Effect of Transition Planning on Postsecondary Support Receipt by Students With Disabilities

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Abstract

Data from the National Longitudinal Transition Study-2 were analyzed to determine the effect of receiving transition planning education and having a transition plan that specified needed postsecondary accommodations on the receipt of disability-specific services and generally available supports at the postsecondary level by students with disabilities. The analyses included a nationally representative cohort of 1,210 students. Propensity model analyses indicated that both variables significantly increased the odds that students with disabilities would receive disability-specific and generally available supports at 2-year institutions. In addition, students with transition plans specifying accommodations were more likely to receive disability-related supports at career/technical education (CTE) schools and CTE students who had received transition planning education in high school were more likely to receive generally available supports. The results provide important implications for policy and practice, and a strong foundation for further exploration of the linkages between transition planning experiences and receipt of disability-specific and generally available supports at postsecondary schools. Given the significant change in responsibility faced by students with disabilities in college in regard to decision making and self-advocacy, transition planning for students with disabilities needs to include explicit instruction related to accessing needed services at the college level. (Contains 2 tables).

Effect of Transition Planning on Postsecondary Support Receipt by Students With Disabilities

Over a ten-year period, the National Longitudinal Transition Study-2 (NLTS2) collected data on a nationally representative sample of more than 11,000 students with disabilities from 500 local education agencies and 40 special schools across the United States. Of these students, approximately 1,210 reported transitioning from high school to some type of postsecondary education and were followed longitudinally, offering a unique and comprehensive understanding of the experiences of the complete population of postsecondary students with disabilities. Most other studies of postsecondary students with disabilities feature small sample sizes, are based on institutional reports, or relied on student self-identification and thereby overlooked the nearly two-thirds of postsecondary students with disabilities who do not self-disclose (Newman & Madaus, 2014a).

The NTLS2 conceptual framework (Wagner &Marder, 2003) posited that youth's experiences in secondary and postsecondary school are shaped not only by the immutable characteristics of students (e.g., disability category, gender, race/ethnicity) and their households (e.g., household income, mother's education level), but also by factors that have occurred in their past (e.g., academic preparation and performance, transition planning), and factors that are fluid and can change over time (e.g., seeking supports in postsecondary school). Newman and Madaus (2014a; in press) conducted a series of secondary analyses of the NLTS2 data set, specific to those students who attended postsecondary education, guided by the NTLS2 conceptual framework, as well as by Tinto's interactional theory of student departure from postsecondary school (Tinto, 1975; 1993). Tinto's theory examines the role of the individual characteristics of students, including family background and high school experiences, upon decisions to commit to

an institution and the goal of graduation, or the decision to leave college (Braxton, Hirschy, & McLendon, 2004).

The first analysis examined rates of self-disclosure and accommodation receipt, an important consideration because upon transitioning to college, responsibility for decision-making and advocacy shifts from the school to the student. Postsecondary students with disabilities may be eligible to receive disability-related accommodations under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act of 2008, civil rights laws designed to guarantee protection from discrimination on the basis of disability and equal access to participation. However, in order to receive disability-related accommodations and supports, college students with disabilities must disclose their disability to the school and request specific supports in a timely manner that follows the procedures set forth by the institution. Newman and Madaus (2014a) found that only 35% of students with disabilities who received special education services in high school and later attended postsecondary school disclosed their disability. Additionally, whereas 98% of the sample had received at least one disability-specific accommodation or service while in high school, only 24% did so in postsecondary institutions.

The second analysis by Newman and Madaus (in press) used the NLTS2 framework and Tinto's theory to examine which specific individual student characteristics and secondary school experiences were related to the receipt of postsecondary disability-specific accommodations and supports. Existing literature has noted the impact of high school experiences on postsecondary receipt of accommodations and other disability-specific supports. For example, Lightner et al. (Lightner, Kipps-Vaughn, Schulte, & Trice, 2012) found that students who received more transition planning in high school were more likely to self-disclose their disability earlier in college, and then were more likely to have higher college GPA's and earned credits by their

sophomore year than those students who waited to disclose. Barber (2012) found that students who reported holding negative attitudes about special education in high school were more likely to be reluctant to receive college-level services.

High school experiences, particularly those related to course taking, including course rigor and performance, and high school grades also can have a significant impact on rates of high school graduation and entry into, and graduation from, college for all students. Adelman (1999, 2006) found that academic course taking in high school predicted college completion, even after controlling for other predictors of college success. Using a propensity score matching approach, Long, Conger, and Iatorala (2012) found that students who took rigorous high school academic courses were more likely to enroll in college. In addition, these students earned more college credits, had higher college GPAs, and were more likely to earn a bachelor's degree. Jackson and Kurlaender (2014) examined 6-year longitudinal data on two cohorts of freshmen entering the California State University system (across 23 campuses) and found that students who were ready for college (as indicated by not needing to take remedial level courses) were 6.1% more likely to persist into their sophomore year, and 8.7% more likely to complete college. In addition, when controlling for readiness level, high school grade point average was found significantly related to retention and graduation.

Research also indicates that youth's disabilities can have a powerful influence on their secondary course taking. Hitchings, Retish, and Horvath (2005) found that 77% of a sample of 110 high school sophomores expressed interest in attending college, but only four of the students were enrolled in college preparatory classes. Moreover, by the end of the junior year, only one student was still taking such courses. Weiss, Hutchins, and Meece (2012) collected data on 3,138 juniors and seniors from 73 randomly selected high schools in 34 states. The authors found that

79% of the students with disabilities reported wanting to continue their education after high school, but these students were statistically less likely than their peers to be enrolled in college preparatory classes and more likely to be in a vocational program.

Course taking also appears to have an impact on transition planning experiences and outcomes. Lehmann and colleagues (Lehmann, Bassett, Sands, Spencer, & Gliner, 1999) found that those students with disabilities who took more general education classes were more likely to be actively involved in their transition planning. Transition planning components also have been linked to higher rates of receipt of postsecondary supports. Newman and Madaus (in press) reported that students who received education on transition planning during high school were more likely to receive disability-specific supports at 2-year colleges, and those who had transition plans that directly specified needed postsecondary accommodations and supports were more likely to receive disability-specific supports at 2-year and CTE schools.

In addition to disability-specific supports, postsecondary institutions offer a range of academic programs and services to support the achievement and progress of all students, including students with disabilities. These can include learning assistance centers, writing and other types of study centers, tutoring services, and other types of academic assistance (Arendale, 2004; Trammell & Hathaway, 2007). Newman et al. (2011) noted that approximately 44% of postsecondary students with disabilities accessed such generally available supports. The researchers also found that 50% of students in 2- and 4-year colleges and more than 30% of those in career and technical education (CTE) schools, who had not received disability-specific or generally available supports, reported the need for help with schoolwork. This finding was consistent with Mamiseishvili and Koch's (2011) finding based on analysis of data from the Beginning Postsecondary Students Longitudinal Study that students with disabilities who were

academically integrated (those who partook in generally available supports, such as study

groups, meeting with academic advisors, and meeting informally with faculty), were more likely

to persist from the freshman to the sophomore year.

Likewise, these types of supports have been found to be beneficial for postsecondary

students in the general population. For example, tutoring was related to students' academic

performance (Longwill & Kleinert, 1998) and retention (Reinheimer & McKenzie, 2011). Study

skill support was related to increase in persistence rates for students in the general population

(Zeidenberg, Jenkins, & Calcagno, 2007). As is the case for students with disabilities seeking

accommodations, all students must recognize when they need help, understand where to get it,

and then actively follow through (Mechur Karp & Hare Bork, 2012; Trammell & Hathaway,

2007).

Rationale for the Present Study

Given the finding that both student based characteristics and modifiable high school

practices are related to whether students seek postsecondary supports, the present study was

intended to extend the research conducted by Newman and Madaus (in press) in two significant

aspects. The findings that receipt of transition planning education and that having a transition

plan specifying postsecondary accommodations as a needed post-high school service increased

the likelihood of receipt of disability-specific supports in postsecondary school were based on

logistic regression analyses. It is important to corroborate these results through more rigorous

methods. Thus, the present study employed propensity score modeling, a quasi-experimental

method that creates a statistical experimental and control group and allows for the estimation of a

treatment effect in a case where a randomized controlled trial is not possible (Becker & Ichino,

2002). Such more-rigorous analysis enables researchers to move beyond description and begin to

draw conclusions about interventions, a component of research that is needed in the field of secondary transition, and that supports identification of evidence-based practices that may lead to improved outcomes for students with disabilities (Rojewski, Lee, & Gregg, 2013; Test, Mazzotti, Mustian, & Fowler, 2009). In addition, Newman and Madaus (in press) addressed only disability-specific supports in their analyses. Based on the hypothesis that transition planning activities more broadly influence postsecondary students' behaviors, the current study expanded the focus to include the relationship between high school transition planning and the receipt of supports available to the general postsecondary student body.

Therefore, the present study used data from NLTS2 to further examine the relationship between components of high school transition planning and the receipt of services at the postsecondary level among a nationally representative sample of students with disabilities, using propensity score methodology. The study addressed two research questions:

1. What was the impact of two transition planning components: receipt of transition planning education and having a transition plan that specified postsecondary accommodations as a needed post-high school service—on receipt of postsecondary disability-related supports?

2. What was the impact of the two transition planning components on receipt of supports available to the general postsecondary student body?

Methods

Sample

The findings in this paper are based on secondary analyses of data from NLTS2, funded by the U.S. Department of Education. NLTS2 is the largest and richest dataset available that generalizes nationally to youth with disabilities transitioning from high school to early

adulthood. The NLTS2 two-stage sampling strategy first randomly sampled local educational

agencies (LEAs) and state-supported special schools stratified by geographic region, district

enrollment, and wealth. Students ages 13 to 16, in grade 7 or above, and receiving special

education services as of December 1, 2000, were randomly selected from rosters of 500 LEAs

and 40 special schools. The initial NLTS2 sample comprised more than 11,000 students and

included students in each of the 12 federally recognized disability categories. Each student's

eligibility for special education services and the designated disability category were determined

by the LEA or special school contributing the student roster. Sample selection, sample attrition,

and representativeness were more fully described by SRI International (2000) and Javitz and

Wagner (2005). NLTS2 data yield nationally representative estimates of students with

disabilities as a whole and in each disability category. Weights were computed by taking into

account various youth and school characteristics used in stratifying variables in the sampling and

nonresponse in those strata (see Newman et al. [2012] for more details on the weighting strategy

in the NLTS2).

       NLTS2 data were compiled over a 9-year period (2001–2009), with five waves of data

collection, conducted every other year. By the final data collection wave, youth were 21 to 25

years old. An important benefit of using NLTS2 data, which longitudinally followed students

with disabilities from high school to college, is that it provides an understanding of the

experiences of the complete population of postsecondary students with disabilities.

       The present study included approximately 1,210 youth who had (a) at least one parent or

youth interview/survey after leaving high school that reported postsecondary school attendance

and (b) a Wave 1 or Wave 2 school program survey from which high school transition planning

information could be determined. Unweighted sample sizes were rounded to the nearest 10, as required for restricted-use data by the U.S. Department of Education.

Data Sources/Measures

   Treatment: high school transition planning activities. Two components of transition planning were the focus of analyses: (a) whether a student had received transition planning education; and (b) whether postsecondary accommodations were specified on a transition plan as a service need after high school. The data source for the two variables were the school program surveys completed by high school staff who were most knowledgeable about students' overall school programs in wave 2 (2004), or in wave 1 (2002) for sample members no longer in high school in 2004. Each transition planning component was included as a dichotomous variable (1 = *yes*, 0 = *no*) in the analyses.

   Outcomes: receipt of postsecondary accommodations and supports. Data for receipt of two types of postsecondary supports in each of three types of postsecondary schools—2-year or community college, 4-year college or university, and CTE schools—were outcome measures in the analyses. The two types of postsecondary supports were (a) disability-specific accommodations, modifications, and services (e.g., a notetaker or more time to take tests because of a disability; see Newman and Madaus, [2014a] for more information on specific types of supports), and (b) generally available help with schoolwork (e.g., tutoring, writing and study centers). Postsecondary support data came from Wave 2 through 5 post-high school parent/youth telephone interviews and mail surveys, conducted every other year between 2003 and 2009. A dichotomous variable (1 = *yes*, 0 = *no*) was created for receipt of each of the two types of help at each type of postsecondary school.

Covariates. Covariate selection is critical to the propensity modeling process. A primary purpose of propensity scoring is to achieve the optimal balance between comparison groups on prominent covariates that influence participation in the treatment and the outcome (Caliendo & Kopeing, 2008; Cuong, 2013; McCaffrey, Ridgeway, & Morral, 2004; Rubin & Thomas, 1996).

As discussed previously, the covariates included in these analyses were selected on the basis of the NLTS2 conceptual framework (Wagner & Marder, 2003), as well as Tinto's interactional theory (Tinto, 1975, 1993). In addition, their selection for inclusion in the present analysis also was based upon prior research findings of student characteristics and experiences influencing the treatment (secondary school transition planning activities), as well as the outcomes (postsecondary school receipt of disability-specific and generally-available supports). These covariates, included in Tables 1 and 2, are described below.

Indicators of the *nature and severity of youth's disabilities* had been reported by parents during the Wave 1 parent interview/survey or by students' school districts, and included students' disability category, social skills, and affected functional domains. Secondary school LEAs had provided the disability category for students among the 12 federally defined disability categories in place when NLTS2 youth were sampled. Eleven of the 12 disability categories were included as dichotomous variables. Two categories—multiple disabilities and deaf-blindness— were combined into a single category because of the small sample sizes. Students' social skills were measured by summing the responses to 11 questions from the parent version of the Social Skills Rating System (Gresham & Elliott, 1990), included in the Wave 1 parent interview/survey. Scores ranged from 0 to 22, with a reliability of alpha = 0.79. Parents also reported whether youth had any problems with seeing, speaking, conversing, understanding language, appendage use, or health. The number of problem domains mentioned ranged from 0 to 6.

Demographic covariates came from the Wave 1 parent interview/surveys and included

the following dichotomous variables: youth's gender (1 = *male*, 0 = *female*); race/ethnicity (1 =

other than white, 0=*white*); household income, based upon the following income categories

included in the interview/survey (1 = < *$25,000–$50,000*, 0 = *≥$50,000*); and mother's education

level (1 = *high school graduate/GED or less*, 0 = *all other education categories*).

Academic preparation and *achievement* were measured on the basis of students' 9th and

10th grade high school transcripts, rather than complete transcripts, so that these measures

predated receipt of transition planning for most students, and specifically preceded receipt of the

two treatment measures, transition planning education and having a transition plan with specified

post-high school service needs. Older students were more likely to have received these transition

planning components than were their younger peers (Cameto, Levine, Wagner, 2004). Academic

preparation was indicated by the number of credits earned in academic general education courses

in 9th and 10th grade, calculated as a percentage of overall 9th and 10th grade credits. The

percentage of earned academic general education credits was dichotomously coded (1 = *above*

the mean, 0 = *below the mean*). Academic achievement was measured by high school grade point

average (GPA) in general education academic coursework in 9th and 10th grade.

Propensity Score Methodology

Propensity score techniques (Becker & Ichino, 2002) are increasingly used in

observational studies with cohort designs to reduce selection bias in estimating treatment effects

when randomized controlled trials are not feasible or ethical (Rosenbaum & Rubin, 1983, 1984,

1985). We used propensity score methods in this study to test the effects of transition planning

education and of having a transition plan specifying the need for postsecondary accommodations

on the odds of students obtaining disability-specific and generally available supports during

postsecondary school. Propensity score methods strive to create balance on observed covariates between treatment and comparison groups using statistical methods instead of randomization. The goal is to achieve a valid test of the treatment effect while statistically balancing treatment participants and nonparticipants on measured covariates that might be confounders, thus disentangling confounding effects from treatment effects.

The analyses presented here estimated the average treatment effect on students in the treatment condition in the population (PATT) represented by NLTS2 students—i.e., the effect of the two aspects of transition planning on students who experienced them. Separate sets of analyses were conducted for each of the three sub-samples, students in: 2-year colleges; 4-year colleges; and CTE schools. The analysis approach recommended by DuGoff, Schuler, and Stuart (2014) was used to adjust for potential confounding (i.e., differences between the treated and untreated students in the sample other than the treatment itself, which might have affected the outcome).

Logistic regressions to generate propensity scores were performed on multiply imputed data. Data were weighted using NLTS2 cross-wave, cross-instrument weight, "wt_anyPYPHSsch" (Valdes et al., 2013). The dependent variable was one of the transition planning treatments and the independent variables were the covariates. The survey weights for control students were adjusted by multiplying the NLTS2 weight by the quantity $p/(1-p)$ where p is the propensity score. Propensity scores were truncated at 0.99 to avoid excessively large adjustment factors. Treatment students' survey weights were not adjusted. Separate weighted logistic regressions were conducted for each implicate using the adjusted survey weights where the dependent variable was one of the two postsecondary support-receipt outcomes and the independent variables included transition planning treatment variables and all covariates.

Regression results were combined across implicates using the Stata mim procedure which

generated odds ratios (*OR*s). The odds ratios (*OR*s) that were generated can be interpreted as

measures of relative odds of postsecondary support receipt by the treatment group and

comparison group in each of three types of postsecondary schools, controlling for the observed

covariates and their respective propensity to have experienced treatment. Effect size for the odds

ratios (*OR*s) can be calculated using the Cox Index $LOR_{Cox} = \ln(OR)/1.65$ (Cox, 1970).

The propensity scoring approach weighted the treatment group to the national population

and the control group to the distribution of the treatment group in the population. This approach

essentially weighted the comparison group to create balance with the treatment group on

observed covariates and thus facilitated estimation of the effect of specified transition planning

activities for participants. Weighting was selected over other approaches, such as matching,

because of its good performance in this data set and because it retains all subjects in the analysis.

Handling Missing Data

Missingness rates for most variables ranged from 0 to 11.4%. Exceptions were missingness

rates of 14.9% for course-taking variables. Missing data on covariates were imputed 20 times

using Stata's ICE (Imputation by Chained Equations) procedure (Royston, 2004, 2009; Royston,

Carlin, & White, 2009). Imputations were performed on all variables used in the analyses to

avoid bias associated with listwise deletion and to capture the information contained in the

correlation between covariates and the outcome and treatment variables. As recommended (Little

& Rubin, 2002; White, Royston, & Wood, 2011), however, we did not use imputed values for

the outcomes or treatments in the analyses.

Adequacy of Adjustment for Treatment and Control Differences

To ensure that the propensity score method created balanced treatment and comparison groups, the standardized mean differences (SMDs) between the two groups on each covariate were compared using survey weights and the propensity score-adjusted survey weights, respectively, before and after propensity score weighting. The SMD is the difference in means between the groups, divided by their pooled standard deviation. The What Works Clearinghouse (WWC) established a 0.25 cutoff for baseline equivalence for quasi-experimental studies (What Works Clearinghouse, 2008), a standard also supported by other analysts (e.g., Ho, Imai, King, & Stuard, 2007). Baseline equivalence of the treatment and comparison group SMDs were compared, utilizing the 0.25 criteria. SMDs were required to be less than 0.25 to demonstrate equivalence of the analytical sample. Before propensity score weighting, the SMDs for four covariates in the model comparing receipt of transition planning education and no receipt for those in the 2-year college sample were above this cutoff (Table 1), as were five SMDs in the 4-year college sample model and three SMDs in the CTE school sample model. After propensity score weighting, all SMDs, with one exception, were below the WWC cutoff, indicating that the two groups were balanced on the covariates in all of the models. The exception was students with intellectual disabilities in the 4-year college sample (SMD = .38). All covariates also were included in all subsequent models to further account for any possible differences between treatment and comparison groups due to covariates.

< Table 1 >

Regarding the effect of having a high school transition plan specifying postsecondary accommodations and supports versus not having those types of supports specified, before propensity score weighting, the SMDs for three covariates in the 2-year college sample model were above the WWC cutoff, as were three SMDs in the 4-year college sample model and three

SMDs in the CTE school sample (Table 2). After propensity score weighting, all SMDs were below the WWC cutoff, indicating that the two groups were balanced on the covariates and that propensity modeling was warranted.

< Table 2>

Results

Across the three types of postsecondary schools (2-year and 4-year colleges and CTE schools), approximately two thirds of postsecondary students with disabilities were male and an equal proportion was White. Twenty-eight percent of postsecondary students with disabilities at 2-year colleges came from families with incomes of $25,000 or less at the beginning of the NLTS2 study in 2001, as did 19% of those at 4-year colleges and 31% at CTE schools. Students with learning disabilities constituted approximately 70% of the population of students with disabilities at each of the three types of postsecondary schools. Disability-related and demographic characteristics did not vary by type of postsecondary school, except for mother's education; mothers of 4-year college students were more likely to have attained a bachelor's degree or higher than mothers of students at CTE schools (36% vs. 15%, $p < .05$).

Rates of receiving high school transition planning components did not differ significantly for students across the three types of postsecondary schools. Almost half of 4-year college students had received transition planning education in high school, as had 58% of 2-year college students and 62% of CTE students. Approximately 60% of CTE students, 66% of 2-year college students, and 71% of 4-year college students had a high school transition plan with postsecondary accommodations and supports specified as a needed postsecondary school support. Rates of receiving postsecondary supports also did not differ significantly for students across the three types of postsecondary schools. Of students with disabilities in 2-year colleges,

approximately 25% had received disability-specific help during postsecondary school, as had

22% of those at 4-year colleges and 15% of those at CTE schools. Newman and Madaus (2014a)

provided more comprehensive information about the specific types of disability-related supports

received across postsecondary school types. In addition, 50% of those at 4-year colleges, 48% at

2-year colleges, and 36% at CTE schools had accessed the types of supports available to the

general student body, such as tutoring and writing centers.

Research Question 1: Transition Planning Impacts on Disability-Specific Supports

Propensity-adjusted results (see Table 3) demonstrate that both receipt of transition planning

education in high school and having postsecondary accommodations specified on high school

transition plans significantly increased the odds of students with disabilities at 2-year colleges

seeking and using disability-specific supports (ORs = 3.701 and 3.06, $p < .01$ for both). In

addition, students at CTE schools who had had transition plans specifying the need for

accommodations and supports also were more likely to receive disability-specific supports in

postsecondary school ($OR = 6.55$, $p < .01$). In contrast, neither type of transition planning

activity contributed to higher odds of students receiving disability-specific support at 4-year

colleges or universities.

<p style="text-align: center;">**< Table 3>**</p>

Research Question 2: Transition Planning Impacts on Generally Available Supports

Propensity-adjusted results support the hypothesis that transition planning activities also

impact postsecondary students' receipt of generally available supports (Table 4). Students at 2-

year colleges who had experienced both types of transition planning activities in high school

were significantly more likely to access generally available supports in college (ORs = 3.68 and

2.15, $p<.001$ and $p<.05$, for transition planning education and a transition plan specifying

supports, respectively). Receiving transition planning education in high school significantly predicted receipt of generally available supports for students in CTE schools ($OR = 3.11$, $p<.05$). Transition planning activities did not contribute to a higher likelihood of 4-year college students with disabilities receiving generally available supports.

< Table 4>

Discussion

This study examined whether components of high school transition planning affected postsecondary students with disabilities receipt of disability-specific supports and supports available to the general student body, based on secondary analysis of NLTS2. The importance of these components of transition planning on students subsequently accessing both disability-related and generally available supports is clear in the present analysis. Evidence from propensity model analyses indicated that secondary school transition planning had a significant positive effect on postsecondary support receipt by students with disabilities, particularly those at 2-year or community colleges. Receipt of transition planning education in high school and having postsecondary accommodations specified on high school transition plans significantly increased the odds of students with disabilities at 2-year colleges seeking and using both disability-specific and generally available postsecondary supports. CTE school students with disabilities were more likely to receive disability-specific supports when their high school transition plan directly specified postsecondary accommodations as a needed post-high school service and were more likely to use supports available to the general student body when they received transition planning education in high school. These findings are especially relevant given that most students with disabilities (44%) enroll in 2-year or community colleges, followed by 32% who enroll in CTE schools and 19% who enroll in 4-year institutions (Newman et al., 2011).

The present study corroborated the prior finding by Newman and Madaus (in press) that components of transition planning were related to receipt of disability-specific supports at 2-year colleges and CTE schools. The prior findings were based on logistic regression analysis, whereas the current study used propensity modeling analysis, a generally highly regarded alternative approach to the analysis of non-experimental data (Long, Conger & Iatarola, 2012). Current results related to disability-specific supports are consistent with analyses by Lightner et al. (2012), who found that students who received more transition orientation in high school were more likely to disclose a disability earlier in their college career. The current study also extended these prior findings by identifying the effect of transition planning components on receipt of supports available to the general student body, beyond those that are disability-specific.

Given the low rates of disability disclosure and accessing services (both disability-related and generally available supports), efforts should be made to help students avail themselves of supports at the postsecondary level. As noted previously, there are a myriad of reasons that postsecondary students do not access services, including fear of stigma, lack of self-advocacy skills, not believing that services were needed, and lack of knowledge about available services and/or how to access them. It is critical for secondary school personnel, families, and students to be aware that although disclosure of disability is always voluntary, it is required to access disability supports (Office for Civil Rights, 2007). In addition, students need to be aware that they are eligible to access the types of supports available to the general student body, such as tutoring and writing centers, independent of their decision to disclose a disability to their postsecondary school. The two variables studied here—transition planning education and the transition plans that specify accommodation needs—are within the control of secondary special education teachers and transition specialists, and the common reasons for not accessing needed

services can be comprehensively addressed in transition planning. However, the present data also indicated that as many as one third to one half of students with disabilities report not receiving such transition planning services. This is a crucial area for improvement in future practice.

Implications for Practice

The IDEA (2004) requires that all students with disabilities age 16 and older have an Individualized Education Program (IEP) that must include appropriate and measurable postsecondary goals and describe the transition services required to assist the student in reaching these goals (Individuals with Disabilities Education Act of 2004, 2004). Approximately two thirds of the students in the present study had transition plans that specified needed postsecondary accommodations and supports, and only half the students in 4-year colleges, 58% of students in 2-year schools, and 62% of students in CTE schools reported receiving transition planning education. Given the significant change in responsibility faced by students with disabilities in college in regard to decision-making and self-advocacy, and given the mandates of the IDEA, transition planning education should be universal for students with disabilities who intend to attend college. Some students will require additional, more intensive transition supports and instruction. Madaus, Morningstar, and Test (2014) described a multi-tiered process of planning to support the transition to college for students with disabilities. They noted that at Tier 1, all students should receive instruction related to understanding academic expectations in college, managing deadlines, and knowing about generally available supports and how to access them. At Tier 2, some students need to learn about the impact of their disability and how it might affect the need to request services at the college level, including disability-based services. At Tier 3, a smaller number of students need more explicit direct instruction in the development of these skills and instruction on how to identify and request specific accommodations.

The importance of such explicit instruction for students related to accessing needed services at the college level was captured in the *Guideposts for Success* (National Collaborative on Workforce and Disability, n.d.). This model contains five transition-related guideposts that serve as an organizational framework for youth and families, practitioners, and local- and state-level administrators and policy makers. The document is based on research findings on educational and career development interventions that can positively affect the lives of all youth, including those with disabilities. Guidepost 1, "School-Based Preparatory Experiences," mirrors the key findings in the present study. It notes that students with disabilities need to be able to "use their individual transition plans to drive their personal instruction, and use strategies to continue the transition process post-schooling" (p. 4). Students must also "develop knowledge of reasonable accommodations that they can request and control in educational settings" (p. 4). Given the present results, clearly, this is an area that requires additional investigation and attention in both the research and policy arena.

Limitations

This study has provided evidence of the benefits of receiving transition planning education and having a high school transition plan specifying the need for postsecondary supports for students with disabilities, particularly regarding receipt of disability-specific and generally available supports from postsecondary institutions. Nonetheless, the study has the following limitations. Some analyses were based on self-reported data; income levels, mother's education level, and postsecondary receipt of supports could not be independently verified. Support receipt rates may have been underreported because parents and youth may have been unaware of the types of postsecondary supports received. Measures of the functional covariate were based on parents' reports, which cannot be equated with the results of professional

evaluations. In addition, as a secondary analysis, this study was constrained by the NLTS2

design and the items available in the data set. Limited information was available about the

transition planning education that students received during high school, beyond school staffs'

responses to a dichotomous item on a school survey indicating whether the student had received

that type of instruction. Future work is needed to understand better the specific focus and content

of transition planning education and the optimal timing for providing that type of instruction

during a student's high school career. Finally, unobserved confounding is a concern in non-

experimental studies such as this, where transition planning components could not be

randomized. The propensity score approach adjusts for observed covariates but does not

necessarily balance on unobserved factors. Bias may arise if there is unobserved confounding,

that is, if an unmeasured factor was correlated with both transition planning components and

receipt of postsecondary support.

Areas for Future Research

        This study provides a strong foundation for further exploration of the linkages between

transition planning experiences and receipt of disability-specific and generally available supports

at postsecondary schools. For example, it would be important to determine whether the effects of

high school transition planning experiences on postsecondary support receipt identified in this

study for youth with disabilities as a whole also generalize to youth in specific disability

categories (e.g., learning disabilities, speech and language). Future research also should examine

and determine characteristics of effective transition planning education; specifically what content

should be delivered, when, and for how long? Furthermore, what are the characteristics of

schools and the special education team structures that offer effective transition planning

education? Finally, these findings identified two transition practices that have the potential to

impact the support-seeking behavior of postsecondary students with disabilities. These results

expand the research knowledge base, but must be incorporated into practice in order to change

student behavior (Cook & Odom, 2013).

It also would be useful to assess whether receiving supports in postsecondary school

contributes to a higher likelihood of those with disabilities completing their postsecondary

programs, particularly given the low completion rates. For example, only 34% of 4-year college

students with disabilities graduate from their program compared with 51% ($p <.001$) of their

peers in the general population (Newman et al., 2011). This low completion rate speaks to the

need for identifying programs and supports that would promote postsecondary success for

students with disabilities.

Until now, the field primarily has focused on issues related to receipt of disability-

specific supports in postsecondary school. However, this study, coupled with the findings of

Mamiseishvili and Koch (2011) that students with disabilities who participated in generally

available supports were more likely to persist from the freshman to the sophomore year, points to

the need for future research to also focus on the impact of generally available supports on the

needs of students with disabilities. Preliminary findings, using a propensity score modeling

approach, based on secondary analysis of NLTS2 data, indicate that postsecondary students who

received generally available supports from their 2- or 4-year college were more likely to

successfully persevere in and complete their postsecondary programs (Newman & Madaus,

2014b; Newman, Madaus, & Javitz, in preparation).

Low postsecondary completion rates, tied with the present findings, point to the need for

coordinated lines of research that allow the field to better understand the impact of student

characteristics, modifiable evidence-based transition practices, as well as postsecondary

accommodations, services, and supports on postsecondary retention and completion levels for

students with disabilities.

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Table 1

Treatment and Control Balance Statistics on Covariates After Propensity Score Weighting (PSW) for Receipt of Transition Planning Education in High School

	2-year or community college sample	Standardized mean difference		4-year college or university sample	Standardized mean difference[b]		Career/technical education school sample CTE	Standardized mean difference[b]	
					Mean[a]			Mean[a]	
	Mean[a]	Pre-PSW difference[b]	Post-PSW difference	Pre-PSW		Post-PSW	Pre-PSW		Post-PSW
Disability category/functioning									
Speech impairment	3.38	-0.29	0.00	3.57	-0.33	0.020	3.18	-0.02	-0.00
Intellectual disabilities	9.19	-0.26	-0.23	8.02	0.26	-0.38	11.44	0.35	-0.22
Emotional disturbances	8.65	-0.09	-0.02	9.53	0.20	0.06	10.65	0.15	-0.01
Hearing impairment	1.56	0.06	-0.02	3.78	0.04	-0.06	1.72	-0.03	-0.02
Visual impairment	0.701	0.07	-0.03	1.72	0.06	-0.06	0.48	0.04	-0.00
Orthopedic impairment	1.50	-0.03	-0.01	2.03	0.02	0.01	1.05	-0.04	0.00
Other health impairment	6.06	0.01	-0.01	4.98	-0.06	0.01	4.64	-0.09	-0.03

Autism	0.65	-0.01	-0.01	0.91	0.02	0.00	0.77	0.06	-0.05
Traumatic brain injury	0.31	-0.04	-0.00	0.40	-0.00	-0.01	0.39	0.04	-0.03
Multiple disabilities/deaf/blindness	1.21	0.07	0.01	1.36	0.09	0.01	1.27	0.07	-0.05
Social skills scale score (mean)	14.36	-0.35	0.08	15.09	-0.19	0.18	14.19	-0.13	-0.15
Number functional domains impaired (mean)	1.73	0.15	-0.09	1.71	-0.09	-0.07	1.71	0.18	-0.08
Demographics (%)									
Male	72.38	0.39	-0.10	69.63	0.38	-0.17	72.75	0.34	0.02
Race/ethnicity - not white	32.91	-0.01	0.04	25.86	-0.22	0.22	37.86	0.15	-0.12
Household income < $25,000–$50,000[c]	55.33	-0.13	0.03	45.12	-0.11	-0.02	50.24	-0.25	0.06
Mother's education - high school graduate or less	47.09	-0.11	0.02	45.70	0.26	-0.07	53.62	-0.14	0.23
High school course-taking experiences									
Percent credits earned in academic general education courses in grades 9 & 10	46.93	-0.02	0.02	53.39	-0.28	0.15	51.48	-0.05	-0.17

GPA in academic general education courses in grades 9 & 10 (% above mean)	50.62	-0.03	0.08	47.39	-0.17	-0.22	53.84	0.26	0.04
Sample size	1,210			640			610		

[a]Post-PSW treatment mean. [b]Pre-PSW standardized mean difference (SMD) is calculated as the treatment mean minus the control mean (both means calculated using survey weights), with the difference divided by the pooled standard deviation. The Post-PSW SMD is calculated as the treatment mean (calculated using survey weights) minus the control mean (calculated using PSW-adjusted survey weights), with the difference divided by the pooled standard deviation.

Table 2

Treatment and Control Balance Statistics on Covariates After Propensity Score Weighting (PSW) for Having High School Transition Plan Specifying Postsecondary Accommodations and Supports

	2-year or community college sample			4-year college or university sample			Career/technical education school sample		
	Mean[a]	Standardized mean difference[b]		Mean[a]	Standardized mean difference[b]		Mean[a]	Standardized mean difference[b]	
		Pre-PSW	Post-PSW		Pre-PSW	Post-PSW		Pre-PSW	Post-PSW
Disability category/functioning									
Speech impairment	2.24	0.18	0.00	2.39	-0.63	-0.03	1.65	-0.14	-0.03
Intellectual disabilities	4.28	0.30	-0.06	5.25	-0.14	-0.07	6.13	-0.11	0.00
Emotional disturbances	7.62	-0.00	-0.01	6.13	-0.21	-0.18	8.26	-0.08	-0.05
Hearing impairment	1.72	0.02	-0.02	3.50	-0.01	-0.14	2.34	0.10	-0.02
Visual impairment	0.75	0.06	-0.02	1.94	0.07	-0.07	0.47	0.04	-0.03
Orthopedic impairment	1.41	-0.05	-0.02	1.89	-0.05	-0.08	0.98	-0.04	-0.04
Other health impairment	5.95	0.03	-0.02	5.55	-0.08	-0.14	5.02	-0.03	-0.04
Autism	0.52	0.05	0.01	1.02	-0.01	-0.04	0.55	-0.03	-0.01
Traumatic brain injury	0.22	-0.01	0.01	0.32	-0.07	-0.03	0.29	0.00	0.00
Multiple disabilities/deaf/blindness	0.84	0.07	0.00	0.97	-0.10	-0.13	0.40	-0.13	-0.00

Social skills scale score (mean)	15.04	0.34	0.08	15.53	0.33	0.09	14.66	0.26	-0.01
Number functional domains impaired (mean)	1.65	0.10	-0.00	1.76	0.25	0.18	1.56	-0.06	0.02
Demographics (%)									
Male	66.80	0.03	-0.01	65.26	0.22	0.08	66.99	-0.03	-0.07
Race/ethnicity - not white	28.92	-0.17	0.00	27.37	0.11	-0.08	31.99	-0.05	0.12
Household income < $25,000–$50,000	54.75	-0.18	-0.01	45.43	-0.12	-0.07	52.83	0.03	-0.06
Mother's education - high school graduate or less	43.87	-0.35	0.06	38.93	-0.20	0.01	52.84	-0.18	0.07
High school course-taking experiences									
Percent credits earned in academic general education courses in grades 9 & 10	53.64	-0.15	-0.09	52.49	-0.18	-0.08	59.08	0.27	0.01
Percent credits earned in academic general education courses in grades 9 & 10	50.97	0.14	0.09	49.10	-0.22	-0.10	47.08	-0.29	-0.03
Sample size	1,120			570			570		

[a]Post-PSW treatment mean. [b]Pre-PSW standardized mean difference (SMD) is calculated as the treatment mean minus the control mean (both means calculated using survey weights), with the difference divided by the pooled standard deviation. The Post-PSW SMD is calculated as the treatment mean (calculated using survey weights) minus the control mean (calculated using PSW-adjusted survey weights), with the difference divided by the pooled standard deviation

Table 3

PATT Effect of Transition Planning Components on Receipt of Disability-Specific Supports in Postsecondary School for Students with Disabilities, by Type of Postsecondary School

	Receipt of in:								
	2-year or community college disability-specific supports receipt			4-year college or university disability-specific supports receipt			Career/technical education school disability-specific supports receipt		
Transition planning treatment	Treatment group[a] (%)	Adjusted control group[b] (%)	Propensity adjusted OR^c [95% CI]	Treatment group[a] (%)	Adjusted control group[b] (%)	Adjusted Propensity OR^c [95% CI]	Treatment group[a] (%)	Adjusted control group[b] (%)	Propensity adjusted OR^c [95% CI]
Received transition planning education in high school	37.9	14.2	3.70** (1.55, 8.79)	27.1	22.5	1.28 (0.48, 3.43)	26.3	13.8	2.22 (0.52, 9.44)
Postsecondary accommodations and supports specified in high school transition plan	36.8	16.0	3.06** (1.29, 7.24)	24.1	13.9	1.97 (0.57, 6.74)	26.7	5.3	6.55** (1.70,25.25)

Note. PATT= population average treatment effect on the treated; *OR* = odds ratio; CI = confidence interval.

** *p* < .01. *** *p* < .001.

[a] Treatment group percentage, using survey weights.

[b] Percentage positive for a control group that would yield the propensity adjusted *OR* if it matched the treatment group on all covariate means; calculated 100 * Pt / [*OR* (1-Pt) + Pt], where Pt is the survey-weighted percentage of the treatment group with a positive outcome and *OR* is the propensity and covariate adjusted *OR*.

[c] Effect size for dichotomous outcomes can be calculated using the Cox Index*: LOR*$_{Cox}$ =ln(OR)/1.65, where *LOR* is the logged [c]odds ratio, ln() is the natural

logarithm function, and *OR* is the odds ratio. D. R. Cox, 1970, *Analysis of Binary Data,* New York, NY: Chapman & Hall/CRC.

Table 4

PATT Effect of Transition Planning Components on Receipt of Generally Available Supports in Postsecondary School for Students with Disabilities, by Type of Postsecondary School

	Receipt of supports available to the general student body in:								
	2-year or community college			4-year college or university			Career/technical education school		
:			Propensity			Propensity			Propensity
		Adjusted	adjusted		Adjusted	adjusted		Adjusted	Adjusted
Transition planning	Treatment	control	OR^c	Treatment	control	OR^c	Treatment	control	OR^c
treatment	group[a] (%)	group[b] (%)	[95% CI]	group[a] (%)	group[b] (%)	[95% CI]	group[a] (%)	group[b] (%)	[95% CI]
Received transition planning	58.9	28.0	3.68***	56.4	55.4	1.04	48.7	23.4	3.11*
education in high school			(1.85, 7.33)			(0.41, 2.67)			(1.09, 8.85)
Postsecondary	53.9	35.2	2.15*	55.9	31.6	2.74	39.5	26.4	1.82
accommodations and			(0.98, 4.71)			(0.89,8.43)			(0.84, 7.91)
supports specified in high									
school transition plan									

Note. PATT= population average treatment effect on the treated; *OR* = odds ratio; CI = confidence interval.

** *p* < .01. *** *p* < .001.

[a]Treatment group percentage, using survey weights.

[b]Percentage positive for a control group that would yield the propensity adjusted *OR* if it matched the treatment group on all covariate means; calculated 100 * Pt / [*OR* (1-Pt) + Pt], where Pt is the survey-weighted percentage of the treatment group with a positive outcome and *OR* is the propensity and covariate adjusted *OR*.

[c]Effect size for dichotomous outcomes can be calculated using the Cox Index: $LOR_{Cox} = \ln(OR)/1.65$ where *LOR* is the logged [c]odds ratio, ln() is the natural logarithm function, and *OR* is the odds ratio. D. R. Cox, 1970, *Analysis of Binary Data,* New York: Chapman & Hall/CRC.