITT designs.

Implications for Research and Practice

The findings from this efficacy trial have implications for both research and practice. Based on the results of this study, we found that participation in a gender-specific career development curriculum can have important and unique benefits for young women with disabilities. Given that young women with disabilities often have limited career aspirations and restricted career opportunities, we believe high schools special education programs should focus on introducing content related to both disability and gender to encourage personal development and build awareness of a broad range of career opportunities. We also recommend that teachers develop opportunities to reflect the unique needs of young women with disabilities in coeducational career and transition services, focusing on developing self-advocacy and self-awareness and increasing vocational skill self-efficacy.

In terms of future research, it is crucial to continue to identify and explore gender differences in school experiences, transition planning, and postschool career outcomes for young women with disabilities receiving special education services. More specifically, single-sex career development interventions should be examined with more diverse samples from various regions of the country, taking into account race-ethnicity, language, and disability status, to understand potential differential impacts with a variety of participants and settings. Future studies could also employ a comparative effectiveness design to determine whether a gender-specific career development curriculum is more effective than nonspecified general career development. In addition, we recommend that future studies in this area collect follow-up data either 1 or 2 years postintervention in order to document longer-term changes in career development constructs as well as enrollment in postsecondary education and engagement in employment. Finally, development and examination of school-based career development interventions for young men with disabilities are needed to help elevate the postsecondary career outcomes for all youth with disabilities.

The P2F study extends previous career and transition research by testing the efficacy of a gender-specific career curriculum

for young women with high-incidence disabilities, such as learning disabilities and other health impairments, using a randomized trial. Unlike previous studies, P2F used a multidimensional career development construct that combined key indicators, including self-determination, disability and gender awareness, vocational skills self-efficacy, vocational outcome expectations, and student engagement. We found significant overall gains in career development over time, controlling for both student and school characteristics. Controlling for individual barriers, girls in P2F demonstrated greater gains relative to the control group counterparts. Thus, we found that young women in this study with barriers that often impede high school completion or postschool success benefited significantly from participation in P2F.

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