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FROM THE EDITOR
DAVID R. PARKER

Each year, AHEAD’s annual conference provides stimulating updates on emerging topics in the field of postsecondary disability issues. This summer’s gathering in Sacramento, California, was no exception. Rich learning experiences and lively conversations ensued from sessions on diverse topics such as graduate students with psychiatric disabilities, use of the revised CAS standards to conduct program evaluations, teaching faculty about students with Asperger’s using video clips from the U.S. television program “The Big Bang Theory,” and campus collaborations that promote successful study abroad experiences for students with disabilities, to name just a few. Respecting that our work is at the nexus of research and practice, AHEAD is promoting a thoughtful dialogue about how practitioners can utilize research findings in meaningful ways. This year, two new awards were announced at the conference banquet: the JPED Research Reviewer of the Year and the JPED Practice Brief Reviewer of the Year. Congratulations to Dr. Pam Luft (Kent State University) and Dr. Lori Muskat (Argosy University-Atlanta), respectively, who were this year’s inaugural recipients.

JPED 27(3) mirrors the AHEAD conference by addressing a wide range of current topics from a variety of countries. White, Summers, Zhang, and Renault open this issue with an empirical bridge between K-12 and postsecondary environments. Their study evaluates the efficacy of a self-advocacy training program for new college students with disabilities. They found that the program, which can be implemented by disability service providers, significantly enhanced the knowledge and skills of its participants.

In a companion piece, Summers, White, Zhang, and Gordon contribute a conceptual article that reviews the literature on factors that promote or limit students’ self-advocacy in higher education. This paper includes a comprehensive review of the literature on self-advocacy. Based on their findings, the authors provide a detailed description of the online, interactive training tutorial studied in this issue’s first article.

The National Science Foundation and other important funding sources have driven recent research to discover evidence-based practices that increase the participation of individuals with disabilities in science, technology, engineering, and mathematical (STEM) majors and careers. Lee expands this line of research by investigating the influence of gender, race, and campus type on the academic success of students with disabilities in STEM college courses.

Fichten, Nguyen, Budd, Jorgensen, Barile, Asuncion, Amsel, and Tibbs explore the role of personal and school-related factors on the grade point average (GPA) and graduation rates of Canadian students with disabilities. They found that the absence of social alienation, strong course self-efficacy and campus-based factors predicted students’ intention to graduate. The study reinforces earlier findings that junior (community) colleges were “friendlier” postsecondary options for students with disabilities.

In the next research study, Richardson investigates the academic attainment of students with various disabilities in distance education. This large-scale study from the United Kingdom found weaker outcomes for students with mental health issues, mobility impairments, and dyslexia. The author makes data-based recommendations for more effective accommodations for students taking online courses.

Sears, Strauser, and Wong contribute a pilot study involving career readiness in undergraduates with disabilities. Utilizing two widely used career assessment instruments, the authors found that students with the highest level of dysfunctional plans for future employment also had the highest levels of negative affect. They offer timely recommendations for practitioners who wish to help students engage in more effective career preparation.

Reflecting a growing interest in issues unique to graduate and professional-school students with disabilities, Levey’s review of the literature informs us about the attitudes of faculty towards nursing students with disabilities. As one might expect, this paper identified a range of attitudes and practices within nursing school faculty and administrators. Nursing students were found to be sensitive to issues of stigma associated with identifying their disability in environments where academic performance was closely related to perceptions of professional qualifications.
This issue concludes with a practice brief about students on the autism spectrum. Longtin describes one institution’s collaborative approach to providing comprehensive services that addressed the academic and social needs of students with ASD. The article also describes efforts to educate faculty and staff about participants’ needs. Longtin concludes the practice brief with suggestions for expanding this type of program and studying its efficacy.

As summer gives way to another busy academic year, may we continue to find meaningful bridges between research and practice.
Evaluating the Effects of a Self-Advocacy Training Program for Undergraduates with Disabilities

Glen W. White
Jean Ann Summers
E Zhang
Val Renault
University of Kansas

Abstract
The purpose of this study is to explore the efficacy of a training program with a group of college students who have physical, sensory, and/or learning disabilities regarding their acquisition of knowledge and skills related to their rights to reasonable accommodations under several disability-related federal laws (e.g., Section 504, Americans with Disabilities Act [ADA]). This investigation seeks to address the following research question: Do participants in a knowledge- and skill-based training program successfully acquire knowledge and behaviors associated with understanding their disability-related rights and how to request disability-related accommodations? The study showed significant results concerning student acquisition of knowledge (***p < .001) and accommodation skills (***p < .001). Future applications for this research are discussed.

Keywords: Disability rights, Americans with Disabilities Act, Section 504, disability support services, postsecondary accommodations, empowerment, self-advocacy, self-determination

Policymakers, educators, and researchers have long recognized that postsecondary education is a key factor in ensuring successful adult outcomes for individuals with disabilities. Few employment differences between postsecondary graduates with and without disabilities were found according to a survey conducted by Fichten et al. (2012). However, several studies indicate that individuals with disabilities without postsecondary education might be disadvantaged when seeking employment. Recent data show that overall employment of adults with disabilities in 2011 was 33%, but for those with college degrees (Bachelor’s degree or higher), employment increased to 53% (Erickson, Lee, & von Schrader, 2012). In another recent study of students with intellectual disabilities, Grigal, Hart, and Migliore (2011) found that the only predictor associated with a greater likelihood of employment for these students was attendance at a two- or four-year college. These results suggest that postsecondary education influences a more favorable employment rate for college graduates with disabilities.

The passage of Individuals with Disabilities Education Act (IDEA) and the protection of the Americans with Disabilities Act (ADA) as well as other laws such as Section 504 of the Rehabilitation Act, has provided some advantages for students with disabilities regarding postsecondary education. For example, the number of students with disabilities at transition age who were enrolling in some form of postsecondary education within four years of leaving high school rose from 27% in 2003 to 57% in 2009 (National Council on Disability, 2011). By 2010, the overall percentage of persons with disabilities with some college had risen to 30.1%; this figure is comparable to that for persons without disabilities, which is 32.2% (Erickson et al., 2012). However, the proportion of persons with disabilities who complete a Bachelor’s degree or higher is only 12.2%, compared with 30.9% of those without disabilities (Erickson et al., 2012). While many postsecondary students face stressors and challenges in completing their degrees, this is exacerbated for students with disabilities (Getzel & Thoma, 2008). Thus,
the literature has identified a strong need to increase success in postsecondary education (Burgstahler, 2003; Dowrick, Anderson, & Acosta, 2005; Flannery, Yovanoff, Benz, & Kato, 2008; Stodden & Zucker, 2004; Zaft, Hart, & Zimrich, 2004).

One of the factors that can affect the success of students with disabilities is their access to appropriate accommodations. Several studies have indicated that there is a positive relationship between academic accommodations and academic performance (Keim, 1996; Trammel, 2003). However, it is often challenging for students with disabilities to obtain the appropriate disability services needed to be successful in their postsecondary program (Cawthon & Cole, 2010). Nearly one-fourth of college students with disabilities reported not receiving the appropriate accommodations needed to be academically successful (Horn & Nevill, 2006).

One barrier to accessing appropriate accommodations may be a difference in how accommodations are provided between secondary education supports and postsecondary education (Eckes & Ochoa, 2005). In secondary education settings under IDEA, Section 504 of the Rehabilitation Act, and the ADA, the school is responsible for initiating and providing disability accommodations and services through the individualized education plan (IEP) process; however, postsecondary students must re-establish their eligibility for disability accommodations when they enroll in a postsecondary institution before they can receive supports (Cawthon & Cole, 2010; Madaus, 2005). In other words, students must take the responsibility for establishing their eligibility for accommodations, and, in most postsecondary institutions, are responsible for obtaining their own disability accommodations. Unfortunately, it appears that many students with disabilities may not know how to initiate the process of establishing eligibility for and accessing accommodations. For example, in a survey of 110 students with disabilities at one four-year college, 48% reported that they had received no guidance about whom to contact on their campus to access accommodation supports (Cawthon & Cole, 2010).

Disability Support Services (DSS) offices provide a wide array of services ranging from counseling, to assistive technology such as audio translation of reading material, to supervising extended test time (Shaw & Dukes, 2006). Surveys of DSS staff suggest a wide variation in the types and extent of services provided, however. The bulk of DSS staff reported that their services were usually provided in the form of direct classroom support (e.g., note takers, extended test time), while far fewer reported providing capacity-building training to students such as self-advocacy training or counseling (Tagayuna, Stodden, Chang, Zeleznik, & Whelley, 2005). In summary, while postsecondary accommodations can be effective in supporting students with disabilities, students with disabilities may not be aware of them and/or may not receive the capacity-building training they may need to be successful on their own.

Important components of capacity-building training consist of knowledge of disability rights under the various disability-related laws and skills needed to successfully request needed disability-related accommodations from higher education staff members. As Test, Fowler, Wood, Brewer, and Eddy (2005) propose, “students must have knowledge of themselves and know that they have rights before they can self-advocate effectively” (p. 49). Cummings, Maddux, and Casey (2000) found that students with learning disabilities may not always be effective advocates because they lack understanding about their strengths and weaknesses and are inadequately prepared to communicate these to university staff. This is confirmed by college administrators, who are ultimately responsible for ensuring that services are provided (Janiga & Costenbader, 2002).

Research has documented that students with disabilities often are unable to describe their disability and its impact on their lives (Glover-Graf, Janikowski & Handley, 2003; Hitchings et al., 2001; Triano, 2003). In addition, students often lack knowledge about their legal rights (Carroll & Johnson-Brown, 1996; Rumrill, 1994) and lack an ability to assess their need for personal accommodations in academic settings (Izzo, Hertzfeld, Simmons-Reed, & Aaron, 2001; Izzo & Lamb, 2003; Vo, White, Higgins, & Nary, 2005). This lack of self-awareness, coupled with fear of stigma related to disclosure of their disability, may lead students to either refuse to access support services or request inappropriate accommodations (Barnard-Brak, Sulak, Tate & Lechtenberger, 2010; Collins & Mowbray, 2005; Hitchings et al., 2001). For example, according to a survey of 110 undergraduate students with learning disabilities, only 32% of students interacted with faculty about their learning disability (Cawthon & Cole, 2010).

Self-awareness is a prerequisite for self-determination. According to Turnbull and Turnbull (2001), self-determination is “the means for experiencing quality of life consistent with one’s own values, preferences, strengths and needs” (p. 58). Self-determination emerges across an individual’s life span and plays a significant role in an adult’s life (Turnbull & Turnbull, 2006; Wehmeyer, Martin, & Sands, 2008). A self-determined young person has the ability to identify goals, problem-solve effectively, and appropriately express
and advocate for him or herself (Karvonen et al., 2004; Wehmeyer & Palmer, 2003). Self-advocacy, defined as recognizing and acting on one’s rights (Getzel, 2008), is a component of self-determination. Balcazar, Fawcett, and Seekins (1991) stated that self-advocacy is the ability to communicate with others to acquire information and recruit help in meeting personal needs and goals. Van Reusen, Bos, Shumaker, and Deshler (1994) define self-advocacy as an individual’s ability to effectively communicate, convey, negotiate, or assert his or her own interests, desires, needs and rights. It is also described as educating students about their rights and responsibilities and how to successfully request accommodations and modifications (Pocock et al., 2002).

Many students lack self-awareness and self-advocacy skills (Schreiner, 2007) and have had limited opportunities to learn them (Test et al., 2005). Both self-determination and self-advocacy have been identified as critical factors related to success for students with disabilities in postsecondary settings (Carter, Swedeen, Walter, Moss, & Hsin, 2010; Getzel, 2008; Getzel & Thoma, 2008; Lock & Layton, 2001; Palmer & Roessler, 2000; Walker & Test, 2011). These studies suggest that students with disabilities who lack self-advocacy skills can learn them through a structured, behaviorally-oriented training technology (Palmer & Roessler, 2000; Test et al., 2005; White & Vo, 2006). Such training should focus on developing self-advocacy skills in students with disabilities rather than just providing them with advocacy and advice (Hitchings et al., 2001; Stodden, Whelley, Chang, & Harding, 2001). Moreover, according to Satcher (1995) and Carroll and Johnson-Brown (1996), students with disabilities can receive many benefits from self-advocacy skills training. This training can result in (a) more empowered students with disabilities who become autonomous adults, (b) enhanced self-advocacy skills to reduce social isolation that may cause a significant number of students with disabilities to drop out of school, and (c) students becoming more successful in the transition from postsecondary education to employment.

This study reports the results of a pilot test to determine whether the training enabled participants to acquire specific behaviors to request accommodations from university staff members. Determining whether a training curriculum actually imparts the knowledge and skills it is intended to deliver is a critical first step that must be completed in order to establish the plausibility of efficacy or “going to scale” in future, larger scale research (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). Therefore, this paper seeks to address the following research question related to acquisition of ADA accommodation requesting skills: Do participants in a knowledge- and skill-based training program successfully acquire knowledge and behaviors associated with understanding their disability-related rights and how to request disability-related accommodations?

**Method**

**Participants and Settings**

**Recruitment.** Because this was a pilot study with a focus only on whether students with disabilities could acquire the specific intended knowledge and skills being taught in the curriculum, we did not attempt to recruit students with disabilities who were not already identified and being served by DSS programs. The investigators recruited students with disabilities through an email distributed by the DSS offices at four higher education settings in the Midwest. The email briefly described the study, requested their involvement in it, and provided contact information to the research team. Additionally, the DSS staff made personal contacts to qualified students. Eligible students indicated they had a disability that was recognized by their respective DSS Office. Students who volunteered for the study met with researchers who explained the study and asked students to sign a consent form. The students were compensated for their time with $25 for completing the online knowledge-based training, and another $100 for participating in the skills-based workshop. In all, 52 students with different types of disabilities completed the entire study across four higher education settings. See Table 1 for a description of participant demographics. The overall distribution of disabilities experienced by the participants is roughly equivalent to national reports of disability prevalence among postsecondary students (Newman, et al., 2011).

**Site Selection.** The researchers conducted this study in collaboration with DSS support staff in four locations: two large four-year state universities, one university for Native Americans, and one two-year community college located in an urban, low-income community. The research team selected these sites in order to maximize diversity of students as well as the
type of support service offices located at these institutions. DSS support staff served on the Consumer Empowered Team for the project and also advised on strategies to recruit participants for the training. They received brochures and flyers describing the training and were the primary agents for recruiting participants. Each DSS office received $2,500 in compensation for their time and use of the institution’s facilities.

**Training Materials**

The training materials consisted of a two-part curriculum: (a) a knowledge-based, online tutorial (KBOT) and (b) a face-to-face skill-based training workshop. We describe the disability-related accommodations training content in greater detail elsewhere (see Summers, White, Zhang, Gordon & Renault, 2014). Following is a brief summary of the content and method of delivery.

**Knowledge-based Online Tutorial (KBOT).** The online tutorial contained content from an earlier knowledge-based training component (White & Vo, 2006), which was updated and expanded to contain information to enhance self-awareness and to enable selection of accommodations based on students’ needs. After signing consent forms and receiving brief instructions about the study, the investigators gave each participant a password to access the KBOT. Upon website entry, students were directed to a pretest site to determine their knowledge about the content they were about to receive. Students worked on the KBOT at their own pace. The tutorial was constructed so that students could not skip or advance to the next section until they had completed the previous one. The content of the tutorial included (a) knowledge about their rights under disability law (ADA, Section 504, etc.); (b) a comparison of the procedures for receiving accommodations in postsecondary schools versus high school; (c) the meaning of “reasonable” accommodations (including comparisons of reasonable and unreasonable accommodations); (d) a strengths and challenges self-assessment related to the student’s ability to succeed in postsecondary courses; and (e) an accommodations self-assessment worksheet to identify accommodations best suited to the student’s needs. After completing their review of the materials, each student completed a posttest to assess his/her knowledge acquisition.

**Skills-based Training.** Because this study was a pilot, we focused on delivering the developed training with fidelity; therefore, the facilitators were members of the research team. We did include a designated DSS staff representative at each training site to introduce the trainers and to provide an overview of available services.

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**Table 1**

**Demographic Characteristics of Study Participants**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>59.6</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>40.4</td>
</tr>
<tr>
<td><strong>Year in School</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>15</td>
<td>28.8</td>
</tr>
<tr>
<td>Sophomore</td>
<td>13</td>
<td>25.0</td>
</tr>
<tr>
<td>Junior</td>
<td>11</td>
<td>21.2</td>
</tr>
<tr>
<td>Senior</td>
<td>13</td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Disability Types</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical disability</td>
<td>5</td>
<td>9.62</td>
</tr>
<tr>
<td>Learning disability</td>
<td>31</td>
<td>59.62</td>
</tr>
<tr>
<td>Sensory disability</td>
<td>3</td>
<td>5.77</td>
</tr>
<tr>
<td>Mental health issues</td>
<td>13</td>
<td>25</td>
</tr>
</tbody>
</table>
on his or her campus. The facilitators used a Facilitator’s Manual that had been developed in an earlier phase of the project, which included a PowerPoint presentation accompanied by a script for the presenters.

The team delivered four training workshops, one at each of the four participating institutions. The skills-based training consisted of a 1.5-day workshop that was convened on a Friday afternoon and ran from 8:30 to 3:30 on Saturday. The majority of students did not report any class conflict with the workshop. On the first day, the facilitators reviewed KBOT and the self-assessments completed in the KBOT. The second day of the workshop focused on skills acquisition. This consisted of a seven-step negotiation rubric, including 18 discrete behaviors within these seven steps, on how to request ADA accommodations from higher education staff members. The facilitators described each of the behaviors, including examples and non-examples of each. Students then practiced the behaviors through role-playing with other students using training vignettes of hypothetical scenarios. Finally, they developed a personal scenario based on their own anticipated personal accommodation needs for a specific class or other higher education situation and role-played it with other students to practice and receive feedback on their accommodation-requesting behaviors.

Measurement

Knowledge-based Online Training. To assess knowledge acquisition, the KBOT included a pre- and posttest measure consisting of 12 multiple-choice questions covering the content of the material in the online tutorial. The posttest questions were worded slightly differently, but covered the same content. Students could not access the KBOT until they had completed the pretest. Once the students had completed all sections on disability-related law, accommodations, and self-awareness activities, they could then proceed to the posttest page to complete the test and then check out of the tutorial.

Skills-based Training. Researchers conducted pre- and posttest role plays with each participant before and following the skills-based training. These tests consisted of scenarios of a situation where a university student needs some type of ADA accommodation. The researchers met individually with each participant in private rooms adjacent to the workshop room. The student read the testing vignette and the researcher answered any questions. For the pretest, the researcher asked the student to pretend to have the disability in the hypothetical situation and to ask for an accommodation based on the scenario as it was written. The researcher played the role of a professor or other higher education staff member. All testing scenarios were videotaped for later review and scoring purposes. The pre- and posttest vignettes were different but both included an opportunity for the student to display all 18 behaviors included in the training. In the posttest, the students were allowed to keep a “Seven Step Checklist” introduced in the training and listing the behaviors before them as they engaged in the role play.

Social Validity

The researchers collected social validity data on study outcomes from students at the end of the skills-based face-to-face workshop through a survey using a Likert-type Scale (ranging from 1 = very dissatisfied to 5 = very satisfied) and a yes/no question that focused on the students’ satisfaction with their online tutorial and workshop experience. Students completed the survey and turned it in to one of the facilitators in order to receive their participation payment. See Table 4 for a description of the questions.

Research Design and Analysis

For this study we used a pretest/posttest design. The research team delivered the complete training (both KBOT and Skills-based workshop) to each of the four participating institutions sequentially.

Independent variables. The research team documented completion of the KBOT as described above; students who did not complete both a pretest and posttest were not included in the analysis. Similarly, students who did not complete a pre- and post-training role play, and who did not attend both days, were not included in the analysis of the skills-based training.

Dependent variables. Pre- and posttest knowledge scores from the KBOT served as one of the dependent variables, while the number of accommodation requesting skills exhibited by students at pre- and post-assessment times served as the other dependent variable for this study. The research team created an observation score sheet (see Appendix A) to be used while viewing the video-recorded role plays. The two researchers who delivered the training, and served as the university instructor in the role plays, collaborated to develop agreement about the definitions of each of the behaviors and to revise the observation score sheet to reflect that agreement. Two additional research team members who had not participated in the participant training received training from the senior researchers on inter-observer use of the observation score sheet. They then independently scored the full data set consisting of pre- and post-training role plays for all 52 of the skills-based training participants.
Results

Knowledge-based Training
The total number of students completing the KBOT pre- and posttests was 52. The mean percentage correct from pre- to posttest rose from 67 to 85%. Table 2 shows the results of a paired t-test analysis of the change. There was a statistically significant difference ($p < .001$) in mean disability-related accommodation knowledge score before and after taking/completing the online knowledge tutorial. The effect size, based on a Cohen’s $d$ calculation, was 1.05 (Cohen, 1994).

Skills-based Training
Pre- and Posttest Skills Demonstration. The overall mean percentage of observed skills scored as correctly demonstrated was 42% in the pretest and 65% in the posttest. Table 3 presents a paired t-test analysis and reveals that the change from pre- to posttest skills was significant at $p < .001$. The effect size in this analysis was 1.35 (Cohen, 1994).

Reliability. As noted, two trained observers viewed and scored all of the video-recorded role plays.

Inter-observer agreement reliability was calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100. The inter-observer reliability for the pretest and posttest were 97% and 96%, respectively.

Social Validity
The social validity survey included five questions; four of them were in the form of Likert-type Scale and one was a yes/no question. Specifically, the questions were: (1) How would you rate the ADA workshop?; (2) How would you rate the content of the training?; (3) How would you rate the overall experience of the ADA tutorial?; (4) How would you rate this overall ADA training program?; and (5) Would you recommend this training to someone who has a similar disability? Survey results indicated that the satisfaction with the online tutorial was slightly lower than the satisfaction with the workshop training. However, overall all the students were satisfied with the entire training and would recommend it to other students with disabilities. See Table 4 for further results description.

Table 2
Paired t-test Results Comparing ADA Accommodation Knowledge Pre- and Posttest Scores

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pretest</th>
<th>Posttest</th>
<th>$n$</th>
<th>95% CI</th>
<th>$t$</th>
<th>df</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.67</td>
<td>0.17</td>
<td>0.85</td>
<td>0.17</td>
<td>52</td>
<td>-.23, -.13</td>
<td>-7.20***</td>
<td>51</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval.  
***$p < .001$.

Table 3
Paired t-test Results Comparing ADA Accommodation Skills Pre- and Posttest Scores

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pretest</th>
<th>Posttest</th>
<th>$n$</th>
<th>95% CI</th>
<th>$t$</th>
<th>df</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.42</td>
<td>0.16</td>
<td>0.65</td>
<td>0.17</td>
<td>52</td>
<td>-.28, -.18</td>
<td>-9.14***</td>
<td>51</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval.  
***$p < .001$.
Discussion

In this pilot study, the investigators sought to empirically test whether a designed training curriculum could help postsecondary students with disabilities acquire the specific knowledge and skills to successfully request disability-related accommodations. While this study did not assess longer-term impacts of acquiring the knowledge and skills targeted in this training model (e.g., successful completion of coursework, graduation), it did demonstrate that students can learn both knowledge and skills using this combined online and face-to-face format. As a pilot, the primary research question focused on whether the training could produce the intended changes in knowledge and skills; such a result is needed before moving on to the question of longer-term impacts. This study also revealed that the training could produce a large effect size, which will serve as a guide for future sample size calculations and the design for a more longitudinal approach to determine generalization in naturalistic settings.

The KBOT proved to be an effective approach to helping students obtain information on the disability-related legislation and the types of accommodations they might use to enhance their educational outcomes in a higher education setting. The mean pretest versus posttest scores showed a significant increase in knowledge (M = 0.67 vs. 0.85; p < .001). Similarly, the skills-based training proved to be an effective strategy to help students acquire necessary skills for requesting accommodations, showing a significant training effect (M = 0.42 vs. 0.65; p < .001) on the improvement of the students’ performance in scenario role play situations.

The results from pre- to posttest for both the knowledge and skills portions of the training demonstrated statistical significance. However, a higher level of skill acquisition was anticipated. This would suggest that the training was necessary but not sufficient. Future training might increase practice opportunities until a specified criterion for mastery is achieved. As noted previously, this exploratory study did not follow students to determine whether the acquired skills were successfully generalized beyond the training. White and Vo (2006) used university staff member confederates to whom students were directed with requests for accommodations. White and Vo’s findings show that generalization probes in naturalistic settings had high consistency with accommodation-requesting scores under training conditions.

Limitations

This project is primarily focused on intervention development and therefore the emphasis of this pilot was on testing of the training model to determine its potential efficacy in further research. Therefore, testing was exploratory in nature and intended primarily to indicate whether participants could successfully acquire the knowledge and skills intended in the curriculum. However, we should point out the limitation created by the small sample size in this study (N = 52), and the lack of a control group against which to measure knowledge and skill acquisition. Second, future research should include students who have not previously established their eligibility for accommodations through contacts with their campus DSS, in order to determine broader impacts such as attitudinal change and a willingness to self-disclose their disability and seek accommodations. A third limitation to be noted is that the face-to-face training was delivered in four sequential workshops held in different locations. The presenters followed the same script for all presentations and kept fidelity ratings in the form of checks at each stage of the agenda. Nevertheless, it is possible that these participants did not receive exactly the same dosage in delivery of the skills-based training. There were, however, no significant differences between the pre- and post-training skill acquisition scores across the four sites.

Future Research

The primary purpose of this pilot study was to determine whether the training curriculum, as designed, could result in successful acquisition of the target knowledge and skills for students with disabilities. The proximal variables of knowledge and skill acquisition in this study demonstrated statistical significance. The large effect size of this study provides guidance concerning the appropriate sample sizes for a future research design utilizing control groups. Yet to be determined is whether this intervention results in more significant effects on long-term or distal variables such as changing attitudes of students who are reluctant to request accommodations or self-disclose their disability, requesting accommodations in natural environments, grade achievement across semesters, grade point change, duration of enrollment, and successful graduation.

The focus of this pilot study was on further developing the original training program as discussed in White and Vo (2006). The re-design of the curriculum involved transformation of the knowledge portion of the intervention from paper and pencil to an online tutorial format. The intent was to create a tool that could be used by students almost anytime or anywhere
Table 4

**Social Validation of ADA Training**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Four-year state university (A) (n = 16) M</th>
<th>Four-year state university (B) (n = 13) M</th>
<th>University for Native Americans (n = 9) M</th>
<th>Two-year community college (n = 12) M</th>
<th>Overall (n = 52) M</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate the ADA workshop?</td>
<td>4.56</td>
<td>4.31</td>
<td>4.00</td>
<td>5.00</td>
<td>4.47</td>
</tr>
<tr>
<td>How would you rate the content of the training?</td>
<td>4.63</td>
<td>3.92</td>
<td>4.33</td>
<td>5.00</td>
<td>4.47</td>
</tr>
<tr>
<td>How would you rate the overall experience of the ADA tutorial?</td>
<td>3.69</td>
<td>3.85</td>
<td>3.67</td>
<td>4.36</td>
<td>3.89</td>
</tr>
<tr>
<td>How would you rate this overall ADA training program?</td>
<td>4.69</td>
<td>4.23</td>
<td>4.22</td>
<td>5.00</td>
<td>4.54</td>
</tr>
<tr>
<td>Would you recommend this training to someone who has a similar disability? (Yes/No)</td>
<td>16 Yes</td>
<td>13 Yes</td>
<td>9 Yes</td>
<td>12 Yes</td>
<td>52 Yes</td>
</tr>
</tbody>
</table>
and at their own pace. It was also our thought that this training format would help save DSS staff time and provide an effective and efficient tool to educate students about legal rights, the nature of disability-related accommodations, and enhanced self-awareness of their own needs and strengths. At this developmental stage, the research team continued to be the primary training team delivering this ADA accommodations training. While we have anecdotal data from our collaborating DSS partners concerning the value and relevance of the training, future research needs to explore the fidelity and social validity with which the training can be delivered by others, such as DSS staff who would serve as trainers for future application of this product. The Facilitator’s Guide used to establish fidelity will serve as the basis for an observation-based fidelity check to help facilitators reach criterion fidelity in delivery of the face-to-face training.

Another avenue for future research lies in the more effective and flexible use of the interactive online technology, which we used in this project primarily for the knowledge-based component of the training curriculum. Because of the need to test the overall content, it was necessary to have all participants complete all of the knowledge-based materials. The research protocol required students to do the online tutorial in a linear fashion from start to finish. Under non-research conditions students might take an alternate approach to obtaining knowledge and content. The students might direct their attention to different sections of the webpage with the intent of only seeking the information they need at the moment versus reviewing the whole webpage document on disability-related knowledge. Future research could explore the patterns of use and application of skill acquisition using more innovative delivery of the material. For example, students could use a mobile device application to access disability accommodation knowledge and skill materials and also plan their meetings with university staff.

Following completion of postsecondary training, the disability-related accommodations training may also be useful to graduates for better understanding their individual needs and their rights under the disability laws such as 504 and the ADA in order to proactively secure the accommodations they require in the workplace as well. Knowing one’s rights is one thing, but the skills of respectful negotiation taught through this training may be critical to secure needed accommodations with future employers.

Based on feedback from our DSS colleagues, we believe this intervention would be of value for university and college personnel working with students with disabilities. Many DSS offices face increasing workloads and diminishing budgets and personnel to accomplish their ever-increasing work. The knowledge-based online tutorial is designed to help students learn information about disability laws designed to afford them accommodations. This knowledge acquisition can be done at the student’s own pace and does not require extensive disability services personnel for set up. The length of time to complete the instructional tutorial was not over-bearing. After controlling for outliers, our data show that the mean number of minutes students were engaged with the knowledge instruction was 38.23 minutes (range 8.09 minutes to 1.55 hours). The other main component of this intervention, the face-to-face accommodations requesting training, is designed to be taught in groups between eight and 12 students. There is economy of scale in terms of teaching students in group formats and there is the added benefit of peer interactions and cooperative learning.

Education can be the key to opening many new doors to employment, to new networks, or even more advanced education. This is especially advantageous for people with disabilities. Researchers, educators, advocates, and family members must work together to help students with disabilities gain academic success. To achieve this, a combination of human and technological supports can be used to help students with disabilities develop knowledge and skills to request appropriate accommodations, which will provide them equal opportunity for success in the academic environment. The research reported here is one small step toward achieving that goal.
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Authors’ Note

The contents of this article were developed with funding from the National Institute on Disability and Rehabilitation Research, U.S. Department of Education (grant number H133G070160). However, the contents of this article do not necessarily represent the policy of the Department of Education, and the reader should not assume endorsement by the Federal Government. We would also like to acknowledge the assistance of Andrew Shoemaker, Andrea Blair, Jason Tomlinson-Maseberg, Jaclyn Anderson, and Perry Graves for their involvement with the ADA and Accommodations training at their respective institutions of higher education. Recognition also is given to our project coordinator, Leslie Schmille, and our e-Learning Team colleagues Dr. Ed Meyen, Dr. Diana Greer, and Tom Shorock.
## Appendix A

### INDIVIDUAL SCORING FORM

<table>
<thead>
<tr>
<th>Observer:</th>
<th>Date scored:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant:</td>
<td></td>
</tr>
<tr>
<td>Location:</td>
<td>(circle one) Pretest or Posttest</td>
</tr>
</tbody>
</table>

**Abbreviation:** S = student; USM = university staff member; O = Occurrence; N = Nonoccurrence; N/A = Not Applicable

**Scoring Code:**
- **O** = Occurrence
- **N** = Nonoccurrence
- **E** = Early Occurrence (If the behavior occurs but at the earlier time than suggested)
- **L** = Late Occurrence (If the behavior occurs but at the later time than suggested)

<table>
<thead>
<tr>
<th>BEHAVIORS</th>
<th>Score</th>
<th>Comment</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(A) OPENING THE MEETING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Greeting</td>
<td>O</td>
<td>: A greeting consists of both words of salutation and the USM’s title and last name.</td>
<td>N: The S does not greet the USM or, if the S uses slang.</td>
</tr>
<tr>
<td>2. Introduce oneself</td>
<td>O</td>
<td>: A statement made by the S that identifies himself or herself to the USM.</td>
<td>N: The S does not mention his or her name.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the USM knows the S</td>
<td></td>
</tr>
<tr>
<td>3. State appreciation</td>
<td>O</td>
<td>: A positive statement made by the S to the USM that expresses appreciation in meeting the USM</td>
<td>N: No statement of appreciation occurs.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the USM starts asking questions before the S has an opportunity to make statement of appreciation.</td>
<td></td>
</tr>
<tr>
<td>4. Mention a referring person</td>
<td>O</td>
<td>: Statement that mentions the name of the person that referred him/her to the USM, and also states brief information about the referring person.</td>
<td>N: The S does not mention the referring person OR does not include information about the referring person.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the situation does not specify a referring person OR the S and the USM know each other</td>
<td></td>
</tr>
<tr>
<td><strong>(B) MAKING THE REQUEST</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Describe personal situation</td>
<td>O</td>
<td>: A statement that provides the USM with specific contextual information directly related to the pending request for accommodation.</td>
<td>N: If the S does not mention his/her current situation OR provides non-specific information.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the USM indicates he/she knows the S’s situation</td>
<td></td>
</tr>
<tr>
<td>6. Describe your talent/strength related to your request/situation</td>
<td>O</td>
<td>: A statement that provides the USM with specific contextual information directly related to your talents or strengths that is pertinent to your request for accommodation or the specific situation.</td>
<td>N: If the S does not mention his/her strengths or talents OR provides non-specific information, or identifies talents/strengths that are not related to the request.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the USM indicates he/she knows the S’s talents/strengths.</td>
<td></td>
</tr>
<tr>
<td>7. Describe the challenge</td>
<td>O</td>
<td>: A statement that provides additional information about the S’s personal challenge, which should be related to the request for accommodation.</td>
<td>N: If the S does not mention the disability or challenge.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>: If the USM states he/she knows the meeting’s purpose</td>
<td></td>
</tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
| 8 | Make a specific request | **O** : A statement that specifically describes how the USM can assist him/her.  
**N** : If the S does not make a specific request or says something not related to the meeting’s purpose.  

| 9 | State potential benefit of the accommodation required | **O** : A statement of rationale that explains HOW the specific accommodation can help the S with the academic tasks.  
**N** : If the S does not mention the specific potential benefit of the accommodation.  

- If the request is met, go to **(C) – Planning action**, and then score items 11-15 as N/A, and then go to **(F) Summarizing** and **(G) Closing the Meeting**.  
- If the request is rejected, go to **(D) – Handling rejections**  
  - If (D) is agreed to go back to **(C)**, then score 13-15 as N/A, then go to **(F) Summarizing** and **(G) Closing the Meeting**.  
  - If the USM refuses to help with **(C)**, **(D)**, and **(E)**, skip **(F)** and then score.  

**C) PLANNING ACTION**

| 10 | S states or requests an action plan | **O** : S states or requests information that would result in an action plan designed to meet the requested accommodation need.  
**N** : If the S does not ask about details for how to carry out the initial request.  
**N/A** : If the USM response is a simple yes or no or if the USM volunteers an action plan.  

**D) HANDLING REJECTIONS**

| 11 | Ask USM for alternative/suggestions or S makes thoughtful request for alternative suggestion | **O** : A statement or question after the initial request has been rejected, which seeks the USM’s ideas or suggestions as to possible alternative actions the S might take to achieve his/her requested accommodation. The S may also make a thoughtful suggestion.  
**N** : If the S does not ask or request an alternative or a different suggestion, or makes a threatening suggestion.  
**N/A** : If the initial request is NOT rejected or if the USM spontaneously offers a different suggestion.  

| 12 | Analyze feasibility of the suggestion | **O** : A statement that specifically indicates whether or not the suggestion is feasible, given his/her situation.  
**N** : If the S does not analyze the feasibility of the suggestion.  
**N/A** : If the USM did not make a suggestion OR accepted the initial request.  

**E) ASKING FOR A REFERRAL**

| 13 | Ask for a referring person | **O** : A statement or question that requests the name of someone else who might help him/her with the requested accommodation.  
**N** : If the S does not ask for a referral, OR makes a negative statement.  
**N/A** : If the USM voluntarily offers a referring person  
Score as N/A if request is granted.  

| 14 | Ask for necessary information to contact the referring person | **O** : A statement that seeks more information about the person who has been recommended as an appropriate referring person. This information could include the person’s full name, address, and number.  
**N** : If the S does not ask for specific information about the referring person.  
**N/A** : If the USM volunteers the information about the referring person  
Score as N/A if request is granted.  

<p>| | | |</p>
<table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
|   | **15** Ask for permission to use the university staff member’s name | **O** : The S asks if he/she can use the USM’s name when talking to the referring person.  
   **N** : If the S does not ask for permission to use the USM’s name.  
   **N/A** : If the USM volunteers first states that the S can use his/her name OR offers to contact the referring person in advance  
   **Score as N/A if request is granted.** |
|   |   |   |
| **F** | **SUMMARIZING** |   |
|   | **16** Summarize | **O** : The S reviews the relevant parts of previous discussion. Answer who, when, what, how, and/or where the necessary action steps are going to occur as appropriate.  
   **N** : If the S does not summarize his/her understanding of the future action they (the student and the USM) will take.  
   **N/A** : If the USM refused to help OR the USM summarizes future actions to be taken before the S has the opportunity |
|   |   |   |
| **G** | **CLOSING THE MEETING** |   |
|   | **17** State appreciation | **O** : The S expresses his/her gratefulness for the opportunity to meet the USM.  
   **N** : If the S does not state his/her appreciation. |
|   | **18** Make a final closing | **O** : A statement made by the S to indicate the ending of the interaction  
   **N** : If the S does not state a final greeting. |
Providing Support to Postsecondary Students with Disabilities to Request Accommodations: A Framework for Intervention

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Glen W. White  
E Zhang  
Jeffrey M. Gordon  
University of Kansas

Abstract
Federal laws supporting the rights of students with disabilities to access postsecondary education have helped to facilitate a significant increase in the number of individuals with disabilities enrolling in postsecondary institutions. The rate at which these students complete their education, however, continues to lag behind the rate of students who do not have disabilities. This conceptual paper reviews the literature to provide an overview of the supports offered to students with disabilities in postsecondary settings as well as barriers and gaps in that support. Primary gaps include the lack of tools for Disability Support Services staff to use in providing appropriate training to students to enhance their ability to self-advocate for accommodations. The authors then present a conceptual framework for and a description of a training curriculum that is intended to address these gaps. The training includes an online, interactive tutorial that offers knowledge about rights, procedures for accessing accommodations, and a self-assessment for students to learn about appropriate accommodations to meet their individualized needs.

Keywords: Americans with Disabilities Act, accommodations, empowerment, self-advocacy, self-determination, postsecondary, students, disabilities

Federal disability legislation such as the Individuals with Disabilities Education Act of 2004, Section 504 of the Rehabilitation Act of 1973 as amended, and Title II of the Americans with Disabilities Amendments Act (ADA-AA) of 2008, was enacted to help facilitate the successful inclusion, independence, and integration into society of all individuals with disabilities (Gajar, 1998; Henderson, 2001; Horn & Berktold, 1999). An important component of successful inclusion in society is employment and, as for all citizens, completion of an education to prepare for employment opportunities. Completing postsecondary education improves the likelihood that individuals with disabilities will be employed (Stodden, 2005; Stodden & Dowrick, 2001). For example, only 33% of adults with disabilities were employed in 2011 compared to 53% of adults without disabilities who completed college degrees (Bachelor’s degree or higher) (Erickson, Lee, & von Schrader, 2012). Given these data, it is not surprising that increasing numbers of students with disabilities are enrolling in postsecondary education. For example, The National Council on Disability (2011) reported that the number of students with disabilities at transition age who were enrolling in postsecondary education within four years of leaving high school rose from 27% in 2003 to 57% in 2009. Additionally, in 2010 the overall percentage of persons with disabilities with some college experience had increased to levels comparable to that of persons without disabilities; 30.1% for persons with disabilities and 32.2% for persons without. However, persons with disabilities completed a Bachelor’s degree or higher at a rate of only 12.2%, compared with 30.9% of those without disabilities (Erickson et al. 2012). Finally, The National Council on Disability (2011) reported that, while nearly 28% of the general population 25 years or older has completed college, people with disabilities completed college at half that rate. These data suggest
that at some point in their postsecondary education, students with disabilities encounter a variety of barriers that could discourage them from completing their postsecondary education (Burgstahler, 2003; Dowrick, Anderson, Heyer, & Acosta, 2005; Flannery, Yovanoff, Benz, & Kato, 2008; Stodden & Zucker, 2004; Zaft, Hart, & Zimrich; 2004).

This conceptual paper has three broad purposes. First, we provide an overview of supports currently provided in postsecondary institutions for students with disabilities. Second, we examine barriers students with disabilities experience in accessing these supports, along with additional supports that students with disabilities need for success in postsecondary education. Finally, we will introduce a training module produced by our research team that is intended to address some of those barriers.

**Overview of Supports and Needs for Students with Disabilities in Postsecondary Education**

**Current Disability Support Services**

Increased participation in postsecondary education is an outgrowth of the Rehabilitation Act, the Americans with Disabilities Act (ADA, 1990) and its subsequent amendments in the Americans with Disabilities Act Amendments Act (ADA-AA, 2008). These laws mandate that postsecondary institutions provide reasonable accommodations to “otherwise qualified” students with disabilities to allow equal opportunities for participation. Earlier ADA regulations state that a “public entity shall furnish appropriate auxiliary aids and services where necessary to afford an individual with a disability an equal opportunity to participate in, and enjoy the benefits of, a service, program, or activity conducted by a public entity” (U.S. Department of Education, Office for Civil Rights, 2002). To facilitate accommodations, many postsecondary institutions have offered supports through Disability Support Services (DSS) offices (Adams & Proctor, 2010; Black, Smith, Chang, Harding, & Stodden, 2002).

Additionally, the Association of Higher Education And Disability (AHEAD) is an international organization of more than 2,500 professionals providing supports to postsecondary students with disabilities (http://www.ahead.org/). AHEAD has helped to develop professional programs, standards, and performance indicators essential to establishing supports available through DSS offices. DSS staff may draw upon professional development and information disseminated by AHEAD to carry out a variety of roles and responsibilities, including: providing direct consultation and counseling, disseminating information about services and programs, building faculty/staff awareness about disabilities and accommodations, developing policies and procedures to help facilitate access to eligible students, facilitating academic adjustments and accommodations, facilitating program administration, and providing training to DSS staff (Shaw & Dukes, 2006).

Through the guidance of the Rehabilitation Act and ADA-AA and with support from AHEAD, DDS staff has been able to provide a variety of reasonable accommodations to students with disabilities. For students with disabilities who qualify, the DSS offices provide reasonable accommodations such as testing accommodations, qualified interpreters, assistive listening systems, captioning, TTYs (text telephones), notetakers, readers, audio recordings, taped texts, Braille materials, large print materials, materials on computer disk, priority registration, class relocation to an accessible location, and adapted computer terminals. Beyond these mandated accommodations, DSS offices may offer a variety of additional supports to students enrolled in the postsecondary institution. Examples of these include personal and career counseling, advocacy services, study skills, tutors, class relocation, and learning center laboratories (Sharpe & Johnson, 2001; Sharpe, Johnson, Izzo, & Murray, 2005; Stodden, Whelley, Chang, & Harding, 2001; Tagayuna, Stodden, Chang, Zeleznik, & Whelley, 2005).

The degree to which these additional services are offered, and the specific types of supports, varies widely across postsecondary institutions (Stodden et al., 2001; Tagayuna et al., 2005). For example, some institutions offered significantly less in terms of training and informational materials to faculty about responsibilities and techniques for providing accommodations to students with disabilities (Sharpe & Johnson, 2001).

In general, students with disabilities tend to be satisfied with the services they receive from DSS offices. For example, Kurth and Mellard (2006) surveyed 108 students with disabilities who were receiving services from DSS offices in 15 colleges across three states. The students rated their satisfaction with the accommodation requesting process (e.g., the process of selecting an accommodation, perceived effectiveness of the accommodation, confidentiality) Overall the student mean ratings of all components were above 4 on a 5-point scale, where 1=not satisfied and 5=very satisfied. Students in this study reported that the use of note takers was the most effective accommodation received (87.5% of students using this service rated this service as effective). Supports beyond mandated services, such as mental health counseling, were rated the least effective (63.6% of students using this ser-
vice rated it as effective). More nuanced results about satisfaction were presented in a study by Kundu, Dutta, Schiro-Geist, and Crandall (2003). This study examined whether there was a difference in satisfaction with DSS services among 445 students based on various demographic characteristics, type of disability, educational status, and high school grade point average, in four institutions of higher education. The majority of students at all four universities expressed satisfaction with the overall quantity and quality of services and supports. Men tended to have greater needs and higher satisfaction than women; sophomores had both higher levels of need and higher satisfaction; students with higher grade point averages in high school also tended to be more satisfied with their accommodations and services (Kundu et al., 2003).

**Barriers and Facilitators to Success for Students with Disabilities**

**Facilitators.** While the laws and regulations go far to ensure students with disabilities have access to accommodations in postsecondary campuses, the next question is, what factors are most contributive to successful degree completion once they have accessed postsecondary education? The research literature on this question is somewhat sparse. Barber (2012) conducted a qualitative study of 20 students with disabilities who were defined as successful “college completers” at three community colleges and two universities. These students encompassed a range of physical, emotional, and learning disabilities. The findings suggest that a common thread among these students was their self-awareness of their disabilities and the ability to advocate for the accommodations they needed. Further, they cited positive relationships with mentors, either on campus or among their families. For some, these mentors were support staff at their Disability Support Offices (Barber, 2012). In another study of 262 college students with learning disabilities, Troiano, Liefeld, and Trachtenberg (2010) found that students with higher levels of attendance at learning support centers were more likely to have higher grades and to graduate college than those who did not. Finally, Trammell (2003) found that students who experience both ADD an LD attained a significant boost in grades after using ADA-related accommodations.

Regarding barriers to successful outcomes (e.g., higher grades, degree completion), there is a greater body of literature available. We will address three barriers that present a consistent theme in the literature: (a) students’ lack of knowledge about their rights for accommodation in postsecondary programs; (b) students’ lack of self-awareness of their needs for accommodations; and (c) students’ lack of self-advocacy and self-determination skills.

**Knowledge of legal rights.** Early research documented that students often lack knowledge about their legal rights (Carroll & Johnson-Brown, 1996; Rumrill, 1994). This appears to continue to be the case. In a more recent study of 110 students with learning disabilities at a four-year university, Cawthon and Cole (2010) found that only 9% of the respondents reported they had an Individualized Education Plan (IEP) in high school, despite the fact that their descriptions of services received in high school suggest they must have had either an IEP or Section 504 plan in order to receive those services. In this same study, these students reported a low level of interaction with their instructors outside of the classroom (32%) and only 48% had contacted their Office of Students with Disabilities. Students with disabilities who have limited knowledge about their rights and who do not request accommodations have been found to experience significantly lower levels academic achievements (Barnard-Brak, Saluk, Tate, & Lechtenberger, 2010).

Contributing to this lack of awareness of legal rights are the differences between supports and accommodations offered through elementary and secondary special education specified by the Individuals with Disabilities Education Improvement Act (IDEIA) and the requirements for accommodation established under ADA-AA and other laws. Students must be proactive and establish their eligibility for accommodations by presenting documentation of their disability to DSS offices; students and their parents are often surprised to find that the IEP that served to guide accommodations in high school is not sufficient documentation in postsecondary institutions (Madaus & Shaw, 2004). Changes in both IDEIA in 2004 and in the ADA-AA in 2008 were intended to address the need to smooth transitions for students from high school to postsecondary education.

On the part of ADA-AA, the recent amendments have clarified that the determination of disability is based on functional limitations rather than diagnostic categories (Shaw, Keenan, Madaus, & Banerjee, 2010). On the part of IDEIA, high schools are expected to develop a Summary of Performance (SOP) consisting of a summary of the student’s academic achievement and functional level of performance, along with recommendations needed to assist the student in achieving postsecondary goals (IDEIA, 2007). In a review of 16 articles published on SOP’s, Richter and Mazotti (2011) note that common recommendations among these authors is that the SOP offers promise to improve coordination between secondary and postsecondary...
programs and that postsecondary programs should consider using the SOP as documentation of the disability. While this idea is not yet universally accepted, the clarifications in ADA-AAA toward a more functional assessment of disability-related needs suggest this may be the future direction (Shaw et al., 2010). Regardless of how well these changes may affect transitions, students and their families will need to understand these changes in the law and how to use them as they prepare to enroll in a postsecondary program.

Self-Awareness. Test, Fowler, Wood, Brewer, and Eddy (2005) noted, “students must have knowledge of themselves and know that they have rights before they can self-advocate effectively” (p. 49). Students with disabilities often are unable to describe their disability and its impact on their lives (Hitchings et al., 2001; Glover-Graf, Janikowski & Handley, 2003; Troiano, 2003).

Lack of awareness about the nature of their disability may be compounded by a reluctance to disclose a disability. The National Longitudinal Transition Study (Newman et al., 2011) found that more than half (52%) of youth who received special education services while in secondary school and attended college reported that they do not consider themselves to have a disability. An additional 7% reported that they do consider themselves to have a disability but choose not to disclose it to their postsecondary schools. Bernard-Brak et al., (2010) developed a measure to assess student attitudes toward requesting accommodations. The authors used a sample of 276 college students who were registered with their DSS offices in 10 universities. Students were asked to rate their degree of agreement with 32 items concerning the appropriateness or risks of seeking accommodations. A factor analysis revealed four factors: academic integrity (degree to which requesting accommodations might be considered “cheating”), disability disclosure (concern that disclosure would be stigmatizing), disability acceptance (degree to which the student agrees he or she has a disability), and accommodations process (perceived degree of difficulty in obtaining accommodations). All of these factors were discriminative of students who had versus those who had not requested accommodations. In sum, knowledge of rights, awareness of one’s own disability characteristics and needs, and attitudes toward the value and “fairness” of seeking accommodations, are critical components of the knowledge base which leads a student to avail himself or herself of accommodations and other services.

Self-Advocacy and Self-Determination Skills. Self-determination skills are important for students with disabilities to acquire because they can lead to improved self-awareness and self-advocacy. According to Turnbull and Turnbull (2001), self-determination is “the means for experiencing quality of life consistent with one’s own values, preferences, strengths and needs” (p. 58). Self-determination emerges across an individual’s life span and plays a significant role in an adult’s life (Turnbull & Turnbull, 2006; Wehmeyer, Martin, & Sands, 2008). A self-determined young person has the ability to identify goals, problem-solve effectively, and appropriately express and advocate for him or herself (Karvonen, Test, Wood, Browder, & Algozzine, 2004; Wehmeyer & Palmer, 2003). Components of self-determination include autonomy, problem solving, and persistence (Field, Sarver, & Shaw, 2003).

Both self-determination and self-advocacy skill sets have been identified as critical factors related to success for students with disabilities in postsecondary settings. Field et al., (2003) propose that self-determination is a critical skill for college students with disabilities because it fosters a sense of autonomy and independence for students to enable them to succeed in the far less structured college environment where, for example, there are no structured study times and students must have self-reliance and self-discipline to meet assignments. Self-advocacy, a part of self-determination, involves the ability to appropriately problem solve and negotiate on one’s own behalf. Self-determination, including assertiveness, self-advocacy, and independence is “salient to [students’] success in attaining a degree in a postsecondary setting” (Belch, 2005, p. 11). These comments are consistent with the voices of young adults with disabilities in postsecondary settings. For example, Getzel and Thoma (2008) conducted a series of focus groups with 34 students with disabilities who were referred by their DSS offices in three community college and three four-year college sites. The DSS staff were asked to identify students who they believed had self-determination skills and who were in good academic standing in their institutions. The researchers convened these students in focus groups and asked them to discuss what skills they believed were essential to staying in school and getting needed supports. The analysis produced a series of themes including self-awareness, problem-solving, goal setting, self-management, seeking services, forming relationships with instructors, and developing support systems on campus (Getzel & Thoma, 2008). In another qualitative study of 34 young adults with disabilities, Carter, Swedeen, Walter, Moss, and Hsin (2010) identified key attitudes and skills they believed were important for leadership. The results included perseverance, independence, positive attitude,
confidence, goal setting, effective communication, advocacy, and self-advocacy.

IDEIA contains a number of provisions encouraging development of self-determination and self-advocacy, including requirements that students over age 16 attend their own IEP meetings, that they participate in developing their SOP, and that secondary programs provide training in self-determination. However, there are indications that students with disabilities are arriving on postsecondary campuses without adequate training in self-determination and self-advocacy. An example is the finding, noted earlier, that a large proportion of students with learning disabilities were not even aware that they had an IEP during their high school career (Cawthon & Cole, 2010). Only 32% of students in this study reported any level of interaction with college faculty and staff, and of those they primarily asked for letters of recommendation, not accommodations. Despite broad agreement in secondary settings on the importance of self-determination, these skills are still not regularly incorporated into the high school curriculum (Cease-Cook, Test, & Scroggins, 2013; Fiedler & Dannaker, 2007). Initially, self-determination and self-advocacy for secondary students was included as an elective course; however, increasing emphasis on core curriculum standards, access to the general curriculum, and multi-tiered instruction requiring greater time spent on academic learning, has meant an even greater reduction in instructional time spent in high school on self-determination and self-advocacy (Cease-Cook et al., 2013). The upshot is that many students leave high school without self-advocacy skills (Eckes & Ochoa, 2005).

In summary, this overview of literature related to supports for students with disabilities in postsecondary settings highlights several critical points. First, postsecondary education programs appear to be attracting larger numbers of students with disabilities and the research suggests that accommodations are effective in improving access to postsecondary education. Accommodations and supports offered through DSS offices were included among factors associated with successful college completion (Barber, 2012; Troiano et al., 2010).

We identified several knowledge-based barriers which impeded students’ abilities to access accommodations. These included a lack of knowledge about their legal rights and lack of self-awareness of their own disabilities. These knowledge and attitudinal gaps (Barnard-Brak et al., 2010) persist in spite of changes in the law to smooth transitions (e.g., SOP documentation) and in spite of requirements for students in high school to attend their own IEP and SOP planning meetings (Richter & Mazzotti, 2011).

Self-determination and self-advocacy skills are identified as critical to successful outcomes beyond high school, including in postsecondary settings (Belch, 2005). However, despite requirements for self-determination instruction in high school, many students are arriving in postsecondary settings without the requisite self-determination and self-advocacy skills they need (Fiedler & Dannaker, 2007). Recent trends emphasizing greater academic time and access to the general curriculum for high school students with disabilities suggest that students with disabilities will continue to have restricted opportunities for instruction in self-determination and self-advocacy (Cease-Cook et al., 2013).

To address these issues, we have developed an online knowledge and skills based training program for students with disabilities, *Access for Success*, through a Field Initiated Development grant from the National Institute on Disability and Rehabilitation Research. In the following section, we present an overview of the training model and content. A further evaluation of the efficacy of the *Access to Success* training in terms of student acquisition of knowledge and skills will be presented in a separate article (White, Summers, Zhang, & Renault, 2014). The current paper provides a more detailed, conceptual description of the training and the empirical results from it.

**Access to Success: Teaching Postsecondary Students with Disabilities to Request Appropriate Accommodations**

The basic framework for *Access to Success* is focused on providing two critical components to students with disabilities: (a) knowledge about their legal rights and their own disability and (b) specific skills to self-advocate for accommodations. Figure 1 describes the framework of knowledge and targeted skill components provided in the training. For the knowledge-based component, we focused on creating an online-based curriculum that DSS staff could easily provide as a self-paced tutorial for students. For the skills-based component, we designed a face-to-face workshop to teach and provide practice opportunities for students to negotiate appropriate ADA accommodations with faculty and staff.

**Knowledge-Based Online Tutorial (KBOT)**

The technological platform for the knowledge-based online tutorial (KBOT) was the e-Learning Resource Authoring (ERA) system developed by our partners in this project (Meyen, Poggio, Aust, & Smith, 2008). This program enabled us to use universal design
for learning (UDL) principles to enhance access for students with different learning styles and disabilities. The user interface elements include multiple navigation strategies with pagination and position indicators, a main table of contents, and sub-menus that support a modular design that allow lessons to be used independently. Interactive features include multiple choice and open-ended assessments to assist in individualizing remediation (through correction and repetition of original material) and hyper reference links to context-sensitive glossaries and other instructional features. The module design and interface maximizes accessibility for persons with disabilities by offering four different formats for students, depending on their instructional needs and/or learning preferences. All software applications comply with BOBBY, W3C, and Section 508 standards for web accessibility. Format options include a text version with graphics, multimedia version with audio and visuals, downloadable MP3 files, and a screen reader version. The text version has embedded icons so that students can access resources without leaving the text they are studying. KBOT content includes two main sections: (a) knowledge about the law and accommodations and (b) two self-assessments of strengths and challenges needed to request appropriate ADA accommodations.

**Legal Knowledge Base.** The knowledge tutorial includes four components that include information about the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act Amendments Act (ADA-AA). The tutorial first introduces students to their legal rights to accommodations through a brief description of the Rehabilitation Act of 1973 and the ADA-AA. Next, the tutorial helps students consider how these laws help protect their rights in higher education settings and allow for a comparison of what they currently know based upon previous experiences in high school and with the IDEIA. This section also informs students how to establish their eligibility for accommodations and gain access to their DSS Office. Additionally, the tutorial provides an overview of the different types of accommodations available, an explanation and interactive exercise to learn the difference between “reasonable” and “unreasonable” accommodations, and a description of different technological and non-technological accommodations. Finally, students review the different types of ADA-AA accommodations and supports commonly provided based on types of disabilities, including motor, sensory, and cognitive/neurological disabilities.

**Self-Awareness Knowledge Base.** The self-assessment component of the KBOT is intended to help students apply the general knowledge they have learned to consider their own needs for accommodation. In this section, students learn to consider their strengths as well as their challenges before considering the specific accommodations they may want to request. The *Strengths and Needs Self-Assessment Worksheet* is a simple checklist focused on typical activities in higher education programs. These activities include (a) academic skills (e.g., reading, math, writing); (b) classroom participation skills (e.g., taking notes, avoiding distractions); (c) test-taking skills (e.g., working under a time limit, writing essays); (d) homework (e.g., managing time, reading and taking notes); (e) campus accessibility (e.g., accessing classrooms); and (f) social interactions (e.g., participating in group assignments). Students rate the items in each category on a five-point scale where 5=a strength, 3=neutral, and 1=a challenge. See Figure 2 for the first page of the Self-Assessment Worksheet. Students are able to download the worksheet for future reference and to bring to the skills-based workshop.

The second step in self-assessment is to guide students through the process of applying their strengths and challenges to think systematically about choosing appropriate accommodations linked to their individual needs. Students are asked to download and complete the *Choosing Accommodations Worksheet* before the skills-based workshop. As part of the worksheet, each student is asked to think of a specific and challenging class or campus life situation, consider challenging aspects of it, then consider appropriate accommodations to meet the challenge. For this specific class or situation, the student is asked to list (1) environmental challenges (e.g., accessibility, visual or auditory distractions, etc.); (2) academic expectations/challenges (amount of reading, teaching style, group discussions, projects); and (3) social and self-advocacy expectations/challenges (whether the class requires group or team projects, class discussions, etc.). In each of these three areas, the student thinks about specific personal strengths that might be useful and potential accommodations that could help to overcome the challenge(s). Finally, the student is asked to prioritize which accommodation would be the most effective and consider whether the best option would be a technology-based (e.g., a digital recorder) or non-technology based (e.g., extended test time) accommodation. See Figure 3 for the first page of the *Choosing Accommodations Worksheet.*
Figure 1. Access to Success Framework
Skills-Based Training

The Access to Success skills-based training is an in-person workshop intended to improve skills to help the student request accommodations with higher education faculty or staff. The Access to Success skills-based training involves breaking down the negotiation process into seven steps and detailing the target behaviors to be used during each step. Research has demonstrated that acquisition of behavioral skills is best accomplished through a combination of reviewing definitions of the target response, rehearsal or practice of different scenarios related to obtaining accommodations (Fenstermacher, Olympia, & Sheridan, 2006; Roter et al., 2004; White & Vo, 2006), and performance feedback (Shanley & Niec, 2010). As such, the workshop includes the following components: (a) review, discussion and questions about the KBOT; (b) introduction of the seven-step negotiation skills model designed to enable students to negotiate effectively for needed accommodations; (c) demonstration of the seven-step model by workshop facilitators; (d) several practice opportunities for participants using a variety of hypothetical role play situations; and (e) application of the self-assessment materials from the KBOT to help students construct their own plan to request an accommodation. The skills-based training was designed to be completed during a 1.5-day workshop. While we have not tried other schedule formats, our intent has been to create a workshop agenda flexible enough to be delivered during times that are more sensitive to students’ schedules (e.g., over five 1- or 2-hour sessions).

We also designed the workshop to be flexible in allowing facilitators to vary the number of students to whom they are delivering the training. However, anecdotal data seem to indicate that the training may have greater social validity when it includes about eight to 10 students. Thus, while learning hands-on skills, students experience an opportunity to network with other students with disabilities on their campus. Students are asked to complete the KBOT before attending the workshop and to come with their completed self-assessments.

The first section of the workshop includes introductions and an opportunity to learn about one another through “ice breaker” activities. The facilitator reviews the online knowledge-based module and asks for discussion. In this introductory section, the facilitator introduces a staff member of the local DSS office, who describes the student services of that office. Thus far, facilitators of the skills-based training component have been members of our research team; future trials will assess the training when it is delivered by DSS staff directly. It appears from our social validity results that having two facilitators is optimal in order to enable more dialogue, monitor and support small group activities, and demonstrate role plays.

The seven-step negotiation model is a decision tree that outlines actions and anticipates responses the students may need to engage in when requesting accommodations. See Figure 4 for an overview of the seven steps. The seven steps include (a) opening the meeting, (b) making the accommodation request, (c) asking for suggestions (if the request is refused), (d) asking for a referral (if the request is still unresolved), (e) planning future action, (f) summarizing the meeting, and (g) closing the meeting. For each of these seven steps, the facilitators describe several examples and non-examples of behaviors associated with each step. Following this presentation, the two facilitators demonstrate the process with a hypothetical role play, where one takes the role of a student and the other takes the role of the instructor or staff member. The facilitator playing the staff role will deliberately refuse the request for accommodations in this role play scenario, so that the full behavioral repertoire of asking for suggestions and requesting a referral can also be demonstrated. The facilitators then provide feedback on this demonstration with discussion and additional role play scenarios using the students’ suggested situations.

Using a checklist with the seven steps and the behaviors in each step, students are then divided into dyads so that they can practice with additional role play scenarios (see Figure 5 for a hypothetical role play scenario). The description of each scenario contains directions for both the “staff” and the “student” roles. Each student dyad practices each scenario with one person taking the student role and the student taking the staff role. After completing a role play, the students then switch roles and repeat the scenario. The student taking the staff role completes the seven-step checklist as his or her partner goes through the hypothetical role play to check for completeness of the accommodation requesting skills. The facilitators then elicit discussion and descriptive feedback on each student’s performance following each role play scenario practice session.

Finally, the students use the personalized self-assessment worksheet that they brought to the workshop to construct a seven-step “script” to request an accommodation related to their individual need for accommodation(s) that they have identified as most important for them. This part of the training is an individual exercise, with the facilitators working with each student to guide them in creating their personal scenario. Following this step, the students again break into pairs and practice using their “real” (as opposed to previously hypothetical) scenarios.
Choosing Accommodations That Fit Individual Needs: Strengths and Needs Self-Assessment Worksheet

ADA Accommodations Training Project

STEP ONE: Assess Your Strengths and Challenges:
Think about the kinds of activities you will be doing in your higher education program. Then think about the \( \text{kind of strengths you have to do those activities well and also the kinds of challenges that you will need to think about to determine what accommodations you may need.} \)

Instructions: In the next section, six skill categories of activities that are typical in a higher education setting are listed. For each of the skills listed, circle the number that best matches your rating for each item:

\( 5 = \text{a strength} \quad 3 = \text{neither} \quad 1 = \text{a challenge} \)

1. Academics: Think about the areas of basic school work skills that every student needs to be successful.

<table>
<thead>
<tr>
<th>Academic Skills</th>
<th>Strength</th>
<th>Neither</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Speed</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b. Understanding</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2. Math</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Completing word problems</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b. Calculating</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>3. Writing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Grammar and spelling</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b. Composition and writing style</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4. Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. ____________________________</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b. ____________________________</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
Figure 3. Choosing Accommodations Worksheet

Think of an example of a class or campus life situation – this may be a class you recently took, or it may be one you plan to take next. Or, you could choose a non-classroom environment you find challenging (library, study area of your dorm, etc.). Your task is to think about the particular accommodations you will need to be successful in this environment.

1. **What Physical and Sensory Challenges does this classroom or other space have for me?** (For example, fixed auditorium seating, poor lighting, noise distractions, visual distractions (for example, windows):

   - What personal strengths can I use to meet these challenges?
   - What additional accommodations do I need to meet these challenges?

2. **What Academic, Classroom, and Homework Expectations does this class have for me?** (For example, lectures, group projects and discussions, required readings and reports)

   - What personal strengths can I use to meet these expectations?
   - What accommodations could I use to help me meet these expectations?

3. **What Social and Advocacy Expectations does this class or other setting have for me?** (For example, interactions with other students in group discussions or team projects)

   - What personal strengths can I use to meet these expectations?
   - What accommodations could I use to help me meet these expectations?

**Conclusion**

*Access to Success* is a training curriculum designed to help students develop the self-advocacy skills needed to request disability-related accommodations in higher education settings. DSS programs in postsecondary institutions are the primary vehicle for providing supports to these students. *Access to Success* can help to build both knowledge and skills through more convenient media-based means. Formal self-advocacy training in group settings can maximize staff members’ limited time and provide social learning benefits to students not available in one-on-one situations. Second, many students with disabilities lack the knowledge and skills needed to access postsecondary accommodations and services from which they could benefit. By pairing an online-based tutorial with a face-to-face skills-based workshop that provides students with the information and skills needed to successfully request accommodations, we hope to give DSS staff a more efficient tool to deliver the training that students with disabilities may need to access their services.

Additionally, we have presented results of an initial efficacy test of *Access to Success Tutorial* in a separate report (see White, Summers, Zhang, & Renault, this issue). The data presented students’ acquisition of knowledge and skills immediately following the training. These findings show significant increases in knowledge using a pre-post test for the KBOT and significant increases in accommodation negotiation skills based on pre-post assessments using an observational measure of video recordings of participants engaging in role play scenarios (see White et al., this issue).

There are several next steps needed to further test the efficacy of this work. First, while we developed *Access to Success* under the advice and guidance from DSS staff, it will be important to demonstrate transferability and fidelity of the use of the training by
non-research facilitators. Second, more longitudinal evaluation of the efficacy of the training is needed to determine whether it has lasting impacts. Based on our conceptual framework (Figure 1), these would include (a) increased self-awareness and willingness to self-disclose and request accommodations, (b) generalized use of the knowledge and skills taught in Access to Success in real-life situations where accommodations are needed, and (c) successful completion of coursework and graduation.

Future research should also focus on making the process of disclosing and accessing accommodation supports more attractive to postsecondary students with disabilities. Learning to self-advocate requires a shift in attitude (i.e., that one can and should accept support), as well as in knowledge and skills targeted by Access to Success. The task is to find efficient and effective ways to provide long-term support to students as they complete their postsecondary educational careers. Additionally, a component analysis could be conducted to determine which steps in the process are most important for students with disabilities to learn self-advocacy skills. These steps could make it easier for DSS staff to further disseminate the access to self-advocacy training. Finally, extensions to the Access to Success training could be made to help individuals with disabilities learn self-advocacy skills related to areas of employment, recreation, housing, and other areas in which people with disabilities encounter barriers that could affect their independence within the community. In sum, extensions of the Access to Success training could be used to help individuals further build capacities to help ensure their independence and interdependence in adulthood.
Figure 5. Example Roly Play Scenario

**Setting Description** (Student sees only this paragraph)

You are a student with a reading disability. You are very good at numbers and math. With math, you can handle number problems very well, but when there is a story problem, you need to read the problem over to yourself several times before you understand it. You have enrolled in an Algebra class and were really looking forward to it. On the first day of class, while Dr. Rapp is explaining the requirements and the schedule for the course, he says that he plans to give a pop quiz at the beginning of class at least once a week. It will only be one problem but he says it will almost always be a story problem because he believes that it is important for students to be able to apply math principles to real world situations. He tells everyone not to worry because he doesn’t think it will take people more than 5 minutes at the beginning of class to finish the one problem. But you are very worried because you know that it will very likely take you much more than 5 minutes to read and understand the problem well enough to answer it. You talk to the Disability Supports counselor about your worries. She suggests you get an appointment to talk with Dr. Rapp before the second class. So you call him and he agrees to meet with you on the day before the next class, in his office.

**Role-play Partner:** (Partner playing instructor role sees both sections)

You are Dr. Rapp, a math instructor. You have a meeting with a student who tells you he/she has a reading disability requests the accommodation he/she needs for his/her tests. You know very little about the ADA.

**Step 1:** You listen politely, but do NOT ask questions (except “What can I do for you?” OR “Can I help you?”), rather simply let the student introduce him/herself, describe his/her personal situation and the challenge, and make the request.

**Step 2:** You will say, “I know how hard it is for you, but unfortunately I cannot give you more time because it gives you unfair advantage over other students.”

**Step 3:** ONLY ASKED FOR SUGGESTION, “I don’t know. You may try to talk to a counselor from the University Services for Students with Disabilities.”
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Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C.


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Authors’ Note

The research reported here was supported by the National Institute of Disability and Rehabilitation Research, U.S. Department of Education, through Grant No. 8133G09022 to the University of Kansas. The opinions expressed are those of the authors and do not represent views of the National Institute of Disability and Rehabilitation Research or the U.S. Department of Education.
Students with Disabilities Choosing Science Technology Engineering and Math (STEM) Majors in Postsecondary Institutions

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Abstract
Many science, technology, engineering and math (STEM) studies have focused on issues related to underrepresented groups’ participation in STEM disciplines. Most of these studies have targeted women and individuals from racial minorities as the underrepresented groups of interest, while little attention has been paid to people with disabilities. Extracting a nationally represented sample of students with disabilities from the National Longitudinal Transition Study-2, this study investigated whether and to what extent the selected demographic and academic factors predict STEM major choices by type of postsecondary institutions. Based on the literature on STEM students without disabilities, logistic regression analyses yielded both expected and unexpected results. As expected, female students with disabilities were substantially underrepresented in STEM majors in all types of postsecondary institutions. At 2-year or community colleges, White and Asian-American students with disabilities substantially dominated STEM majors over other racial groups. At 4-year postsecondary institutions, students with disabilities who enrolled in STEM majors showed higher high school GPA in math compared to non-STEM students with disabilities. Unexpectedly, at 4-year as well as vocational and technical postsecondary institutions, students with disabilities from lower-income backgrounds were significantly more likely to choose STEM majors compared to their counterparts. The results provide insights into career and academic resources that can help students with disabilities prepare for STEM careers.

Keywords: Disability, STEM majors, postsecondary institutions, and logistic regression

Many studies have investigated ways to encourage underrepresented groups to participate in the STEM workforce. Among the underrepresented groups, the majority of these studies targeted women and individuals from racial minority groups, while only a few studies considered people with disabilities. This gap in the literature may imply that many stakeholders, including scholars, doubt that people with disabilities can succeed in STEM education and related career. In fact, studies showed that students with disabilities are often discouraged from taking science and engineering courses at the K-12 level (Alston, Bell, & Hampton, 2002; Alston & Hampton, 2000; Alston, Hampton, Bell, & Strauss, 1998; National Science Foundation, 2002). Moreover, students with disabilities are not fully supported to participate in STEM-related courses due to teachers’ lack of skills and knowledge related to inclusion (Bargerhuff, Cowan, & Kirch, 2010; Johnson, 2000; Mumba & Chitiyo, 2008; Rule, Stefanich, Haselhuhn, & Peiffer, 2009; Scadden, 2001; Todds, 2008).

Most STEM studies on people with disabilities have addressed how challenging it is for these individuals to pursue STEM education while only a few have investigated their participation in STEM fields. Among these, research conducted by Lee (2011) found that students with disabilities were significantly more likely to enroll in STEM majors compared to students without disabilities at 2-year or community colleges through comparing two nationally representative samples selected from the National Longitudinal Transition Study-2 (NLTS-2) and the Educational Longitudinal Study of 2002 (ELS: 2002). This promising outcome should be enough to encourage subsequent studies that focus on the pathways students with disabilities can take to pursue STEM careers. This study also extends Lee’s work through proposing the following research questions.
Research Questions

1. To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in 2-year or community colleges?

2. To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in 4-year colleges and universities?

3. To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in vocational and technical postsecondary schools?

Literature Review

Concerning the dire shortage of STEM workforce, the National Science Foundation’s Committee on Equal Opportunities in Science and Engineering (CEOSE) was established for the purpose of encouraging underrepresented groups, including women, minorities, and people with disabilities, to participate in the STEM workforce (CEOSE, 2009). Aligned with the goal of the CEOSE, a considerable number of studies have investigated various issues regarding STEM education and careers of women and racial minority groups without considering disability status. However, a dearth of studies has targeted people with disabilities in STEM education and career in spite of the sizeable proportion of people with disabilities who pursue STEM interests. The U.S. Census Bureau indicated that approximately 13% of workers aged 21 to 64 years and about 18% of the U.S. population aged 5 years and older have some form of disability (as cited in National Science Foundation, 2006).

The few STEM studies that focused on people with disabilities did not explore STEM pathways of people with disabilities sufficiently, while several studies have examined the obstacles that students with disabilities often face in STEM classrooms at the K-12 and higher education levels. In response, this study aimed to investigate whether and to what extent certain demographic and academic factors predict students with disabilities’ major selection, paying attention to different types of postsecondary institutions. The current study was developed based on the findings of Lee’s study (2011). Lee compared STEM enrollment rates between students with and without disabilities, considering student demographic characteristics. The major findings from the comparison analyses showed that (a) students with disabilities who enrolled in 2-year colleges were substantially more likely to choose STEM majors compared to students without disabilities; (b) regardless of types of postsecondary institutions, both female students with and without disabilities were substantially underrepresented in STEM disciplines; and (c) in terms of racial/ethnicity backgrounds, African-American students with disabilities were less likely to choose STEM majors compared to their peers without disabilities.

To extend Lee’s study, this research extracted students with disabilities who chose STEM majors in postsecondary settings and explored predictors that contributed to STEM major choices by different types of postsecondary institutions. This study considered gender, race, household-income levels, and high school GPA in mathematics. The types of postsecondary institutions were categorized as 2-year or community colleges, 4-year colleges or universities, and vocational and technical schools.

Conceptual Framework

This study was conceptually framed by the Learning Theory of Career Counseling (LTCC; Krumboltz, 1996). The LTCC indicated that genetic endowments and special abilities, environmental conditions, learning experiences, and task approach skills were four major components that influence an individual’s career choice. Among the four major components, this study focused on genetic, environmental, and learning experience factors, which are assumed to be associated with career choices of students with disabilities. An individual’s career choice in LTCC mirrored a student’s college major choice in the current study, with the assumption that an individual’s college major choice lays the foundation for pursuing a specific career.

For the generic components of LTCC, this study considered the gender and racial/ethnicity background of students with disabilities. Given the underrepresentation of women and racial minority groups in STEM fields, the effects of gender and racial/ethnicity were included along with other environmental and learning experience predictors affecting STEM major choices of students with disabilities. As an environmental factor, household income level was a major focus, assuming that the household economic condition of a student with a disability will influence the selection of a college major. The literature suggests that students from lower-income or socio-economic status (SES) backgrounds are underrepresented in STEM fields; however, most of these studies sampled students without disabilities (Ascher, 1985; Huang et al, 2000; Porter, 1990; Rot-
berg, 1990; Trusty, 2002; Wilson, 1990). High school GPA in mathematics was selected to assess the learning experience component of LTCC. According to LTCC, an individual has a tendency to pursue a career requiring the skills and knowledge that the individual is proficient in. Math performance is a well-known learning predictor of STEM major choices among individuals without disabilities; however, little is known about the effects of math performance on STEM major choices among individuals with disabilities.

In summary, among individuals without disabilities, the influence of genetic, environmental, and learning experience factors, as indicated by the LTCC, has been well documented on the decision to enter STEM disciplines. However, it has not been well understood whether and to what extent these factors predict students with disabilities’ STEM major choices depending on types of postsecondary institutions.

Method

To analyze the proposed research questions, logistic regression was used because the study aimed to predict the dichotomous dependent variables (i.e., a student’s STEM major choice in 2-year, 4-year, and vocational technical postsecondary institutions) associated with the selected independent variables (i.e., gender, race, students’ income level, and high school math GPA). A national representative sample of youths with disabilities was extracted from the National Longitudinal Transition Study-2 (NLTS-2). The students in 2-year, 4-year, or vocational technical postsecondary institutions who were sampled in the study disclosed their college majors by 2005.

Data Source

The NLTS-2 was used to collect demographic characteristics, academic achievement, and college major choices from students with disabilities. The NLTS-2, sponsored by the Office of Special Education Program within the U.S. Department of Education, was designed to monitor longitudinally, from 2001 to 2009, academic progress and outcomes of students with disabilities attending secondary to postsecondary educations and/or working. The student participants in NLTS-2, who were 13 to 16 years of age as of December 1, 2000 and were in 7th grade or higher, were identified as people with disabilities within the federal 12 disability categories and received special education services. Note that the federal 12 disability categories are listed under disability types in Table 1. The NLTS-2 collected student information from multiple sources (i.e., interview and survey results from parents and students, direct assessment, and school data) over five waves extending from 2001 to 2009. This study used the wave 1, wave 3, and wave 5 data.

Based on the wave 1 dataset collected from 2001 to 2002, this study obtained student demographic characteristics information in terms of gender, race, and household income level. School staff gathered the information from the wave 1 data titled as “students’ school survey program.” Students’ high school grade point average (GPA) in math was obtained from the wave 5 transcript dataset. The wave 3 dataset collected in 2005 contained students’ major choices by types of postsecondary institutions. The wave 3 data titled as “wave 3 parents/youth survey” was collected based on the survey responses from youth and their parents. The selected variables are detailed in the next section.

Variables

Demographic characteristics and academic achievement in math were selected as the independent variables, which were assumed to predict the selection of STEM majors by students with disabilities. Regarding the demographic characteristics, this study accounted for gender, racial/ethnicity, and household income level. Considering student math achievement, the weighted average high school math GPA was used. The description of each variable follows.

Gender. The information about gender extracted from the wave 1 dataset was originally labeled as “w1_Gend2.” Gender variable was initially coded for a categorical variable (i.e., 1 = male and 2 = female), but was re-coded to create a dummy variable (i.e., 0 = male, 1 = female).

Racial/Ethnicity Backgrounds. Racial/ethnic backgrounds of students with disabilities were obtained from wave 1 dataset. This variable was originally labeled as “w1_Eth6.” Six racial/ethnicity categories were reported (i.e., 1 = White, 2 = African American/Black, 3 = Hispanic, 4 = Asian/Pacific Islander, 5 = American Indian/Alaska Native, and 6 = Multi/Other race). This variable was re-coded to create a dummy variable for racial majority group in STEM fields (i.e., 0 = racial minority group in STEM fields, 1 = racial majority group in STEM fields). The racial minority groups in STEM fields represented African-American/Black, Hispanic, American Indian/Alaska Native, and Multi/other races. White and Asian/Pacific Islander were characterized as the racial majority groups in STEM fields. The logistic regression indicated an effect of racial majority group in STEM fields. Note that the criteria of STEM racial minority and majority groups was determined according to the literature, which suggested that White and Asian-American students...
were overrepresented in STEM fields while African-American, Hispanic, and American-Indian students were traditionally underrepresented (National Science Board, 2010).

**Household Income Level.** The information on the household income level was collected from the wave 1 dataset. This variable, which was originally labeled as “w1_Incm3,” assessed three household income levels as follows: 1 = $25,000 and under; 2 = $25,001 to $50,000; and 3 = over $50,000. This variable was treated as a numerical variable in the logistic regression analysis.

**High School GPA in Math.** High school GPA in math represented students’ math achievement in this study and was obtained from the wave 5 transcript data. This variable, originally labeled as “ntgGPA_Alt-Math.” was defined as the weighted grade point average of the high school student participants in mathematics who attended either general or special education settings. The NLTS-2 described that the weighted grade point average was calculated as sum of weighted grade points ÷ sum of hours, noting that the weighted grade point = grade point*number of semester hours for math. The weighted grade point was scaled from 0 = low/F to 4 = high/A. This variable was treated as a numerical variable in the logistic regression analysis.

**STEM Major Choice.** A student’s STEM major choice by type of postsecondary institution was the dichotomous dependent variable in this study. This variable was developed based on the parents’ and youths’ survey responses to the following questions: (a) What is your (or your child’s) major or course of study at a 2-year/community college? (b) What is your (or your child’s) major or course of study at a 4-year college or university? and (c) What is your (or your child’s) course of study or training at a postsecondary vocational and technical school? In this study, the criteria for STEM majors were determined based on the STEM major categorization indicated in the Chen and Weko’s report (2009) from the U.S. Department of Education. The STEM majors specified by Chen and Weko include mathematics, agricultural and natural sciences, physical sciences, biological sciences, engineering and engineering technologies, and computer and information sciences. These were matched to the following STEM categories in the NLTS-2: (a) mathematics and statistics in the category of mathematics; (b) agriculture related, science, biology, earth sciences, geology, physics, chemistry, and environmental science in the categories of agricultural and natural sciences; (c) engineering, electrical, mechanical, and chemical types of majors in the category of engineering and engineering technology; and (d) computer science, programming, information technologies, computer support, and web page development in the category of computer and information sciences. Based on this STEM classification, this variable was created as a dummy variable by being re-coded as 1 = STEM majors and 0 = non-STEM major.

**Sample**

This study included students who enrolled in postsecondary institutions who disclosed their majors by 2005. In terms of the types of postsecondary institutions, this study considered 2-year or community colleges, 4-year colleges or universities, and postsecondary vocational and technical schools. Data from 224 students at the 2-year or community colleges were extracted. Of the 224 students, 95 (42.41%) students selected STEM majors while 129 (57.59%) students selected non-STEM majors. Furthermore, the study included data from 347 students in 4-year colleges or universities. Out of the 347 students, 90 (25.94%) declared STEM and 257 (74.06%) non-STEM majors. Additionally, 324 students were selected from postsecondary vocational and technical schools, representing 138 STEM (42.59%) and 186 non-STEM students (57.41%). Table 1 shows the descriptive statistics of the STEM and non-STEM major enrollment by gender, racial/ethnicity, household income levels, and disability types in each type of postsecondary institutions.

**Results**

Descriptive statistics of the selected independent variables by types of postsecondary institutions are presented first, followed by the logistic regression analyses. Table 2 shows the descriptive statistics of the selected variables by types of postsecondary institutions.

As shown in Table 2, at 2-year or community colleges, the mean of .08 for gender in STEM majors indicated that 8% of all STEM students were female students. Likewise, at 4-year colleges or universities, female students represented 17% of STEM students. At postsecondary vocational technical schools, female students comprised 12% of all STEM students. Regarding racial/ethnicity backgrounds, 81% of the STEM students at 2-year or community colleges were White and Asian-American. At 4-year colleges or universities, White and Asian-American students comprised 80% of all STEM students. At postsecondary vocational and technical schools, 71% of STEM students were White and Asian-American. Regarding the household income levels, the average income of STEM students at 2 year or community colleges was 2.26, which was slightly lower than 2.29 reported for non-STEM students. At
Table 1

Percentage of Students who Enrolled in STEM and Non-STEM Major by Student Demographic Characteristics

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Postsecondary Institution Types</th>
<th>2-year or Community Colleges</th>
<th>4-Year Colleges or Universities</th>
<th>Vocational and Technical Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STEM</td>
<td>non-STEM</td>
<td>STEM</td>
<td>non-STEM</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>91.58%</td>
<td>(87)</td>
<td>57.36%</td>
<td>(74)</td>
</tr>
<tr>
<td>Female</td>
<td>8.42%</td>
<td>(8)</td>
<td>42.64%</td>
<td>(55)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>(95)</td>
<td>100%</td>
<td>(129)</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>78.95%</td>
<td>(75)</td>
<td>67.44%</td>
<td>(87)</td>
</tr>
<tr>
<td>African-American</td>
<td>7.37%</td>
<td>(7)</td>
<td>16.28%</td>
<td>(21)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10.53%</td>
<td>(10)</td>
<td>13.18%</td>
<td>(17)</td>
</tr>
<tr>
<td>Asian-American</td>
<td>2.11%</td>
<td>(2)</td>
<td>2.33%</td>
<td>(3)</td>
</tr>
<tr>
<td>American-Indian</td>
<td>1.05%</td>
<td>(1)</td>
<td>0.00%</td>
<td>(0)</td>
</tr>
<tr>
<td>Other/Multi races</td>
<td>0.00%</td>
<td>(0)</td>
<td>0.78%</td>
<td>(1)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>(95)</td>
<td>100%</td>
<td>(129)</td>
</tr>
<tr>
<td>Income Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25,000 and Under</td>
<td>18.95%</td>
<td>(18)</td>
<td>17.83%</td>
<td>(23)</td>
</tr>
<tr>
<td>$25,001 to $50,000</td>
<td>35.79%</td>
<td>(34)</td>
<td>34.88%</td>
<td>(45)</td>
</tr>
<tr>
<td>Over $50,000</td>
<td>45.26%</td>
<td>(43)</td>
<td>47.29%</td>
<td>(61)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>(95)</td>
<td>100%</td>
<td>(129)</td>
</tr>
<tr>
<td>Disability Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Disability</td>
<td>11.58%</td>
<td>(11)</td>
<td>13.95%</td>
<td>(18)</td>
</tr>
<tr>
<td>Speech Impairment</td>
<td>6.3%</td>
<td>(6)</td>
<td>9.30%</td>
<td>(12)</td>
</tr>
<tr>
<td>Mental Retardation</td>
<td>1.05%</td>
<td>(1)</td>
<td>3.88%</td>
<td>(5)</td>
</tr>
<tr>
<td>Emotional Disturbance</td>
<td>7.37%</td>
<td>(7)</td>
<td>7.75%</td>
<td>(10)</td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>10.53%</td>
<td>(10)</td>
<td>10.08%</td>
<td>(13)</td>
</tr>
<tr>
<td>Visual Impairment</td>
<td>7.37%</td>
<td>(7)</td>
<td>10.85%</td>
<td>(14)</td>
</tr>
<tr>
<td>Orthopedic Impairment</td>
<td>8.42%</td>
<td>(8)</td>
<td>12.40%</td>
<td>(16)</td>
</tr>
<tr>
<td>Health Impairment</td>
<td>23.16%</td>
<td>(22)</td>
<td>17.05%</td>
<td>(22)</td>
</tr>
<tr>
<td>Autism</td>
<td>6.32%</td>
<td>(6)</td>
<td>6.98%</td>
<td>(9)</td>
</tr>
<tr>
<td>Traumatic Brain Injury</td>
<td>10.53%</td>
<td>(10)</td>
<td>1.55%</td>
<td>(2)</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>6.32%</td>
<td>(6)</td>
<td>4.65%</td>
<td>(6)</td>
</tr>
<tr>
<td>Deaf/Blindness</td>
<td>1.05%</td>
<td>(1)</td>
<td>1.55%</td>
<td>(2)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>(95)</td>
<td>100%</td>
<td>(129)</td>
</tr>
</tbody>
</table>

Note. Number of students in parentheses.
the 4-year colleges or universities, STEM students’ average household income was 2.34, which was lower than 2.48 reported for non-STEM students’ average household income. At the postsecondary vocational and technical schools, the average household income for STEM students was 2.09, which was lower than 2.23 reported for non-STEM students. In terms of math GPA at the high school level, at 2-year or community colleges, STEM students had the average math GPA of 2.33, which was lower than 2.43 reported for non-STEM students. At 4-year colleges or universities, the average math GPA of STEM students was 2.78, which was higher than 2.63 reported for non-STEM students. At the vocational and technical schools, STEM students’ average math GPA was 2.26, which was lower than 2.35 reported for non-STEM students’ average math GPA.

In summary, female students with disabilities were substantially less likely than their male counterparts to enroll in STEM majors, regardless of the types of postsecondary institutions, similar to female students without disabilities’ underrepresentation in STEM fields. Unsurprisingly, White and Asian-American students with disabilities dominated STEM fields, regardless of the types of postsecondary institutions. This pattern was also similar to that of students without disabilities. However, interestingly, among students with disabilities, students from lower-income backgrounds seemed to choose STEM majors more than did their peers from higher-income backgrounds. Moreover, in terms of math GPA, STEM students enrolled in 4-year postsecondary institutions achieved a higher math GPA on average compared to non-STEM students while the average math GPAs at the other postsecondary institutions were lower for STEM students compared to non-STEM students. In the next step, employing logistic regression analyses, this study investigated whether and to what extent the selected independent variables predicted significantly STEM major choices.

**Research Question 1.** To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in 2-year or community colleges?

As shown in Table 3, female students with disabilities at 2-year or community colleges were significantly less likely to choose STEM majors compared to male students with disabilities ($p < .01$). The odds ratio of .11 suggested that female students with disabilities were 89% [100 x (odds ratio -1) = -89] less likely to choose STEM majors compared to male students with disabilities. Regarding racial/ethnicity backgrounds, White and Asian-American students with disabilities were more likely to choose STEM majors compared to male students with disabilities ($p < .05$). The odds ratio of 2.41 for race suggests that White and Asian-American students with disabilities were 2.41 times more likely to choose STEM majors compared to other racial minority peers. These results were consistent with results from several previous studies conducted with students without disabilities. However,
household income level and high school math GPA did not significantly impact the likelihood of choosing a STEM major. In terms of logistic regression, the Hosmer-Lemeshow (H-L) goodness-of-fit test yielded an $\chi^2(8)$ of 11.08 with an insignificant p-value ($p > .05$), suggesting that observed and expected values were not significantly different; thus, the model fit the data well.

**Research Question 2.** To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in 4-year colleges and universities?

At 4-year colleges or universities, female students with disabilities were significantly underrepresented in STEM disciplines compared to male students with disabilities ($p < .01$) (see Table 3). The odds ratio of .21 for gender indicated that the likelihood of female students with disabilities choosing STEM majors was 79% lower compared to their male counterparts [100 x (odds ratio -1) = -79%]. Regarding the household income levels, students with disabilities from lower-income backgrounds were significantly more likely to choose STEM majors compared to students with disabilities from higher-income backgrounds ($p < .05$). Explicitly, the odds ratio of .64 suggested that for every one-unit decrease in income level, students with disabilities who came from lower-income backgrounds ($25,000 and under) were 1/0.64 = 1.56 times more likely to select STEM majors compared to students with disabilities who came from higher-income backgrounds (between $25,001 and $50,000).

Regarding math GPA, students with disabilities who received higher math GPA were significantly more likely to enroll in STEM majors compared to their counterparts, although the significant level was marginal ($p < .10$). The odds ratio of 1.31 for math GPA suggested that students with disabilities were 1.31 times more likely to select STEM majors for every one-grade increase in math GPA. For example, those who gained the grade level of 4 in math GPA were 1.31 times more likely to enroll in STEM majors compared to those who earned the grade level of 3 in math GPA.

The effects of both gender and math GPA on STEM major choices did not differ for students without disabilities. However, an interesting finding was that lower household income levels were associated with higher likelihood of selecting STEM majors among students with disabilities at 4-year colleges or universities. This result is not consistent with previous findings on STEM students without disabilities. As noted earlier, among students without disabilities, students from lower-income or SES background were less likely to pursue STEM majors in college. Unlike the case of 2-year or community college, race was not a critical predictor of a student’s STEM major selection. Note that the H-L test showed the model fit the data well, producing $\chi^2(8)$ of 5.22 with an insignificant p-value ($p > .05$).

**Research Question 3.** To what extent do the selected student demographic characteristics and high school math GPA predict STEM major enrollment in vocational and technical postsecondary schools?

At the postsecondary vocational and technical schools, similar to the 2-year and 4-year postsecondary institutions, female students with disabilities were substantially less likely to enroll in STEM majors compared to their male counterparts ($p < .01$). The odds ratio of .14 for gender explained that the likelihood of majoring STEM disciplines was 86% lower for female students with disabilities compared to male students with disabilities [100 x (odds ratio -1) = -86%]. The relationship between household income levels and STEM major choices was similar for 4-year colleges and universities. Students with disabilities from lower-income backgrounds were significantly more likely to enroll in STEM majors compared to those who came from higher-income backgrounds ($p < .05$). Regarding the odds ratio of .70, for every one-unit decrease in income level, students with disabilities from lower-income backgrounds ($25,000 and under) were 1/0.70 = 1.43 times more likely to select STEM majors compared to students with disabilities who came from higher-income backgrounds (between $25,001 and $50,000). Namely, students with disabilities from lower-income backgrounds had a higher tendency to choose STEM majors. However, in vocational and technical postsecondary schools, race and high school math GPA were not significantly associated with the likelihood of choosing a STEM major. Note that the H-L test indicated that the logistic model fit the data well, $\chi^2(8)$ of 8.92, $p > .05$.

**Discussion**

Targeting students with disabilities, this study articulated the extent to which selected demographic and academic factors predict STEM major choices by types of postsecondary institutions. Based on the literature about the characteristics of STEM students without disabilities, some of the results were not surprising. Other results showed different patterns compared to those reported in previous findings. Female students’ underrepresentation in STEM majors and overrepresentation of White and Asian students were the common phenomenon, regardless of disability status. For students with disabilities, math performance was a
marginally significant predictor of the enrollment in STEM majors in 4-year colleges or universities ($p < .10$). This finding is similar to the one found for the students without disabilities in STEM fields. However, the significant role of math performance did not emerge in 2-year and vocational technical postsecondary institutions. Interestingly, the household income level rather than math performance appeared to play a more critical role in students with disabilities’ decision to prepare for STEM careers in 4-year colleges or universities and vocational technical postsecondary institutions. Unlike the students without disabilities, students with disabilities from the lower household income were more likely to select STEM majors. This result can have several interpretations.

It is much more challenging for people with disabilities to obtain employment compared to people without disabilities. The U.S. Bureau of Labor Statistics (2013) indicated that, between 2008 and 2013, the average employment rate of people with disabilities over the age of 16 is 18.28%, while that of people without disabilities is 63.82%. Such a substantial gap in the employment rates between people with and without disabilities seems to increase the awareness of people with disabilities about the realities of being hired. Thus, it might be reasonable to expect that with the much tougher job market for people with disabilities compared to people without disabilities, those from lower-income household backgrounds would be more motivated to find ways that would allow them to gain access to more job opportunities compared to their peers from higher-income households. People with disabilities who tend to struggle with household economic conditions seem to be more interested in STEM fields, which provide many secure and high-paying jobs. By gaining STEM skills and knowledge in postsecondary institutions, people with disabilities from lower-income backgrounds seemed to make greater efforts on increasing employment opportunities compared to their peers from higher-income backgrounds.

Along with the promising results from the previous study (Lee, 2011), the finding that low-income students with disabilities are more likely to select STEM majors suggests that many people with disabilities, particularly those who are economically disadvantaged, attempt to participate in STEM workforce occupations in spite of the challenges often faced in their learning process. While dismissing the belief or bias that people with disabilities could not be successful in STEM fields, diverse stakeholders, including educators and policy makers, should make concerted efforts to improve the learning environments tied to the needs of students with disabilities at both K-12 and higher education levels. As previously addressed, at the K-12 level, students with disabilities often face obstacles to participating fully in STEM-related classes primarily due to inappropriate or insufficient academic accommodation. Without a doubt, students in under-resourced and low-income communities face greater challenges associated with the engagement in STEM-related classes compared to their peers living in higher-income communities. Regarding this critical issue, professional development for STEM teachers should be promoted to help students with disabilities explore their potential and interest in STEM fields and provide them with equal educational opportunities to learn STEM regardless of disability status and household income levels.

At the higher education level, greater attention, beyond STEM enrollment, should be paid to providing support to college students with disabilities, increasing their chances to successfully graduate with STEM degrees and participate in the STEM workforce. Lee’s study (2011) showed that STEM students with disabilities were significantly less likely to receive academic accommodation compared to non-STEM students with disabilities. The rationale supporting this finding remains unknown, but STEM students with disabilities seem to be in a more challenging educational environment, particularly in terms of obtaining academic accommodations, compared to their counterparts. In fact, based on the survey responses of 245 faculty members at a south central land grant university, a study showed that STEM faculty members were less willing to provide academic accommodations to students with disabilities compared to non-STEM faculty members (Rao & Gartin, 2003).

Regarding the lower frequency in STEM students with disabilities receiving academic accommodations compared to non-STEM students with disabilities, future studies need to investigate practical concerns relevant to learning environments of STEM college students with disabilities, with particular focus on the availability of academic accommodations. The studies should identify appropriate academic accommodation that would enhance students’ learning outcomes, including retention and graduation in postsecondary institutions. It has often been reported that many students with disabilities who enroll in STEM courses face barriers to full participation in rigorous hands-on learning activities such as labs, and such barriers provide fewer opportunities to explore their career potential and interest in STEM disciplines compared to their counterparts (Moon, Todds, Morton, & Ivey, 2012). At the same time, students with disabilities are generally discouraged to pursue STEM degrees in postsecondary institutions (Moon et al., 2012).
### Table 3

**Logistic Regression Analyses Results by Type of Postsecondary Institutions**

<table>
<thead>
<tr>
<th>Variable</th>
<th>2-Year or Community Colleges</th>
<th>4-Year Colleges or Universities</th>
<th>Vocational &amp; Technical Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
<td>Wald</td>
</tr>
<tr>
<td>Gender¹</td>
<td>-2.19***</td>
<td>.42</td>
<td>27.45</td>
</tr>
<tr>
<td>Race²</td>
<td>.88**</td>
<td>.36</td>
<td>5.83</td>
</tr>
<tr>
<td>Income Level</td>
<td>-.26</td>
<td>.21</td>
<td>1.50</td>
</tr>
<tr>
<td>Math GPA</td>
<td>-.12</td>
<td>.15</td>
<td>.65</td>
</tr>
<tr>
<td>Model Fit H-L Test³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chi-</td>
<td>df</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td>Square</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.08</td>
<td>8</td>
<td>.197</td>
</tr>
</tbody>
</table>

**Note.** ***p <.01; **p <.05; *p <.10

1. Recall that Gender was coded as female =1 and male = 0. Thus, the coefficient B of this variable indicates the female effect in the logistic regression model.

2. As indicated in the method section, Race was coded as racial majority groups in STEM fields = 1 and racial minority groups in STEM fields =0, noting that racial majority groups in STEM fields are White and Asian-American and racial minority groups in STEM fields are African-American, Hispanic, American-Indian, and Multi/other races. The coefficient B of this variable shows the effect of racial majority groups in STEM fields.

3. Hosmer - Lemeshow Test
Concerning the challenges of students with disabilities in pursuing STEM degrees, a recent study explored effective accommodations for improving STEM learning outcomes provided by eight STEM faculty participants who worked with students with disabilities (Moon, Utschig, Tood, & Bozzorg, 2011). The eight STEM faculty participants reported that most of their students provided positive feedback on group-based learning, which can help them learn how to collaborate with their classmates as well as understand the class materials effectively. Other academic accommodations included online-based learning materials (e.g., animations, interactive tutorials, and video clips), open-book, and pre-lecture quizzes. However, such preliminary findings with only eight faculty participants suggest the need to conduct more research on the accommodation for STEM students with disabilities with the consideration of multiple variables, including types of disability and courses.

Regardless of academic disciplines, faculty members at the postsecondary level often lack knowledge and experience to accommodate students with disabilities through instructional choices that can be framed by the principle of universal design of learning (UDL), which places an emphasis on inclusive teaching (Moon et al., 2012). Of note, Moon and colleagues added that UDL concepts are less likely to be applied to pedagogies for students with disabilities at the postsecondary level than at the K-12 level. Concerning the lack of awareness and implementation of UDL concepts in postsecondary institutions, additional research needs to identify the needs of students with disabilities that are required for successful graduation and workforce participation in all academic fields, including STEM disciplines. Such research based on postsecondary and career pathways of students with disabilities into either STEM or non-STEM will provide the guidelines for the effective career development aligned with individual differences.

Consistent with individual differences among students with disabilities, a future study should also analyze whether different effects of selected factors on STEM major choices exist by demographic characteristics, such as race/ethnicity backgrounds. This study did not elaborate on the effects of the selected variables on STEM major choices by different demographic characteristics due to insufficient data on specific demographic characteristics. However, it would be informative to study whether there are differences in the effects of selected variables on STEM major choices depending on student demographic characteristics.

In conclusion, the results imply that designing pedagogies and providing career advice tailored to individual differences would play a critical role in helping students with disabilities identify their potential in STEM fields and take STEM career pathway. Diverse stakeholders, including faculty members, should make every effort to provide academic resources that meet the interests and needs of students with disabilities, considering a wide range of individual differences, including types of disability, income level, and gender. Teaching and career advice that would consider individual differences would be a key to successful graduation and participation of individuals with disabilities in STEM disciplines.

References


About the Author

Ahlam Lee received her Ph.D. in Educational Leadership and Policy Analysis from the University of Wisconsin - Madison. She earned her Master degree in Rehabilitation Psychology at the University of Wisconsin - Madison, Master degree in Public Finance and Budgeting at the Columbia University, and Bachelor degree in Business Economics and Public Policy at the Indiana University Bloomington. Her professional experience includes working as a post-doc researcher for the Graduate School of Education at the University of Pennsylvania. She is currently an assistant professor in the Center for Excellence in Education at the Arkansas State University. Her research interests include postsecondary education and career development for students with disabilities. She can be reached by email at: alee@astate.edu
Abstract

We examined aspects of the experiences of postsecondary students with various disabilities that facilitate higher grades and stronger intention to graduate. Specifically, we focused on experiences that could be modified by the student, the community, or the school. Self-reports of 611 junior/community college and university students with various disabilities show that the best predictors of intention to graduate were the absence of social alienation on campus, strong course self-efficacy, and school environment related facilitators (e.g., good schedule, positive attitudes of professors) as well as personal situation facilitators, such as having friends and high levels of personal motivation. In addition, students registered for campus disability-related services were more likely to intend to graduate as were full-time students. Intention to graduate and grades were only weakly related. Grades were best predicted by course self-efficacy. Stronger social self-efficacy and more personal situation and school environment-related facilitators were also related to better grades. Results also show that junior/community colleges are more “friendly” to students with disabilities than are universities (i.e., students feel less alienated and experience more school environment related facilitators). Recommendations are made based on the findings on aspects that can be modified to facilitate academic success.

Keywords: Students with disabilities, college, university, academic persistence, graduation, grades, academic performance
Most studies of academic success have excluded students with disabilities. This is important, since recent large-scale North American studies found that as many as 14% of junior/community college students (Ministry of Training, Colleges & Universities, 2012), 11% of undergraduates, and 8% of graduate students have a disability (Schiro-Geist, & Kundu, 2009). These students must cope not only with the usual challenges but also with personal and school aspects related to their disabilities in order to succeed (Adams & Proctor, 2010).

In addition, while many studies of academic success examined demographic and pre-entry characteristics such as age and high school grades – aspects that cannot be changed - few have looked at aspects that can be altered by the school or by the students, their families or communities. Our goal here is to assess “modifiable” aspects that facilitate graduation and academic performance. Our definition of modifiable follows Dutta, Schiro-Geist, and Kundu, (2009), and includes aspects such as accessibility, paid employment, level of motivation, study habits, course load, attitudes of professors and students, opportunity to participate in school extracurricular activities, financial situation, making friends at college, and managing time effectively.

Graduation
Few studies have investigated graduation among students with disabilities. The literature shows that high school grades and college grade point average (GPA) (Jorgensen, Fichten, & Havel, 2009; Mamiseishvili & Koch, 2011), family income, and time spent studying are related to persistence in a sample of students with various disabilities, along with facilitating personal conditions (e.g., good health, financial situation, family support) (Jorgensen, Fichten, & Havel, 2011). DaDeppo (2009) used the 18-item Academic and Social Integration Scales of Mileen and Berger’s (1997) Freshman Year Survey. She found that social inclusion (e.g., Since coming to the university I have developed a close, personal relationship with at least one faculty member) and, to a lesser extent, academic inclusion (e.g., My academic experience at this university has had a strong positive influence on my intellectual growth and interest in ideas) were associated with intention to persist among students with learning disabilities (LD). Similarly, Mamiseishvili and Koch (2011), using different measures, also reported that academic and social inclusion were related to persistence. When examining postsecondary students with LD who had graduated, Vogel, Hruby, and Adelman (1993) found that these students were significantly older and had received tutoring during their schooling. Consistent with these findings, Troiano, Liefeld, and Trachtenberg (2010) found that use of LD related supports was linked to the likelihood of graduation; similarly Mamiseishvili and Koch (2011) reported that receiving accommodations was related to persistence in a sample of students with diverse disabilities. Troiano et al. (2010) also found that full-time students who lived on campus were more likely to persist, and in contradiction to Vogel et al. (1993), that it was younger rather than older students with diverse disabilities who were more likely to graduate. Several studies found that the attrition rate of males was higher than that of females (Jorgensen, Fichten, & Havel, 2009; Mamiseishvili, & Koch, 2011; National Center for Education Statistics, 2010; O’Neil, Markward, & French, 2012; Troiano et al., 2010; Wessel, Jones, Markle, & Westfall, 2009).

It should be noted that these studies used different methods (e.g., concepts studied, school records, self-report); diverse means of recruiting participants (e.g., freshman survey, office for students with disabilities, convenience sample); and various ways of defining disability (self-report, documentation) and outcome (e.g., persistence from one semester to the next, intention to graduate, graduation). In addition, some studies focused exclusively on students with a certain type of disability while others included all students with disabilities. The differences in approach and design used by different researchers makes drawing conclusions difficult.

Grades
In the nondisabled literature, self-efficacy beliefs seem especially important predictors of GPA (Chemers, Hu, & Garcia, 2001). Self-efficacy expectations (i.e., confidence that one can successfully execute a task or a behavior necessary to reach a desired result) (Bandura, 1977) can influence whether or not one engages in a task. In the literature on self-efficacy related to diverse aspects of academic performance, a variety of measures have been used. These evaluate, for example, confidence in being able to write papers, submit assignments on time, participate in class discussions, and study effectively for exams. Not only have successful behavioral outcomes been shown to increase self-efficacy expectations, but strong self-efficacy beliefs have been shown to precede and to predict successful behavior in various areas (Libman et al., 1985; Zajacova, Lynch, & Espenshade, 2005).

In the disability and GPA literature a variety of measures have been used. For example, Butler (2012) used Owen and Froman’s (1988) College Academic Self-Efficacy Scale (included in Butler, 2012: e.g., confidence in taking well-organized notes during a lecture). Lombardi, Murray, and Gerdes (2012) used Solberg et al.’s 1998 Course Self-Efficacy measure
As in the case of graduation, in the disability-related literature on academic performance, too, factors associated with grades have shown widely discrepant results. For example, DaDeppo (2009) found that for university students with LD, background characteristics were minimally related to GPA and that academic and social inclusion were unrelated to GPA. Butler (2012) found that for students with LD, self-reported GPA was related to being older and to being enrolled in a 4-year university rather than a 2-year junior/community college. She also found that GPA was related to academic self-efficacy, as did Lombardi et al. (2012). However, Exner (2010) failed to find any relationship between GPA and academic self-efficacy among students with LD. Exner also failed to find significant links between GPA and effort or self-awareness among students with LD. While Troiano et al. (2010) found that the use of LD-related supports was related to GPA, Lombardi et al. (2012) reported that GPA was unrelated to using accommodations. Lombardi et al. (2012) also failed to find any links between grades and financial stress or peer or family support. A study by Murray and Wren (2003) on university students with LD showed that full scale IQ and some subscales of the Study Habits and Attitudes Measure were related to GPA. In terms of gender difference in academic performance, DaDeppo (2009) found that among university students with LD, being female was related to higher GPA. However, Lombardi et al. (2012) showed, in a university sample of students with a variety of disabilities, that GPA was unrelated to gender.

The inconsistent results may be due to the methodological issues noted for studies of graduation. In addition, grades are measured in diverse ways in various studies, although letter grades and some form of standardized score, such as a GPA, are most commonly reported. Nevertheless, some schools do not use GPAs and grading systems are not equivalent. To overcome such difficulties, self-reports of academic performance have been used. For example, Statistics Canada (2008), which administers the Canadian Census, used a question asking respondents to rank themselves against the rest of their graduating class in their field of study in their Graduates Survey.

The Present Study

The goal of this investigation was to explore “modifiable” aspects that characterize successful students with disabilities. “Modifiable” variables (e.g., college services, services for students with disabilities, school social climate, self-efficacy) are those that may be altered by the school, by parents, professors, community members, or the students themselves (Dutta et al., 2009). We examined two aspects of success in a sample of junior/community college and university students: intention to graduate (measured by a questionnaire) and grades (self-reports). Demographic and status variables (e.g., age, disability, gender) are included but are used mainly to describe the sample.

Hypotheses

We predicted the following modifiable aspects would be related to stronger intention to graduate:

- higher grade,
- strong personal and academic facilitators,
- good academic and social inclusion at school (i.e., high course and social self-efficacy, low campus alienation),
- fewer hours worked during the academic year (based on findings on nondisabled students; see Metcalf, 2003),
- registration for campus disability related services, and
- being enrolled full-time.

Among “non-modifiable” aspects we predicted:

- Being female would be associated with intention to graduate.
- Consistent with findings on nondisabled students (ACT, 2006), we predicted that students who were more advanced in their program of study would be more likely to intend to graduate than those just beginning (greater effort already invested).

As for grades, we predicted that among modifiable variables the following would be related to better academic performance:

- stronger intention to graduate,
- greater course and social self-efficacy,
- more facilitating personal and school related conditions,
- being enrolled in one’s first choice program, and
- working fewer hours during the academic term.
Among non-modifiable variables, we expected:

- being female, and
- being older to be related to better performance.

Method

Participants

A convenience sample of 611 postsecondary students with various disabilities who were enrolled in a certificate, diploma, or degree program in Canada participated. There were 415 females and 194 males (two did not indicate); this gender imbalance is consistent with others’ studies (e.g., Adams & Proctor, 2010, Snyder & Dillow, 2012). Of these, 213 attended a junior/community college and 391 attended a university (five did not indicate). Participants were enrolled in 98 different Canadian universities and junior/community colleges in nine of Canada’s 10 provinces. Eighty-seven percent were registered with their school for disability related services and 84% were enrolled in their first choice program. Consistent with others’ reports (Newman, Wagner, Cameto, & Knokey, 2009), most participants (83%) were full-time students. Approximately half \( n = 309 \) of the sample did not work during the school year. Among university students, 286 were pursuing a bachelor’s degree and 81 were pursuing a graduate degree; the rest were pursuing other credentials (e.g., certificate). Mean age of participants was 29 \( (SD = 9, Mdn = 25, mode = 22, range = 19 \) to 66). University students \( (M = 31, SD = 10) \) were significantly older than junior/community college students \( (M = 25, SD = 8), t(603) = 7.53, p < .001 \).

Table 1 shows that the most common disability/impairment of students was a psychological/psychiatric disability, followed by a learning disability (LD), attention deficit hyperactivity disorder (ADHD), and a chronic medical/health problem. Two-hundred and seventy-one students reported more than one disability/impairment, with LD plus ADHD being most common, followed by ADHD plus psychological disability, chronic health problems plus psychological disability, and mobility impairment plus limitation in the use of hands/arms.

Measures

To evaluate test-retest reliability, all measures were administered twice, with a five-week interval (range 3-16 weeks, \( M = 5, Mdn = 5 \)). Results for all measures show very high test-retest correlations, with most \( r \) scores for all samples at .80 or above.

Demographic questions. These include questions related to gender, age, and parental education. We also provided a list of 14 disabilities/impairments (see Table 1) and asked participants to self-identify as many as applied. We separated psychological/psychiatric disability from LD and from ADHD because these latter two are typically treated as separate entities in the literature due to their impact on academic work.

School related questions. Closed-ended questions asked about full- or part-time status, registration for campus disability-related services, qualifications/credentials pursued or abandoned (e.g., bachelor’s degree, college diploma), type of school (college or university), whether the participant was/had been enrolled in their first choice program, the number of hours employed during the academic year while studying, whether they had taken a leave of absence, and the percentage of their program that they had completed. These questions have been used in previous studies (Fichten, Asuncion, Nguyen, Budd, & Amsel, 2010).

Grades. As in other investigations, we used self-reported grades rather than GPAs from school records (e.g., Butler, 2012; Sachs & Schreuer, 2011; Statistics Canada, 2008); this permits research to be carried out across different schools and locations. We asked participants to describe themselves as an A, B, C, or a D or less student (participants could answer, “I don’t know”). This correlated highly, \( r(496) = .73, p < .001 \), with scores asking participants to rank themselves against the rest of the students in their program of study: in the top, middle, or bottom third. Because more participants answered, “I don’t know” to the ranking question, we used the A, B, C, or D question in data analyses.

College Experience Questionnaire (CEQ). This measure inquires about aspects that facilitate or act as barriers to academic success (1 = much harder to 6 = much easier). Two subscales inquire about the participant’s Personal Situation (financial situation, having a paid employment, family situation, having friends, level of personal motivation, study habits, previous education experiences, health, impact of their disability) and School Environment (level of difficulty of courses, course load, course schedule, attitudes of professors, attitudes of non-teaching staff, attitudes of students, availability of computers on campus, training on computer technologies on campus, availability of course materials, opportunity to participate in school extracurricular activities, willingness of professors to adapt courses to my needs, accessibility of building facilities, accessibility of school physical education courses, availability of disability related services at the school). Higher scores indicate more facilitating conditions. Good psychometric properties were reported by the CEQ’s authors (Fichten, Jorgensen, Havel, & Barile, 2006, 2010). Scores have also been shown to be related to the quality of academic supports that students
with learning disabilities and ADHD report receiving (Wolforth & Roberts, 2009). In addition, scores on both subscales were related to academic satisfaction of students both with and without disabilities and the CEQ Personal subscale was related to academic retention of junior/community students with disabilities (Jorgensen et al., 2011). Higher scores indicate facilitating conditions (i.e., made academic life easier) and lower scores indicate barriers (i.e., made academic life harder).

**Self-Efficacy Questionnaire.** This widely-used measure by Solberg, et al. (1998) evaluates, on a 10-point scale (0 to 9), how confident respondents are that they could successfully enact various school related behaviors. We used two subscales: Course Self-Efficacy (7 items – take good class notes, research a term paper, write a course paper, do well on your exams, manage your time effectively, keep up to date with your school work, understand your textbooks) and Social Self-Efficacy (6 items – participate in class discussions, ask a question in class, talk to your professors/instructors, ask a professor/instructor a question outside of class, talk with academic and support (e.g., advising) staff, make new friends at college). Higher scores indicate greater self-efficacy. The measure has good psychometric properties (Barry & Finney, 2009).

**Campus Climate Social Alienation.** We used only the 4-item Social Alienation subscale of this 6-point Likert scaled measure (Strongly Disagree – Strongly Agree) (I find myself lonely and lost on this campus, my disability prevents me from having more contact with my professors, I do not have much communication with nondisabled students, I communicate well with nondisabled students and faculty (reverse scored)). Higher scores indicate greater alienation. The measure’s authors report good psychometric properties (Wiseman, Emry, & Morgan, 1988).

**Intention to Graduate.** We adapted the 5-item scale from Davis, Ajzen, Saunders, and Williams (2002) to postsecondary education. It uses 6-point Likert scale ratings (strongly disagree to strongly agree). Items are as follows: I intend to complete my program of studies; I will try to complete my program of studies; I expect to complete my program of studies; I am determined to complete my program of studies; All things considered, it is possible that I might not complete my program of study (reverse scored). The mean is calculated, with higher scores indicating greater likelihood of graduation. Our findings indicate good reliability and validity for the measure (Fichten et al., 2014) and a mean score on Intention to Graduate of 5.50, with a
median of 5.80. Given graduation rates and the lack of normality in the distribution, the median is the most appropriate score to divide participants into those who Intend to Graduate and those who do not. Therefore, Intention to Graduate was defined by a score ≥ 5.80 and not intending to graduate as a score < 5.80.

Procedure

In the spring 2010 semester we sent invitations to all current and former postsecondary students with disabilities who had participated in our previous research and who indicated that we may contact them for future studies. We also emailed announcements to discussion lists focusing on Canadian postsecondary education and to project partners (mainly student and campus disability service provider groups). Current postsecondary students with all types of disabilities who were enrolled in a diploma or degree program and were aged 18 or over were sought to help identify environmental, financial, personal, and other factors that facilitate or pose barriers to students with disabilities pursuing a junior/community college or university education in Canada. Based on pre-testing we indicated that it would take approximately 20 minutes to complete the online questionnaire and that we were offering a $20 honorarium.

Individuals who indicated their interest were directed to a website where they read the information and consent form approved by Dawson College’s Human Research Ethics Committee. Participants clicked on the “continue” button to signal their agreement. This brought them to the online questionnaire. The final screen requested permission to contact the individual for future studies and invited participants to provide contact information for the honorarium. Virtually all participants completed this information.

Four weeks later, those who indicated that we may contact them for future studies were emailed and asked to complete the same questionnaire again (to allow calculation of test-retest reliability). They were informed that doing so would qualify them for an additional $20 honorarium. Prior to data analysis, the data set was thoroughly scrutinized to ensure the integrity of responses.

Results

Sample Characteristics

Table 1 presents information for each disability group on age, grade, and Intention to Graduate. The most common disabilities/impairments reported were psychological/psychiatric disability, LD, ADHD, chronic medical/health problem, and limitation in the use of hands/arms. It is important to note that almost half of the sample (n = 271) reported more than one disability/impairment. Table 1 shows that students who were totally blind and those who were Deaf had the best scores on all three variables. When Intention to Graduate was evaluated, several groups scored above the mean, suggesting stronger intention to graduate. In rank order these are: students with low vision, who used a wheelchair or a scooter, had a hearing impairment/were hard of hearing, had a neurological impairment and an LD. As for better grades, the rank order is: chronic medical/health problem, limitation in the use of hands or arms, low vision, mobility impairment (crutch, cane), neurological, and hearing impairment. Students with psychological/psychiatric impairments, ADHD, pervasive developmental disorders such as Asperger’s, and speech/communication disorder scored in the bottom half of grades.

Intention to Graduate

To evaluate the relationship of gender, school type, and Intention to Graduate on modifiable variables we first performed a 3-way multivariate analysis of variance (MANOVA) on the variables of interest. All three main effects were significant, Intention to Graduate $F(13, 469) = 4.64$, $p < .001$, school type (college vs. university), $F(13, 469) = 6.84$, $p < .001$, and gender, $F(13, 469) = 3.51$, $p < .001$, although none of the interactions were significant. A series of analysis of variance comparisons (ANOVAs) followed; results, means and standard deviations are available in Table 2 for only those variables where at least one main effect was significant.

Demographics. ANOVA results for demographic variables, presented in Table 2, show only that university students are older than college students and that students who intend to graduate have fewer disabilities than those who do not. The comparisons on mother’s $(M = 13.46$ years, $SD = 3.63$) and on father’s education $(M = 13.15$, $SD = 3.84$) were not significant.

Grades. Table 2 shows that those who intend to graduate had higher grades than those who do not. University students reported higher grades than college students. Males and females did not differ.

College Experience Questionnaire (CEQ). ANOVA results and means in Table 2 show that those who intend to graduate experienced more facilitating conditions, both on their personal situation as well as on their school environment. In addition, the circumstances of males were more facilitating than those of females on both measures. Colleges were seen as being more facilitating than universities on School Environment.
**Self-Efficacy Questionnaire (SEQ).** Table 2 shows that those who intend to graduate had stronger academic and social self-efficacy beliefs than those who do not and that females had greater self-efficacy than males.

**School-related aspects.** Table 2 shows that students who intend to graduate feel less alienated on the Campus Climate Social Alienation scale than those who do not and that college students feel less alienated than university students. Students in universities report working more hours per week than college students. Percent of program completed by students who intended and those who did not intend to graduate did not differ significantly.

**Other variables.** Students who had registered for disability-related services were more likely to indicate that they would graduate than those who had not registered, X²(1, 606) = 4.71, p < .05, and full-time students were more likely to intend to graduate than part-time students X²(1, 596) = 5.43, p < .05. The same is true for students who had not been on a leave of absence, X²(1, 603) = 8.31, p < .05, as well as for those who were enrolled in their first choice program compared to those who were not, X²(1, 607) = 8.60, p < .001. There was no significant difference between males and females, college and university students, or university students pursuing a bachelor’s degree and those pursuing a graduate degree.

**Predicting Intention to Graduate.** To examine predictors of Intention to Graduate “modifiable” variables were entered into a stepwise regression analysis. These include: employment hours per week, CEQ Personal Situation, CEQ School Environment, Course Self-Efficacy, Social Self-Efficacy, Campus Climate Social Alienation, registration for disability-related services, and full- or part-time student status. The results show that the best predictors of Intention to Graduate were Campus Climate Social Alienation, Course Self-Efficacy, and CEQ Personal Situation, with all three variables adding significantly to the prediction. These variables, while significant, accounted for a small proportion of the variance (10%) in Intention to Graduate, R² = .10, F(3, 591) = 21.61, p < .001. The main effects were significant: grade, F(24, 918) = 3.96, p < .001; gender, F(12, 458) = 2.45, p < .001; school type (college vs. university), F(12, 458) = 4.14, p < .001. Only the grade main effects and the interactions with grade are of interest, since all gender and school type main effects can be seen in Table 2.

**Demographics.** ANOVA results in Table 4 show only that parental education was highest for students with “A”s. The grade main effects for age and for number of disabilities were not significant, although there was a trend for older age to be related to better grade.

**Intention to Graduate.** The main effect for this variable was significant, with Table 4 and the Tukey hsd test showing that a grade of C was related to lower scores on Intention to Graduate.

**College Experience Questionnaire (CEQ).** ANOVA results and means in Table 4 show that those with higher grades had more personal situation as well as school environment related facilitating factors.

**Self-Efficacy Questionnaire (SEQ).** The main effects for both course and social self-efficacy were significant, again showing that those with higher grades had stronger self-efficacy in both domains scores than those with lower grades.

**School-related aspects.** None of the main effects on school related aspects (i.e., employment hours per week, percent of program completed, Campus Climate Social Alienation) were significant.

**Other variables.** Among school related nominal variables, the only significant findings were that students in their first choice program were more likely to have better grades than those not in their first choice program, X²(3, 587) = 13.57, p < .001, and that university students were more likely to have better grades than college students, X²(3, 584) = 33.34, p < .001. The remaining variables showed no significant differences on grades: gender, registration for disability related services, full-time vs. part-time student status, and having been on a leave of absence.

**Predicting Grades.** We also examined predictors of grades using stepwise regression. The variables used to predict Intention to Graduate were included. The predicted variable was grade (A and B vs. C and D). The results show that a single predictor, course self-efficacy, was entered into the equation. This variable accounted for a relatively small proportion of the variance (12%) in grade, R² = .12, F(1, 572) = 77.25, p < .001, Standardized β = -.345.
Table 2

Students’ Intention to Graduate: Means and ANOVA Results

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Intends to Graduate</th>
<th>Does Not Intend to Graduate</th>
<th>Test results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>College Female</td>
<td>Male</td>
<td>University Female</td>
</tr>
<tr>
<td>Age</td>
<td>23.34 25.71</td>
<td>5.00 8.34</td>
<td>29.38 31.56</td>
</tr>
<tr>
<td></td>
<td>School Type F(1, 592) = 50.71, p &lt; .001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender F(1,592) = 0.80, p = .373</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Disabilities</td>
<td>Mean 1.53 1.52</td>
<td>0.83 0.80</td>
<td>1.61 1.54</td>
</tr>
<tr>
<td></td>
<td>School Type F(1, 594) = 1.11, p = .293</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Gender F(1,594) = 2.71, p = .100</td>
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<td></td>
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<tr>
<td>Academic Performance</td>
<td>Mean 2.09 2.00</td>
<td>0.74 0.59</td>
<td>1.72 1.68</td>
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<tr>
<td></td>
<td>School Type F(1, 572) = 28.06, p &lt; .001</td>
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<td></td>
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<tr>
<td></td>
<td>Gender F(1,572) = 1.91, p = .168</td>
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<td></td>
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<tr>
<td>College Experience Questionnaire (CEQ)</td>
<td>Mean 3.96 3.81</td>
<td>0.86 1.08</td>
<td>3.64 3.85</td>
</tr>
<tr>
<td></td>
<td>School Type F(1, 594) = 2.61, p = .107</td>
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<tr>
<td></td>
<td>Gender F(1,594) = 4.35, p &lt; .05</td>
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<tr>
<td>Personal Scale</td>
<td>Mean 4.26 4.31</td>
<td>0.82 1.03</td>
<td>3.85 4.07</td>
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<td></td>
<td>School Type F(1, 594) = 18.20, p &lt; .001</td>
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<td></td>
<td>Gender F(1,594) = 7.94, p &lt; .01</td>
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<tr>
<td>Course Self-Efficacy</td>
<td>Mean 6.80 6.38</td>
<td>2.21 1.49</td>
<td>6.62 6.61</td>
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<td></td>
<td>School Type F(1, 594) = 1.29, p = .257</td>
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<tr>
<td></td>
<td>Gender F(1,594) = 5.01, p &lt; .05</td>
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<tr>
<td>Social Self-Efficacy</td>
<td>Mean 6.80 7.34</td>
<td>1.71 1.51</td>
<td>6.66 7.24</td>
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<td>School Type F(1, 594) = 0.19, p = .660</td>
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<td>Gender F(1,594) = 6.92, p &lt; .01</td>
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<td>School related aspects</td>
<td>Employment Hours per Week</td>
<td>Mean 6.40 7.40</td>
<td>7.99 11.11</td>
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<td>School Type F(1, 594) = 5.02, p &lt; .05</td>
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<td>Gender F(1,594) = 0.58, p = .446</td>
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<td>Campus Climate Social Alienation</td>
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<td>2.36 2.37</td>
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<td>School Type F(1, 594) = 9.10, p &lt; .01</td>
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<td></td>
<td>Gender F(1,594) = 0.59, p = .443</td>
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</tbody>
</table>

1 The lower the better
2 The higher the better
Due to shared variance, several variables of interest that were correlated with grade did not add significantly to the model. Correlations in Table 3 show that social self-efficacy was also closely related to grades.

Relationships Among Variables

Pearson product-moment correlation coefficients in Table 3 show that Intention to Graduate was significantly, although not closely, related to grade. Table 3 also shows the relationships among variables. Of interest are the findings that younger age, fewer disabilities, and more facilitating school environment (CEQ) were related to the predictors of Intention to Graduate and of grade.

Discussion

Sample Characteristics

The results show that almost half of the participants had more than one disability/impairment, with a psychological/psychiatric disability, an LD, ADHD and a chronic health/medical condition being most common. It should be noted, however, that psychological/psychiatric disability was, most of the time, coupled with another disability/impairment and that LD and ADHD were often paired.

Not surprisingly, university students were older than junior/community college students and, as is commonly noted in the literature (e.g., O'Neill et al., 2012), both groups were older than what one would expect in nondisabled samples.

Summary of Key Findings

Table 5 summarizes the findings on both modifiable and non-modifiable aspects and shows the findings for both intention to graduate as well as academic performance. It should be noted that in the case of weak associations between variables, different types of analyses (e.g., correlation, ANOVA) resulted in slightly different results. This is to be expected since we used simple correlations and since the ANOVAs were 3-way and nonorthogonal. In Table 5 we present a summary of the most consistent findings.

Intention to graduate. Our results show that intention to graduate was best predicted by social alienation on campus, course self-efficacy, and personal situation facilitators. These three variables, however, predicted only 10% of the variability in scores. It should also be noted that social self-efficacy was also closely related to intention to graduate. Modest regression coefficients are common when predicting academic persistence (e.g., Murray & Wren, 2003), and this was the case in the present study as well.

We expected campus social alienation to be negatively related to intention to graduate. We confirmed this hypothesis and found that alienation was the most important predictor of intention to graduate. We also expected that students who intended to graduate would have higher course and social self-efficacy scores. This hypothesis, too, was confirmed.

Strong personal and school-related facilitators were also expected to be related to intention to graduate. Consistent with the prediction, the results show that both personal facilitators (e.g., good financial situation, good family situation, having friends, high level of personal motivation, good study habits, good previous education experiences) as well as school related facilitators (e.g., acceptable course load, good schedule, positive attitudes of professors, non-teaching staff and students, availability of computers on campus, accessibility of building facilities) were related to intention to graduate.

Campus access/disability-related support services are typically seen by students with disabilities as the most important facilitator of their academic experience (Fichten et al., 2006). Thus, it was not surprising to find that students intending to graduate were more likely to have registered for campus disability related services than those who did not intend to graduate.

We had not expected enrolment in one’s first choice program to be related to intention to graduate. Yet, the results show that this was, indeed, the case. Contrary to our hypothesis, we found that the number of hours worked during the academic year was not related to intention to graduate. This may be due to students whose health or disabilities interfere with the possibility of working, as the results confirm the hypothesis that being a part-time student as well as having been on a leave of absence are related to poor intention to graduate.

Few of the “non-modifiable” variables were related to intention to graduate. A notable exception was number of disabilities: the results show that students with more disabilities/impairments were less likely to intend to graduate. In fact, in previous investigations, students with disabilities who dropped out of postsecondary education cited their health and the impact of their disability as reasons for quitting (Jorgensen, Fichten, & Havel, 2009; Fichten et al., 2014). This may explain the present finding that, as expected, full-time student status was related to intention to graduate along with not having been on a leave of absence. It is possible that students whose disability/impairment was more intrusive took a semester off or registered as a part-time student. Of course, determining why students with disabilities take a leave of absence and why they register on a part-time basis are empirical questions that should
be addressed in future research. None of the remaining “non-modifiable” variables were related to intention to graduate: age, school type, or parental education. Even though we had expected females to be more likely to plan to graduate, this was not the case.

Intention to graduate and academic performance were weakly related. In fact, the findings show only that students with a grade of C were less likely to plan to graduate than those with As or Bs, who did not differ from each other. Moreover, correlations between intention to graduate and grades, although significant, were very low.

We expected that women would be more likely to graduate. This hypothesis was not confirmed. Based on findings on nondisabled students (ACT, 2006), we also predicted that students who were more advanced in their program of study would be more likely to intend to graduate than those just beginning. This hypothesis was also not confirmed, perhaps because students with disabilities abandon their studies primarily because of disability and health related issues (Fichten et al., 2014; Jorgensen, Fichten, & Havel, 2009).

Grades

The picture was somewhat different from intention to graduate when grades were examined. First, as expected, grade was predicted by a single variable: course self-efficacy; this predicted only 12% of the variability in scores. Of course, since the findings are correlational, the possibility that stronger self-efficacy is engendered by higher grades, rather than the reverse, or that some third variable is operating cannot be ruled out. It should be noted, however, that course self-efficacy may serve as a proxy for a host of different social processes linked to grades. The findings indicate that these include personal situation and school environment facilitators, social self-efficacy, and campus climate social alienation, which are all correlated with course self-efficacy.

Among other “modifiable” aspects, we expected that students with better grades would have higher social self-efficacy scores. This hypothesis was confirmed. We also predicted that strong personal situation and school environment-related facilitators would be related to academic performance. This prediction, too, was upheld. As expected, students enrolled in their first choice academic program had higher grades than those who were not. This is logical, as postsecondary grades are usually related to high school grades, which are likely to influence acceptance into one’s first choice of program.

It is also important to note the variables that were not related to academic performance, even though these were important for intention to graduate: social alienation on campus, whether one was a full or part-time student, and whether one had taken a leave of absence.

Similarly, registration for disability-related access/support services was also unrelated to academic performance. Findings concerning the role of accommodations for academic performance are inconsistent (Lombardi et al., 2012; Troiano et al., 2010). In part, discrepancies in findings may be due to the samples studied, as there may be important differences between those students who do - and those who do not - register for disability-related services. This is a fundamental question that deserves more research attention, including a look at how specific accommodations may affect grades.

As in the case of intention to graduate, contrary to our prediction, hours spent in employment during the term was unrelated to academic performance. This is not consistent with findings in the literature on nondisabled students (Bozick, 2007). Nevertheless, there was a trend in the expected direction. Perhaps this finding is related to the large number (slightly over half) of students in our sample who did not work during the academic year. Given the importance of work experience during the undergraduate years for finding employment after graduation, it would be interesting for future research to study which students, with which disabilities/impairments are likely to work during the academic year.

Among “non-modifiable” aspects, university students had better grades than junior/community college students. Whether this is due to academically weaker students enrolling in junior/community college rather than in a university or to differences in grading practices deserves further research attention.

The highest grades were related to higher parental education. Number of disabilities was not related to academic performance. As was the case for intention to graduate, percent of program completed was unrelated to academic performance. While we expected females to have higher grades than males, this was not the case. Similarly, although we expected older age to be related to better grades, the findings on age were not significant.

School Type: Differences Between Junior/Community Colleges and Universities

Among “modifiable” aspects, the results show that junior/community colleges are more “friendly” to students with disabilities than are universities. For example, alienation on campus and school environment related facilitators were both worse in universities than in junior/community colleges. These differences favoring
Table 3

Correlations Among Variables

<table>
<thead>
<tr>
<th></th>
<th>1 Grade</th>
<th>2 Intention to Graduate</th>
<th>Paternal Education</th>
<th>Maternal Education</th>
<th>Employment (hr/wk)</th>
<th>2 CEQ Personal Situation</th>
<th>2 CEQ School Environment</th>
<th>Course Self-Efficacy</th>
<th>Social Self-Efficacy</th>
<th>1 Campus Climate Social Alienation</th>
<th>Age</th>
<th>% of Program Completed</th>
<th>Number of Disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Grade</td>
<td>1</td>
<td>-.136**</td>
<td>-.084</td>
<td>-.063</td>
<td>.059</td>
<td>-.128**</td>
<td>-.002</td>
<td>-.393**</td>
<td>-.208**</td>
<td>.052</td>
<td>-.125**</td>
<td>.094**</td>
<td>.005</td>
</tr>
<tr>
<td>2 Intention to Graduate</td>
<td>-.136***</td>
<td>1</td>
<td>.040</td>
<td>.058</td>
<td>-.030</td>
<td>.237***</td>
<td>.147***</td>
<td>.231***</td>
<td>.240***</td>
<td>-.268***</td>
<td>-.113**</td>
<td>.066</td>
<td>-.125**</td>
</tr>
<tr>
<td>Paternal Education</td>
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<td>.040</td>
<td>1</td>
<td>.683***</td>
<td>.007</td>
<td>.191***</td>
<td>.032</td>
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<td>.017</td>
<td>-.055</td>
<td>-.317***</td>
<td>.039</td>
<td>-.004</td>
</tr>
<tr>
<td>Maternal Education</td>
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<td>.058</td>
<td>.683***</td>
<td>1</td>
<td>.003</td>
<td>.137***</td>
<td>.031</td>
<td>.004</td>
<td>-.031</td>
<td>-.058</td>
<td>-.364***</td>
<td>-.025</td>
<td>.012</td>
</tr>
<tr>
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<td>-.030</td>
<td>.007</td>
<td>.003</td>
<td>1</td>
<td>.005</td>
<td>-.015</td>
<td>.023</td>
<td>.054</td>
<td>-.040</td>
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<td>-.021</td>
</tr>
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<td>.237***</td>
<td>.191***</td>
<td>.137***</td>
<td>.005</td>
<td>1</td>
<td>.461***</td>
<td>.443***</td>
<td>.353***</td>
<td>-.421***</td>
<td>-.251***</td>
<td>-.048</td>
<td>-.215***</td>
</tr>
<tr>
<td>2 CEQ School Environment</td>
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<td>.147***</td>
<td>.032</td>
<td>.031</td>
<td>-.015</td>
<td>.461***</td>
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<td>.261***</td>
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<td>.061</td>
<td>.004</td>
<td>.023</td>
<td>.443***</td>
<td>.261***</td>
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<td>.040</td>
<td>-.044</td>
</tr>
<tr>
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<td>-.055</td>
<td>-.058</td>
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<td>-.421***</td>
<td>-.375***</td>
<td>-.321***</td>
<td>-.599***</td>
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<td>.209***</td>
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<td>.164***</td>
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<td>-.113**</td>
<td>-.317***</td>
<td>-.364***</td>
<td>.048</td>
<td>-.251***</td>
<td>-.230***</td>
<td>.015</td>
<td>.041</td>
<td>.209***</td>
<td>1</td>
<td>.074</td>
<td>.191***</td>
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<tr>
<td>% of Program Completed</td>
<td>.094*</td>
<td>.066</td>
<td>.039</td>
<td>-.025</td>
<td>.030</td>
<td>-.048</td>
<td>.016</td>
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<td>.057</td>
<td>.074</td>
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<td>.100*</td>
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<tr>
<td>Number of Disabilities</td>
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<td>-.004</td>
<td>.012</td>
<td>-.021</td>
<td>-.215***</td>
<td>-.125**</td>
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<td>-.044</td>
<td>.164***</td>
<td>.191***</td>
<td>.100*</td>
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</tbody>
</table>

1 The lower the better.
2 The higher the better.
*** p < .001
** p < .01
* p < .05
Table 4

**Grades: Means and ANOVA Results**

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>ANOVA Grade main effect and Tukey hsd test</th>
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<td><strong>Demographics</strong></td>
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<td>Age</td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td>29.98</td>
<td>28.87</td>
<td>25.80</td>
<td>Grade F (2,558) = 2.80, p &lt; .10</td>
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<td>SD</td>
<td>9.62</td>
<td>9.72</td>
<td>7.44</td>
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<tr>
<td>Paternal Education</td>
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</tr>
<tr>
<td>Mean</td>
<td>13.67</td>
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<td>13.03</td>
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<td>3.46</td>
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<tr>
<td>Mean</td>
<td>13.96</td>
<td>13.10</td>
<td>13.72</td>
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<tr>
<td>Mean</td>
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<td>5.58</td>
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<tr>
<td>2 Personal Scale</td>
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<tr>
<td>Mean</td>
<td>3.70</td>
<td>3.64</td>
<td>3.40</td>
<td>Grade F (2,558) = 5.33, p &lt; .01</td>
</tr>
<tr>
<td>SD</td>
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<td>0.98</td>
<td>0.94</td>
<td>Tukey: A &gt; C</td>
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<tr>
<td>2 School Scale</td>
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<tr>
<td>Mean</td>
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<td>3.81</td>
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<td>0.90</td>
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<tr>
<td>2 Course Self-Efficacy</td>
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<tr>
<td>Mean</td>
<td>6.98</td>
<td>6.36</td>
<td>5.36</td>
<td>Grade F (2,558) = 34.83, p &lt; .001</td>
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<td>1.39</td>
<td>1.51</td>
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<td>Mean</td>
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<td>Employment Hours per Week</td>
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</tr>
<tr>
<td>Mean</td>
<td>7.18</td>
<td>8.73</td>
<td>9.27</td>
<td>Grade F (2,559) = 2.39, p &lt; .10</td>
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<td>SD</td>
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<td>11.70</td>
<td>11.48</td>
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<tr>
<td>Percent Program Completed</td>
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</tr>
<tr>
<td>Mean</td>
<td>51%</td>
<td>54%</td>
<td>58%</td>
<td>Grade F (2,485) = 2.56, p &lt; .10</td>
</tr>
<tr>
<td>SD</td>
<td>26%</td>
<td>25%</td>
<td>26%</td>
<td></td>
</tr>
</tbody>
</table>

1 The lower the better.

2 The higher the better.
Table 5

*Synthesis of Findings on Grades and Intention to Graduate*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1Intention to Graduate</th>
<th>1 Grade</th>
</tr>
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<tbody>
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<td>Demographics</td>
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<tr>
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<td>X</td>
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<tr>
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<tr>
<td>Father's Education</td>
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<td>X</td>
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<tr>
<td>School Type</td>
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<td>X</td>
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<tr>
<td>Gender</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Age</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Percent of Program Completed</td>
<td>X</td>
<td>X</td>
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<tr>
<td>College Experience Questionnaire (CEQ)</td>
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<tr>
<td>Personal Scale</td>
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<td>School Scale</td>
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<td>Self-Efficacy Questionnaire (SEQ)</td>
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<tr>
<td>Intention to Graduate</td>
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</table>

1X indicates significant findings. n/a indicates not applicable.
colleges, however, did not translate into superior grades or stronger intention to graduate. In fact, university students reported higher grades than junior/community college students, even though they spent more time in paid employment during the academic year.

Gender Differences
The findings show that females reported greater course and social self-efficacy than males. We predicted that being female would be related to both intention to graduate and academic performance. These hypotheses were not confirmed, perhaps because males experienced more facilitating personal situations as well as school related environments than females. The literature that shows that females are less likely to drop out than males is typically based on data provided by the school (Jorgensen, Fichten, & Havel, 2009; Mamiseishvili, & Koch, 2011; National Center for Education Statistics, 2010; O’Neil et al., 2012; Wessel et al., 2009). Our findings, on the other hand, are based on responses of volunteers, who often have different profiles from those who do not volunteer (Jorgensen & Fichten, 2007; Woosley, 2005).

Other Findings of Interest
Social and course self-efficacy, personal situation, and school environment related facilitators, and campus social alienation were all closely related to each other, suggesting the possibility that improvements in any one of these areas may result in improvements in the other realms. This is potentially important since several of these variables are associated with intention to graduate and some, also, with academic performance. In the future, research links among these variables and possible causal relationships should be explored in more detail.

Limitations
Our sample consisted of volunteers. Thus, they are neither a random sample nor fully representative of the population studied. Volunteer effects, self-selection biases, recruitment through e-mail discussion lists, and the low proportion of individuals who had not registered for disability related services set limitations on the generalizability of the results. Moreover, of necessity, students self-reported their grades as well as their disabilities/impairments; of course, it would not have been possible to carry out this research in any other way, since students were enrolled in 98 different schools across Canada.

Recommendations Based on Our Findings
Evaluation of individual items on measures showing significant findings suggest the following. Making friends, increasing one’s level of personal motivation, and improving one’s study habits may improve grades and also improve the chance of graduation. This is also true of improved financial situations, which could be accomplished through more generous bursary and scholarship programs (CEQ Personal Situation). Findings on the Course Self-Efficacy Scale suggest that enhancing one’s belief that one can effectively research a term paper, do well on exams, manage time effectively, take good class notes, keep up-to-date with school work, and understand the material in textbooks may improve academic performance and increase the likelihood of graduation. The school’s learning/academic skills center can be helpful in assisting students with many of these. In addition, schools can provide workshops on effective studying, paper writing, and time management skills. Findings on the CEQ School Environment measure suggest that campus IT departments can help by ensuring that information on campus web sites is accessible and by providing adequate assistive technologies in the diverse computer labs on campus. Training on computer technologies both on and off campus, and ensuring the availability of course materials (alternate formats) can also facilitate success. Moreover, students may wish to enroll for the minimum course load that allows them to remain full-time students and ensure that their course schedule suits their needs.

Opportunities to participate in school extracurricular activities (can require resources, such as an interpreter after class times, rooms with wheelchair access, etc.) may enhance both academic performance and graduation rates. Willingness of professors to adapt course materials and evaluation to the student’s needs, willingness of non-teaching staff to respect students’ needs and concerns are also likely to help. This would likely be addressed best through specific and focused training workshops that teach students to self-advocate and help promote social skills related to effective relationships with professors and peers. Furthermore, ensuring the accessibility of building facilities and providing needed disability related services on campus may also facilitate success.

Aspects of social self-efficacy suggest that students may need to build confidence that they can participate in class discussions, ask questions in class, talk to their professors and ask them questions outside of class, talk with academic and support staff, and make new friends at school. While many of these aspects involve
self-advocacy (Getzel & Thoma, 2008), others relate to social skills, social self-confidence and shyness. Professors can make it easier for students to approach them and students can seek out the school’s counseling department or the campus office responsible for supporting students with disabilities, which often offers workshops to help students with such issues.

An especially important aspect is related to the Campus Climate Social Alienation Scale. Scores on this measure were shown to be especially important in predicting intention to graduate. Items on this scale relate to feeling excluded at college. Schools may take steps to ensure that students do not experience conditions that exclude students with disabilities. For example, access coordinators and faculty need to ensure that a disability does not prevent students from having needed contact with their professors, and that course activities encourage interaction between students with and without disabilities. Holding workshops for those who run extra-curricular clubs and associations to help promote the inclusion of students with disabilities in campus life are also likely to be helpful in mitigating social alienation. Opportunities to participate in school extracurricular activities may enhance both academic performance and graduation rates. Of course, this may need resources from the school, such as an interpreter after class times, rooms with wheelchair access, etc.

References


About the Authors

Catherine S. Fichten received her M.A. from Concordia University and her B.Sc. and Ph.D. in psychology from McGill University. Her experience includes co-directing the Adaptech Research Network and working as a clinical psychologist at the Behavioural Psychotherapy and Research Unit of the Jewish General Hospital in Montreal. She is currently a professor in the Department of Psychology at Dawson College and an Associate Professor in the Department of Psychiatry of McGill University. Her research interests include factors affecting the success of college and university students with various disabilities, including information and communication technologies. She can be reached by email at catherine.fichten@mcgill.ca

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Maria Barile (M.S.W.) died in 2013. She was a co-director of the Adaptech Research Network. She was also Co-Founder of Éco-Access, a consulting company which provides workshops and expertise on disability related issues. She was been a community-based activist and researcher in disability and women’s issues for 25 years and is missed by all who knew her.

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Authors’ Note

This study was funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). We are grateful for the support. We would also like to thank our partner groups. Without their collaboration we could not have conducted the study upon which this report is based: AQEIPS - Association québécoise des étudiants ayant des incapacités au postsecondaire and NEADS - National Educational Association of Disabled Students.
Academic Attainment of Students with Disabilities in Distance Education

John T. E. Richardson
The Open University

Abstract
This investigation compared attainment in 196,405 students with and without disabilities who were taking courses by distance learning with the Open University in the United Kingdom in 2009. When the effects of demographic variables were statistically controlled, students with mental health difficulties showed poorer course completion than nondisabled students; students with restricted mobility showed poorer course completion and lower pass rates than nondisabled students; students with unseen or other disabilities showed lower pass rates than nondisabled students; and students with dyslexia or other specific learning difficulties showed lower pass rates and poorer grades than nondisabled students. In addition, the presence of additional disabilities led to poorer attainment in different respects in students who were blind or partially sighted, students who were deaf or hard of hearing, students with impaired speech, and students with unseen disabilities. Accommodations to support disabled students in distance education need to be focused on different groups of students with particular disabilities.

Keywords: Academic attainment; disabilities; distance education

In recent years, there has been an increase in the interest shown by researchers into the experiences of students with disabilities in higher education (Adams & Brown, 2006; Fuller et al., 2009; Konur, 2006; Riddell, Tinklin, & Wilson, 2005). Nevertheless, little is known about the eventual academic attainment of such students. At a local level, the number of students with disabilities within a single mainstream institution may be relatively small. As a consequence, comparisons with the attainment of nondisabled students may not be reliable or can only be undertaken by adopting the dubious strategy of treating students with disabilities as a single group (Foreman, Dempsey, Robinson, & Manning, 2001; Fuller et al., 2009, p. 169). At a national level, information may simply not be available about students’ achievement. In the United States, for example, students may graduate with bachelors’ degrees cum laude, magna cum laude, and summa cum laude, but the criteria vary widely across different universities and national data on the award of these honors to different student groups are not collected.

In the United Kingdom, in contrast, the same broad framework for classifying first degrees is used by all universities, a system of external examiners seeks to ensure comparability in standards between different institutions, and statistics on the qualifications that they award are compiled by a national agency. Most first degrees in the United Kingdom are awarded with honors, which are usually classified as first, second, or third class, and the second class is normally categorized into an upper and a lower division. A degree that is awarded with either first-class or upper second-class honors is often described as a “good” degree, and this is often used as a gross measure of attainment within and across institutions.

Institutions of higher education in the United Kingdom ask their students to declare disabilities that might necessitate additional support in their studies, their accommodation, or their daily living. Most commonly, this declaration is made by potential students on prepared application forms and confirmed by them on their subsequent admission. Richardson (2001) noted that this way of identifying one’s disability embodies a medical perspective that ascribes its consequences to deficiencies of the students. In contrast, a social perspective would ascribe the consequences of disability to the students’ context. Potential students would be asked whether they might encounter...
difficulties in higher education, either as a result of the environment in which they would have to live and study or as a result of the negative attitudes of other people whom they might encounter (Abberley, 1996; Finkelstein, 1991).

Richardson (2009a) investigated all students who had been awarded first degrees by campus-based institutions of higher education in the United Kingdom in 2004–2005. He found that the presence and nature of a disability explained only 0.1% of the variation in whether or not they obtained good degrees. Graduates with dyslexia and graduates with multiple disabilities were less likely to obtain good degrees than were graduates with no known disability, but this was mainly due to the confounded effects of demographic and institutional variables. Graduates with an unseen disability (such as diabetes, epilepsy, or asthma) were the only group to show significantly poorer attainment when the effects of these variables had been statistically controlled. Richardson concluded that, in overall terms, disablement per se did not play a significant role in predicting academic attainment in campus-based higher education.

Nevertheless, recent years have seen considerable growth in online and other forms of distance education, both in the United States and in other countries (Allen & Seaman, 2011). In the United Kingdom, the Open University was created in 1969 to provide degree programs by distance education. Originally, nearly all of its courses were delivered by correspondence materials, combined with television and radio broadcasts, video and audio recordings, tutorial support at a local level, and (in some cases) residential schools. Nowadays, the University makes extensive use of computer-based support such as CD-ROMs, dedicated websites, and computer-mediated conferencing. Some courses are delivered entirely online.

Many people with disabilities turn to distance education to avoid the problems of access that are posed by campus-based institutions. Indeed, for many people with severe disabilities or chronic illness, distance learning may be the only practical means of access to higher education (Newell & Debenham, 2009). The Open University has a particular commitment to promoting equal opportunities in education, including equal opportunities for people with disabilities. In recent years, this has led to the “Securing Greater Accessibility” project, which aims to ensure that the Open University complies with U.K. equality legislation by making learning resources accessible to all. This legislation requires that institutions should make adjustments to their programs and their facilities in anticipation of admitting students with disabilities rather than simply trying to accommodate their disabilities once they have enrolled.

Richardson (2009b) investigated the role of disability as a factor in the attainment of 2,351 distance-learning students who had been awarded first degrees by the Open University in 2002–2003. In contrast to the pattern of results that he had found in campus-based graduates, graduates with dyslexia or other specific learning difficulties, graduates who were deaf or hard of hearing, and graduates with multiple disabilities were also less likely to obtain good degrees than were graduates with no disability. Richardson concluded that distance education posed specific challenges for students with these disabilities. Even so, at the Open University and at most other U.K. institutions, a student’s class of degree is determined by the distribution of grades that they have obtained on individual course units. Consequently, factors responsible for variations in the proportion of good degrees are likely to have affected attainment at the course level.

The studies by Richardson (2009a, 2009b) were concerned with the level of attainment in students who graduated, whereas disablement may have other effects on academic performance. Accordingly, Richardson (2010) examined the completion rate, the pass rate, and the grades obtained by all 132,588 students who had taken undergraduate courses with the Open University in 2003. Students with mental health difficulties showed poorer course completion than nondisabled students. Those with restricted mobility and those with other disabilities showed lower pass rates and poorer grades than nondisabled students. Students with multiple disabilities showed poorer course completion, lower pass rates, and poorer grades than nondisabled students. Richardson argued that accommodations intended to support students with disabilities in distance education needed to be focused on different groups of students with particular disabilities.

Nevertheless, there are two problems with these findings. One is that they are 10 years old and the total student population of the Open University has increased considerably in the intervening period. The other is that students who had more than one disability were consigned to a single, catch-all category of “multiple disabilities.” This may not be problematic in studies of graduates from campus-based institutions, where such students constitute only around 5% of all graduates with disabilities (Richardson, 2009a). However, it is highly problematic for the Open University, where students with multiple disabilities constitute 33% of all graduates with disabilities (Richardson, 2009b) and 55% of all students with disabilities (Richardson, 2010).
The present study was carried out to compare the completion rate, the pass rate, and the grades obtained by students with and without disabilities who were taking courses with the Open University in 2009. Richardson (2009a, 2009b, 2010) showed that students with and without disabilities differ in terms of age, gender, prior qualifications, and socioeconomic circumstances. Consequently, comparisons between students with and without disabilities need to control for the effects of these demographic variables. There were two research questions. First, when the effects of demographic variables have been statistically controlled, do students with particular disabilities differ in their academic attainment from nondisabled students? Second, when the effects of demographic variables have been statistically controlled, do students with and without particular disabilities differ in their academic attainment?

Method

Most of the Open University’s courses are worth 30 or 60 credit points, on the basis that full-time study would consist of courses worth 120 credit points in any calendar year. Students may register for two or more courses at a time up to a maximum load of 120 credit points. In 2009, 196,405 students had registered for undergraduate courses, an increase of 48% on the number who had registered for undergraduate courses in 2003. Information concerning their demographic characteristics (including disabilities), course registrations, and attainment was retrieved from the University’s administrative records. Of the 196,405 students, 139,358 (or 71.0%) had registered for a single course, 30,086 (or 15.3%) had registered for two courses, and 26,961 (or 13.7%) had registered for three or more courses. The students had been asked at registration to declare whether they had a disability or additional requirements. Those who did so declare were followed up by phone to establish the nature of their disabilities and the accommodations or other support that they might require. Of the 196,405 students, 13,437 (or 6.8%) had declared that they had one or more disabilities. The overall proportion of undergraduate students with one or more disabilities is slightly lower than in 2003 (7.7%: Richardson, 2010) but is similar to that in part-time students at campus-based institutions in the United Kingdom (Department for Innovation, Universities and Skills, 2009, p. 21). Information about the nature of these students’ disabilities was recorded using the checklist shown in Table 1. The list includes symptoms and medical conditions as well as disabilities in a narrow sense, and it is probably for this reason that 7,381 (or 54.9%) of these students had been recorded as having more than one disability (close to the proportion reported for 2003). Table 1 shows the prevalence of each disability among all 196,405 students, among the 13,437 students with disabilities, and among the 6,056 students who were recorded as having just one disability.

Riddell et al. (2005, p. 26) noted that the distribution of particular disabilities at the Open University is different from that in the rest of U.K. higher education. In particular, the Open University has a relatively low proportion of students with dyslexia or other specific learning difficulties but a relatively high proportion of students with multiple disabilities. The latter may be because, as noted earlier, for many people with multiple disabilities resulting from chronic illness, distance learning is the only practical means of access to higher education. Even so, dyslexia or other specific learning difficulties were the most common condition among students who had been recorded as having just one disability. In contrast, fatigue or pain were the most common disability overall but were usually reported in combination with additional disabilities. The most common combinations were restricted mobility and fatigue or pain (3,364 students), restricted manual skills and fatigue or pain (2,099 students), mental health difficulties and fatigue or pain (1,939 students), and restricted mobility and restricted manual skills (1,862 students).

Results

To answer the first research question, “disability” was represented as a single variable with the 14 categories shown in Table 2. Those students who had more than one disability were assigned to a single category of “multiple disabilities” and statistical tests compared the students with each of the 13 kinds of disability with the nondisabled students on relevant variables. These results can be directly compared with those obtained by Richardson (2010).

Demographic Characteristics

Table 2 shows the age distributions of the students in the various disability categories. Relevant data were missing for five students. A chi-squared test showed that these were significantly different from each other, \( \chi^2(52, N = 196,400) = 2766.07, p < .001 \). An analysis of variance using Dunnett’s post hoc tests showed that the students with dyslexia or other specific learning difficulties and the students with autistic spectrum disorder were significantly younger than the nondisabled students. This was due to the increased prevalence of these disabilities in the lowest age band. Similar trends have been noted in previous research in both
the United States (Horn & Berktold, 1999, p. 11) and the United Kingdom (Richardson, 2010; Richardson & Wydell, 2003). These trends probably reflect the increased identification of children and young people with dyslexia or other specific learning difficulties and of children and young people with autistic spectrum disorder over the last 30 years.

The students with mental health difficulties and the small number of students receiving personal care support were not significantly different in age from the nondisabled students. All of the other groups were significantly older than the nondisabled students. The oldest groups were the students who were deaf or hard of hearing, the students with restricted mobility, the students with impaired speech, the students who were blind or partially sighted, and the students with restricted manual skills. The latter disabilities commonly result from accidents or illnesses in adulthood or from the degenerative processes associated with aging, and so it is not surprising that they are more common in people who study later in life (Richardson, 2009a, 2010).

Of the 196,405 students, 77,579 (or 39.5%) were men and 118,826 (or 60.5%) were women. Table 3 shows the percentages of women in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 196,405) = 410.55, p < .001$. Further tests showed that the students who were blind or partially sighted, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, and the students receiving personal care support had similar gender distributions to the nondisabled students. However, the proportion of women was significantly lower in the students with speech impairment and the students with autistic spectrum disorder, whereas the proportion of women was significantly higher in the students who were deaf or hard of hearing, the students with restricted manual skills, the students with mental health difficulties, the students who had fatigue or pain, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities. Similar trends were noted by Richardson (2010).

The Open University accepts applicants over the minimum age of 16 into most of its courses without imposing formal entrance requirements. The students were classified into three groups based on their highest educational qualifications before joining the University: low, below the normal entry requirement at other

<table>
<thead>
<tr>
<th>Tables 1</th>
<th>Prevalence of Specific Disabilities in Open University Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Among all students</td>
</tr>
<tr>
<td>n</td>
<td>(%)</td>
</tr>
<tr>
<td>Blind or partially sighted</td>
<td>1,470</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>1,065</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>4,287</td>
</tr>
<tr>
<td>Restricted manual skills (difficulty handling items)</td>
<td>2,820</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>548</td>
</tr>
<tr>
<td>Dyslexia or other specific learning difficulties</td>
<td>2,960</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>4,350</td>
</tr>
<tr>
<td>Personal care support</td>
<td>1,132</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>5,935</td>
</tr>
<tr>
<td>Unseen disabilities (e.g. diabetes, epilepsy or asthma)</td>
<td>1,933</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>188</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>2,435</td>
</tr>
</tbody>
</table>
Richardson; Attainment in Distance Education

U.K. universities; medium, equivalent to the normal entry requirement at other U.K. universities; and high, beyond the normal entry requirement at other U.K. universities. Of the 196,405 students, 56,001 (or 29.9%) had low prior qualifications, 54,073 (or 28.9%) had medium prior qualifications, and 77,260 (or 41.2%) had high prior qualifications. Relevant data were missing for 9,071 students.

Table 3 shows the distributions of prior qualifications for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, \( \chi^2(26, N = 187,334) = 254.29, p < .001 \). Further tests showed that the students who were deaf or hard of hearing, the students with impaired speech, and the students receiving personal care support did not differ significantly from the nondisabled students in terms of their prior qualifications. The students who were blind or partially sighted had significantly higher prior qualifications, whereas the students with dyslexia or other specific learning difficulties, the students with mental health difficulties, the students with other disabilities, and the students with multiple disabilities had significantly lower prior qualifications. This may reflect poorer attainment of students with disabilities in secondary education or the limited opportunities for people with disabilities to gain postsecondary qualifications in the past (Richardson, 2009a, 2010).

On the basis of their personal circumstances, Open University students could apply for financial assistance towards the cost of their registration fees and study materials. The award of such assistance may be taken as a rough proxy for lower socioeconomic circumstances. Of the 196,405 students, 54,294 (or 27.6%) were receiving such assistance. Table 3 shows the percentages of students receiving such assistance in the various disability categories. A chi-square test showed that these were significantly different from each other, \( \chi^2(13, N = 196,405) = 5937.30, p < .001 \). Further tests showed that the students who were deaf or hard of hearing, the students with impaired speech, and the students receiving personal care support did not differ significantly from the nondisabled students in terms of their socioeconomic circumstances.

Table 2

<table>
<thead>
<tr>
<th>Disability Category</th>
<th>Under 30 years</th>
<th>30–39 years</th>
<th>40–49 years</th>
<th>50–59 years</th>
<th>60 years and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>No declared disability</td>
<td>182,963</td>
<td>33.1</td>
<td>29.5</td>
<td>22.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Blind or partially sighted</td>
<td>340</td>
<td>18.5</td>
<td>19.1</td>
<td>21.2</td>
<td>18.5</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>275</td>
<td>11.6</td>
<td>17.8</td>
<td>23.3</td>
<td>20.7</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>255</td>
<td>11.0</td>
<td>20.8</td>
<td>28.2</td>
<td>16.5</td>
</tr>
<tr>
<td>Restricted manual skills</td>
<td>266</td>
<td>16.5</td>
<td>18.8</td>
<td>27.4</td>
<td>16.2</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>15</td>
<td>26.7</td>
<td>20.0</td>
<td>6.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Dyslexia or other SLDs</td>
<td>1,849</td>
<td>40.2</td>
<td>29.3</td>
<td>22.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>1,588</td>
<td>30.0</td>
<td>34.5</td>
<td>22.2</td>
<td>10.9</td>
</tr>
<tr>
<td>Personal care support</td>
<td>8</td>
<td>12.5</td>
<td>25.0</td>
<td>37.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>503</td>
<td>22.5</td>
<td>25.8</td>
<td>24.3</td>
<td>15.5</td>
</tr>
<tr>
<td>Unseen disabilities</td>
<td>185</td>
<td>26.5</td>
<td>30.8</td>
<td>23.2</td>
<td>10.3</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>52</td>
<td>67.3</td>
<td>19.2</td>
<td>9.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>720</td>
<td>25.1</td>
<td>27.2</td>
<td>22.6</td>
<td>12.8</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>7,381</td>
<td>19.1</td>
<td>24.1</td>
<td>27.8</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Note. SLD, specific learning disability.
of receiving assistance. However, all the other groups of students with disabilities were significantly more likely to be receiving assistance than were the nondisabled students. More than half the students with mental health difficulties and more than half the students with multiple disabilities were receiving assistance.

Completion Rates, Pass Rates, and Grades

Out of the 280,413 course registrations at the Open University in 2009, 180,561 (or 64.4%) led to successful completion. Table 4 shows the completion rates for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 280,413) = 419.15$, $p < .001$. Further tests showed the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with impaired speech, the students receiving personal care support, the students with fatigue or pain, the students with unseen disabilities, and the students with other disabilities obtained completion rates that were not significantly different from that of the nondisabled students.
- The students with restricted manual skills, the students with dyslexia or other specific learning difficulties, and the students with autistic spectrum disorder were significantly more likely to complete their courses than were the nondisabled students.
- However, the students with restricted mobility, the students with mental health difficulties, and the students with multiple disabilities were significantly less likely to complete their courses.

Of the 180,561 completions, 167,836 (or 93.0%) led to passes. Table 4 shows the pass rates for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 180,561) = 357.42$, $p < .001$. Further tests showed the following:

<table>
<thead>
<tr>
<th>Prior Qualifications</th>
<th>Percentage of women</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Percentage with financial support</th>
</tr>
</thead>
<tbody>
<tr>
<td>No declared disability</td>
<td>60.0</td>
<td>29.6</td>
<td>28.9</td>
<td>41.5</td>
<td>25.7</td>
</tr>
<tr>
<td>Blind or partially sighted</td>
<td>60.0</td>
<td>24.8</td>
<td>27.2</td>
<td>48.0</td>
<td>42.4</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>66.5</td>
<td>23.5</td>
<td>30.6</td>
<td>45.9</td>
<td>29.5</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>58.8</td>
<td>30.5</td>
<td>27.3</td>
<td>42.2</td>
<td>43.5</td>
</tr>
<tr>
<td>Restricted manual skills</td>
<td>70.7</td>
<td>28.1</td>
<td>25.9</td>
<td>46.0</td>
<td>34.6</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>26.7</td>
<td>26.7</td>
<td>20.0</td>
<td>53.3</td>
<td>26.7</td>
</tr>
<tr>
<td>Dyslexia or other SLDs</td>
<td>62.0</td>
<td>31.4</td>
<td>30.2</td>
<td>38.4</td>
<td>37.7</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>63.9</td>
<td>35.7</td>
<td>32.3</td>
<td>32.1</td>
<td>63.5</td>
</tr>
<tr>
<td>Personal care support</td>
<td>62.5</td>
<td>50.0</td>
<td>0.0</td>
<td>50.0</td>
<td>37.5</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>78.9</td>
<td>28.1</td>
<td>30.6</td>
<td>41.3</td>
<td>40.6</td>
</tr>
<tr>
<td>Unseen disabilities</td>
<td>69.2</td>
<td>29.4</td>
<td>31.1</td>
<td>39.4</td>
<td>43.8</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>32.7</td>
<td>36.7</td>
<td>26.5</td>
<td>36.7</td>
<td>48.1</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>73.8</td>
<td>29.1</td>
<td>33.3</td>
<td>37.7</td>
<td>39.4</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>68.8</td>
<td>36.6</td>
<td>26.9</td>
<td>36.6</td>
<td>61.7</td>
</tr>
</tbody>
</table>

Note. SLD, specific learning disability.
The students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students receiving personal care support, the students with fatigue or pain, and the students with autistic spectrum disorder obtained pass rates that were not significantly different from that of the nondisabled students. However, the students who were blind or partially sighted, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, the students with mental health difficulties, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities were significantly less likely to pass their courses than were the nondisabled students (although the pass rate was greater than 85% in each case).

Although some courses were assessed simply on a pass/fail basis, on many courses the passing students were awarded grades between 1 (distinction) and 4 (bare pass). When determining the class of honors degrees, the boundary between Grades 2 and 3 maps onto that between upper and lower second-class honors. Consequently, Grades 1 and 2 can be regarded as “good” grades that would merit the award of a good degree. Out of the 76,151 registrations that led to a grade, 37,487 (or 49.2%) led to a good grade. Table 4 shows the distributions of grades and the percentages of good grades for the students in the various disability categories. A chi-square test showed that these percentages were significantly different from each other, $\chi^2(13, N = 76,151) = 116.22, p < .001$. Further tests showed the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted mobility, the students with restricted manual skills, the students with impaired speech, the students with unseen disabilities, the students with autistic spectrum disorder, and the students with other disabilities were not significantly

---

**Table 4**

<table>
<thead>
<tr>
<th>Percentage completed</th>
<th>Percentage passed</th>
<th>Percentage good grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>No declared disability</td>
<td>64.7</td>
<td>93.2</td>
</tr>
<tr>
<td>Blind or partially sighted</td>
<td>64.3</td>
<td>90.4*</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>68.4</td>
<td>93.6</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>58.5*</td>
<td>86.3*</td>
</tr>
<tr>
<td>Restricted manual skills</td>
<td>70.4*</td>
<td>92.0</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>52.4</td>
<td>81.8</td>
</tr>
<tr>
<td>Dyslexia or other SLDs</td>
<td>68.4*</td>
<td>86.9*</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>54.4*</td>
<td>90.1*</td>
</tr>
<tr>
<td>Personal care support</td>
<td>75.0</td>
<td>77.8</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>68.0</td>
<td>93.5</td>
</tr>
<tr>
<td>Unseen disabilities</td>
<td>63.5</td>
<td>88.8*</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>80.0*</td>
<td>93.1</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>64.6</td>
<td>90.7*</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>57.3*</td>
<td>88.7*</td>
</tr>
</tbody>
</table>

*Percentages significantly different ($p < .05$) from those of the nondisabled students.

Note. SLD, specific learning disability.
The students with fatigue or pain were significantly more likely to obtain good grades than were the nondisabled students. However, the students with dyslexia or other specific learning difficulties and the students with multiple disabilities were significantly less likely to obtain good grades than were the nondisabled students.

Controlling for the Effects of Demographic Characteristics

The analyses that have been described thus far have shown that students who are recorded as falling into the different disability categories vary with regard to the likelihood of completing their courses, passing their courses, or obtaining good grades on their courses. In other words, simply at a descriptive level, disablement plays a statistically significant role in predicting completion and attainment. However, students who fall into the different disability categories also vary with regard to age, gender, prior qualifications, and socioeconomic circumstances. It follows that the apparent variation in the completion and attainment of students with disabilities is confounded with variations in their completion and attainment related to these demographic characteristics. Hierarchical logistic regression analyses were carried out to control for possible effects of age, gender, prior qualifications, and financial assistance on completion and attainment in students with disabilities and students with no declared disability.

The results are reported in terms of odds ratios, which can be explained as follows. If the probability of the members of Group 1 exhibiting a particular outcome is \( p \) (e.g., \(.60\)), then the odds of this are \( p/(1-p) \) (i.e., \(.60/.40 \) or \(1.50\)). If the probability of the members of Group 2 exhibiting that outcome is \( q \) (e.g., \(.70\)), then the odds of this are \( q/(1-q) \) (i.e., \(.70/.30 = 2.33\)). The odds ratio is the ratio between these odds (i.e., \([p/(1-p)]/[q/(1-q)]\), which equals \([p(1-q)]/[q(1-p)]\)). In this case, the ratio between the odds is \(1.50/2.33 = 0.64\). In other words, the odds of the members of Group 1 exhibiting the relevant outcome

<table>
<thead>
<tr>
<th></th>
<th>Complete</th>
<th>Pass</th>
<th>Good grades</th>
<th>Complete</th>
<th>Pass</th>
<th>Good grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind or partially sighted</td>
<td>0.98</td>
<td>0.68*</td>
<td>0.92</td>
<td>0.98</td>
<td>0.69</td>
<td>0.92</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>1.18</td>
<td>1.05</td>
<td>0.98</td>
<td>1.09</td>
<td>1.02</td>
<td>0.92</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>0.77*</td>
<td>0.46*</td>
<td>0.81</td>
<td>0.80*</td>
<td>0.50*</td>
<td>0.80</td>
</tr>
<tr>
<td>Restricted manual skills</td>
<td>1.30*</td>
<td>0.83</td>
<td>1.10</td>
<td>1.23</td>
<td>0.79</td>
<td>1.10</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>0.60</td>
<td>0.33</td>
<td>0.51</td>
<td>0.61</td>
<td>0.38</td>
<td>0.55</td>
</tr>
<tr>
<td>Dyslexia or other SLDs</td>
<td>1.18*</td>
<td>0.48*</td>
<td>0.69*</td>
<td>1.24*</td>
<td>0.53*</td>
<td>0.74*</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>0.65*</td>
<td>0.66*</td>
<td>0.88</td>
<td>0.72*</td>
<td>0.86</td>
<td>1.09</td>
</tr>
<tr>
<td>Personal care support</td>
<td>1.63</td>
<td>0.25</td>
<td>0.34</td>
<td>2.00</td>
<td>0.41</td>
<td>0.52</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>1.16</td>
<td>1.05</td>
<td>1.37*</td>
<td>1.19*</td>
<td>1.14</td>
<td>1.49*</td>
</tr>
<tr>
<td>Unseen disabilities</td>
<td>0.95</td>
<td>0.58*</td>
<td>1.38</td>
<td>0.98</td>
<td>0.58*</td>
<td>1.37</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>2.18*</td>
<td>0.97</td>
<td>2.32</td>
<td>2.30*</td>
<td>1.42</td>
<td>2.64*</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>0.99</td>
<td>0.70*</td>
<td>0.87</td>
<td>1.00</td>
<td>0.72*</td>
<td>0.98</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>0.73*</td>
<td>0.57*</td>
<td>0.72*</td>
<td>0.81*</td>
<td>0.69*</td>
<td>0.83*</td>
</tr>
</tbody>
</table>

Note. Data show the odds ratio of each outcome in students with each disability compared with students with no declared disability. SLD, specific learning difficulty. *Odds ratios significantly different (p < .05) from one.
are 64% of the odds of the members of Group 2 exhibiting that outcome. Odds ratios vary from 0 (if \( p = 0 \) or \( q = 1 \)) to infinity (if \( p = 1 \) or \( q = 0 \)). An odds ratio of 1 means that there is no difference in the odds of the groups’ members exhibiting the outcome (when \( p = q \)). Whether an odds ratio is significantly different from 1 depends on the odds ratio itself and on the number of members in each group.

Table 5 shows the odds ratios comparing the students with different disabilities and the nondisabled students in terms of the completion rate, the pass rate, and the proportion of good grades. The numbers in the three left-hand columns are unadjusted and correspond to the data in Table 4. For instance, the odds of students who were blind or partially sighted obtaining good grades for their course were 8% (i.e., \( [1 - 0.92] \times 100 \)) less than the odds of nondisabled students obtaining good grades. The numbers in the three right-hand columns are adjusted for the possible effects of age, gender, prior qualifications, and financial assistance (all treated as categorical variables). For instance, the odds of students who were blind or partially sighted obtaining good grades for their courses were still 8% less than the odds of nondisabled students obtaining good grades when these other characteristics had been taken into account.

In the case of the completion rates, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, \( \chi^2(8, N = 269,423) = 5035.19, p < .001 \). Students aged less than 30 were less likely to complete their courses than were older students, \( \chi^2(4, N = 269,423) = 274.51, p < .001 \); women were more likely to complete their courses than were men, \( \chi^2(1, N = 269,423) = 36.77, p < .001 \); students with medium or high prior qualifications were more likely to complete their courses than were students with low qualifications, \( \chi^2(2, N = 269,423) = 2683.11, p < .001 \); and students who had financial assistance were less likely to complete their courses than were students who did not, \( \chi^2(1, N = 269,423) = 1010.30, p < .001 \).

However, the completion rates for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, \( \chi^2(13, N = 269,423) = 226.61, p < .001 \). Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students receiving personal care support, the students with unseen disabilities and the students with other disabilities did not differ significantly from the nondisabled students in their completion rates.
- The students with dyslexia or other specific learning difficulties, the students with fatigue or pain, and the students with autistic spectrum disorder were significantly more likely to complete their courses than were the nondisabled students.
- The students with restricted mobility, the students with mental health difficulties, and the students with multiple disabilities were significantly less likely to complete their courses than were the nondisabled students.

In the case of the pass rates, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, \( \chi^2(8, N = 175,090) = 1754.93, p < .001 \). Students aged less than 30 were less likely to pass their courses than were older students, \( \chi^2(4, N = 175,090) = 76.76, p < .001 \); women were more likely to pass their courses than were men, \( \chi^2(1, N = 175,090) = 40.48, p < .001 \); students with medium or high prior qualifications were more likely to pass their courses than were students with low qualifications, \( \chi^2(2, N = 175,090) = 356.15, p < .001 \); and students who had financial assistance were less likely to pass their courses than were students who did not, \( \chi^2(1, N = 175,090) = 975.46, p < .001 \).

However, the pass rates for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, \( \chi^2(13, N = 175,090) = 159.86, p < .001 \). Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students with mental health difficulties, the students receiving personal care support, the students with fatigue or pain, and the students with autistic spectrum disorder did not differ significantly from the nondisabled students in their pass rates.
- However, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities were significantly less likely to pass their courses than were the nondisabled students.
With regard to obtaining good grades, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, $\chi^2(8, N = 74,962) = 2033.54, p < .001$. Students aged less than 30 were less likely to obtain good grades than were older students, $\chi^2(4, N = 74,962) = 143.86, p < .001$; students with medium or high prior qualifications were more likely to obtain good grades than were students with low qualifications, $\chi^2(2, N = 74,962) = 938.86, p < .001$; and students who had financial assistance were less likely to obtain good grades than were students who did not, $\chi^2(1, N = 74,962) = 455.23, p < .001$. Nevertheless, there was no significant gender difference in terms of good grades, $\chi^2(1, N = 74,962) = 0.01, p = .92$.

However, the proportions of good grades for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, $\chi^2(13, N = 74,962) = 59.13, p < .001$. Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted mobility, the students with restricted manual skills, and the students with impaired speech were less likely to obtain good grades than were students without these disabilities.
- The students with mental health difficulties were more likely to obtain good grades than were students without these disabilities.
- The students with personal care support were less likely to obtain good grades than were students without this disability.
- The students with fatigue or pain and the students with autistic spectrum disorder were significantly more likely to obtain good grades than were the nondisabled students.
- The students with dyslexia or other specific learning difficulties and the students with multiple disabilities were significantly less likely to obtain good grades than were the nondisabled students.

Table 6

<table>
<thead>
<tr>
<th>Disability Category</th>
<th>Unadjusted Complete</th>
<th>Unadjusted Pass</th>
<th>Unadjusted Good grades</th>
<th>Adjusted Complete</th>
<th>Adjusted Pass</th>
<th>Adjusted Good grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind or partially sighted</td>
<td>0.87*</td>
<td>0.73*</td>
<td>0.95</td>
<td>0.87*</td>
<td>0.71*</td>
<td>0.96</td>
</tr>
<tr>
<td>Deaf or hard of hearing</td>
<td>1.14*</td>
<td>0.86</td>
<td>0.87</td>
<td>1.13*</td>
<td>0.86</td>
<td>0.80*</td>
</tr>
<tr>
<td>Restricted mobility</td>
<td>0.81*</td>
<td>0.72*</td>
<td>0.79*</td>
<td>0.87*</td>
<td>0.78*</td>
<td>0.84*</td>
</tr>
<tr>
<td>Restricted manual skills</td>
<td>1.09*</td>
<td>0.97</td>
<td>1.08</td>
<td>1.08</td>
<td>0.95</td>
<td>1.05</td>
</tr>
<tr>
<td>Impaired speech</td>
<td>1.04</td>
<td>1.12</td>
<td>0.66*</td>
<td>1.03</td>
<td>1.24</td>
<td>0.64*</td>
</tr>
<tr>
<td>Dyslexia or other SLDs</td>
<td>1.03</td>
<td>0.51*</td>
<td>0.65*</td>
<td>1.09*</td>
<td>0.56*</td>
<td>0.69*</td>
</tr>
<tr>
<td>Mental health difficulties</td>
<td>0.63*</td>
<td>0.77*</td>
<td>0.81*</td>
<td>0.69*</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Personal care support</td>
<td>0.88*</td>
<td>0.82</td>
<td>0.94</td>
<td>0.92</td>
<td>0.87</td>
<td>1.01</td>
</tr>
<tr>
<td>Fatigue or pain</td>
<td>0.98</td>
<td>1.22*</td>
<td>1.05</td>
<td>0.98</td>
<td>1.30*</td>
<td>1.11</td>
</tr>
<tr>
<td>Unseen disabilities</td>
<td>0.87*</td>
<td>0.67*</td>
<td>0.84*</td>
<td>0.90*</td>
<td>0.68*</td>
<td>0.83*</td>
</tr>
<tr>
<td>Autistic spectrum disorder</td>
<td>1.25</td>
<td>0.98</td>
<td>1.55</td>
<td>1.34*</td>
<td>1.07</td>
<td>1.77*</td>
</tr>
<tr>
<td>Other disabilities</td>
<td>1.10*</td>
<td>0.83*</td>
<td>0.89</td>
<td>1.08*</td>
<td>0.83*</td>
<td>0.93</td>
</tr>
</tbody>
</table>

*Odds ratios significantly different (p < .05) from one.

Note. Data show the odds ratio of each outcome in students with each disability compared with students with no declared disability. SLD, specific learning difficulty.
Comparing Students With and Without Particular Disabilities

To answer the second research question, “disability” was represented as 12 dichotomous variables corresponding to the 12 disabilities listed in Table 1. The students with more than one disability were disaggregated across their constituent disabilities, and logistic regression analyses were carried out to compare the students with and without each of the disabilities on the relevant variables. This might well yield different results from the previous analysis, because the group of students with a particular disability now includes students who have additional disabilities.

Table 6 shows the odds ratios comparing the students with and without different disabilities in terms of the completion rate, the pass rate, and the proportion of good grades. The numbers in the three left-hand columns are unadjusted. For instance, the odds of students who were blind or partially sighted completing their courses were 13% (i.e., \[1 - 0.87\times 100\]) less than the odds of students who were not blind or partially sighted completing their courses. The numbers in the three right-hand columns are adjusted for the possible effects of age, gender, prior qualifications, and financial assistance (all treated as categorical variables). For instance, the odds of students who were blind or partially sighted completing their courses were still 13% less than the odds of students who were not blind or partially sighted completing their courses when these other characteristics had been taken into account. In the latter analyses, the effects of age, gender, prior qualifications, and financial assistance were identical to those described in the previous section, and so it is unnecessary to report them here.

In the unadjusted data, the 12 disabilities were significantly related to the completion rate, \(\chi^2(12, N = 280,413) = 573.98, p < .001\). Table 6 shows the following:

- The students with impaired speech were not significantly different from the students without impaired speech; the students with dyslexia or other specific learning difficulties were not significantly different from the students without dyslexia or other specific learning difficulties; the students with fatigue or pain were not significantly different from the students without fatigue or pain; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.
- The students who were deaf or hard of hearing were more likely to complete their courses than were the students who were not deaf or hard of hearing; the students with restricted manual skills were more likely to complete their courses than were the students without restricted manual skills; and the students with other disabilities were more likely to complete their courses than were the students without other disabilities.
- However, the students who were blind or partially sighted were less likely to complete their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to complete their courses than were the students without restricted mobility; the students with mental health difficulties were less likely to complete their courses than were the students without mental health difficulties; the students receiving personal care support were less likely to complete their courses than were the students not receiving personal care support; and the students with unseen disabilities were less likely to complete their courses than were the students without unseen disabilities.

The 12 disabilities were still significantly related to the completion rate even when the effects of age, gender, prior qualifications, and financial assistance were controlled, \(\chi^2(12, N = 269,423) = 315.69, p < .001\). Table 6 shows the following:

- The students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with fatigue or pain were not significantly different from the students without fatigue or pain.
- The students who were deaf or hard of hearing were more likely to complete their courses than were the students who were not deaf or hard of hearing; the students with dyslexia or other specific learning difficulties were more likely to complete their courses than were the students without dyslexia or other specific learning difficulties; the students with autism spectrum disorder were more likely to complete their courses than were the students without autism spectrum disorder; and the students with other disabilities were more likely to complete their courses than were the
students without other disabilities.

- However, the students who were blind or partially sighted were less likely to complete their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to complete their courses than were the students without restricted mobility; the students with mental health difficulties were less likely to complete their courses than were the students without mental health difficulties; and the students with unseen disabilities were less likely to complete their courses than were the students without unseen disabilities.

In the unadjusted data, the 12 disabilities were significantly related to the pass rate, $\chi^2(12, N = 180,561) = 323.61, p < .001$. Table 6 shows the following:

- The students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.

- The students with fatigue or pain were more likely to pass their courses than were the students without fatigue or pain.

- However, the students who were blind or partially sighted were less likely to pass their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to pass their courses than were the students without restricted mobility; the students with dyslexia or specific learning difficulties were less likely to pass their courses than were the students without dyslexia or specific learning difficulties; and the students with other disabilities were less likely to pass their courses than were the students without other disabilities.

The 12 disabilities were still significantly related to the pass rate even when the effects of age, gender, prior qualifications, and financial assistance were controlled, $\chi^2(12, N = 76,151) = 144.48, p < .001$. Table 6 shows the following:

- The students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students with mental health difficulties were not significantly different from the students without mental health difficulties; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.

- The students with fatigue or pain were more likely to pass their courses than were the students without fatigue or pain.

- However, the students who were blind or partially sighted were less likely to pass their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to pass their courses than were the students without restricted mobility; the students with dyslexia or other specific learning difficulties were less likely to pass their courses than were the students without dyslexia or other specific learning difficulties; the students with unseen disabilities were less likely to pass their courses than were the students without unseen disabilities; and the students with other disabilities were less likely to pass their courses than were the students without other disabilities.

In the unadjusted data, the 12 disabilities were significantly related to the likelihood of obtaining good grades, $\chi^2(12, N = 76,151) = 144.48, p < .001$. Table 6 shows the following:

- The students who were blind or partially sighted were not significantly different from the students who were not blind or partially sighted; the students with restricted mobility were less likely to pass their courses than were the students without restricted mobility; the students with dyslexia or other specific learning difficulties were less likely to pass their courses than were the students without dyslexia or other specific learning difficulties; and the students with other disabilities were less likely to pass their courses than were the students without other disabilities.
sighted; the students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students receiving personal care support were not significantly different from the students not receiving personal care support; the students with fatigue or pain were not significantly different from the students without fatigue or pain; the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder; and the students with other disabilities were not significantly different from the students without other disabilities.

- However, the students with restricted mobility were less likely to obtain good grades than were the students without restricted mobility; the students with impaired speech were less likely to obtain good grades than were the students with impaired speech; the students with dyslexia or other specific learning difficulties were less likely to obtain good grades than were the students without dyslexia or other specific learning difficulties; the students with mental health difficulties were less likely to obtain good grades than were the students without mental health difficulties; and the students with unseen disabilities were less likely to obtain good grades than were the students without unseen disabilities.

The 12 disabilities were still significantly related to the likelihood of obtaining good grades even when the effects of age, gender, prior qualifications, and financial assistance were controlled, $\chi^2(12, N = 74,962) = 78.31$, $p < .001$. Table 6 shows the following:

- The students who were blind or partially sighted were not significantly different from the students who were not blind or partially sighted; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with mental health difficulties were not significantly different from the students without mental health difficulties; the students receiving personal care support were not significantly different from the students not receiving personal care support; the students with fatigue or pain were not significantly different from the students without fatigue or pain; and the students with other disabilities were not significantly different from the students without other disabilities.
- The students with autistic spectrum disorder were more likely to obtain good grades than were the students without autistic spectrum disorder.
- However, the students who were deaf or hard of hearing were less likely to obtain good grades than were the students who were not deaf or hard of hearing; the students with restricted mobility were less likely to obtain good grades than were the students without restricted mobility; the students with impaired speech were less likely to obtain good grades than were the students without impaired speech; the students with dyslexia or other specific learning difficulties were less likely to obtain good grades than were the students without dyslexia or other specific learning difficulties; and the students with unseen disabilities were less likely to obtain good grades than were the students without unseen disabilities.

Discussion

These results have demonstrated that the presence or absence of different disabilities is confounded with variations in attainment related to a student’s age, gender, prior qualifications and socioeconomic circumstances. In general, older students did better than younger students, women did better than men, students with higher prior qualifications did better than students with lower prior qualifications, and students not receiving financial assistance did better than students who received financial assistance. These trends need to be taken into account when evaluating academic attainment in students with disabilities.

Accordingly, the first research question was as follows: When the effects of demographic variables have been statistically controlled, do students with particular disabilities differ in their academic attainment from nondisabled students? The right-hand side of Table 5 shows that some groups of students with disabilities showed poorer attainment than nondisabled students even when the effect of these variables had been taken into account. Students with restricted mobility and those with mental health difficulties were less likely to complete their courses than were nondisabled students. Students with restricted mobility, those with dyslexia or other specific learning difficulties, those with unseen disabilities, and those with other disabilities were less likely to pass their courses than were nondisabled stu-
dents. Students with dyslexia or other specific learning difficulties were less likely to obtain good grades on their courses than were nondisabled students.

The second research question was as follows: When the effects of demographic variables have been statistically controlled, do students with and without particular disabilities differ in their academic attainment? The right-hand side of Table 6 confirms the trends just noted when comparing students with and without particular disabilities. However, it includes some additional trends attributable to the inclusion of students with multiple disabilities. Table 5 shows that the completion rate, the pass rate, and the chances of obtaining good grades were lower in students with multiple disabilities, and it is therefore not surprising that (in distance education but not in campus-based education) these students were less likely to obtain good degrees than are nondisabled students (Richardson, 2009a, 2009b). Nevertheless, Table 6 enables one to unpack the notion of “multiple disabilities” to identify those situations in which the presence of additional disabilities makes a difference:

- For students who are blind or partially sighted, the presence of additional disabilities leads to a poorer completion rate and a poorer pass rate, although it appears to make no difference to their likelihood of obtaining a good grade.
- For students who are deaf or hard of hearing and for students with impaired speech, the presence of additional disabilities makes it less likely that they will obtain a good grade, although it appears to make no difference to their completion rate or their pass rate.
- For students with unseen disabilities, the presence of additional disabilities leads to a poorer completion rate and makes it less likely that they will obtain a good grade, although it appears to make no difference to their completion rate or their pass rate.
- Finally, students with fatigue or pain and students with autistic spectrum disorder tend to be more likely to complete their courses and more likely to obtain good grades than nondisabled students, but the presence of additional disabilities tends to hold them back in both regards.

These results have some interesting practical implications. First, efforts to improve the completion rates of students with disabilities in distance education should focus on those with restricted mobility and those with mental health difficulties. Second, efforts to improve the pass rates of students with disabilities in distance education should focus on those with restricted mobility, unseen disabilities, and other disabilities. Provided these students have completed and passed their courses, their academic attainment seems to match that of nondisabled students. It is therefore not surprising that those who graduate are just as likely to obtain good degrees as are nondisabled students (Richardson, 2009b). Broadly speaking, these results confirm the findings that were obtained by Richardson (2010) on the basis of data collected six years earlier.

Efforts to improve the pass rates of students with disabilities should also be focused on students with dyslexia or other specific learning difficulties, but these students would benefit from efforts to improve their grades as well as their pass rates. In terms of the classes of their final degrees, they perform as well as nondisabled students in campus-based higher education (Richardson, 2009a). However, Richardson (2009b) found that they were less likely than nondisabled students to obtain good degrees in distance education. He argued that the reliance on written text in distance education posed specific challenges for students with dyslexia and that they might benefit from the provision of speech production software. The increasing adoption of online delivery should enable course designers to make use of more diverse modalities for presenting content. Conversely, however, the most obvious limitation of the present study is that the findings may well not generalize to campus-based higher education, where information can be presented in diverse modalities and where disablement seems not to play a significant role in predicting attainment (Richardson, 2009a).

It was noted earlier that the total student population of the Open University increased by 48% from 2003 to 2009. Since then, the landscape of distance education has changed again. Until 2012, the governments of the four nations of the United Kingdom subsidized the cost of taking courses with the Open University so that students were required to pay only a fraction of the true cost. In 2012, the governments of England and Northern Ireland withdrew this subsidy so that, apart from some courses in science, technology, engineering, and mathematics, students were required to pay the full cost of their courses. This policy decision led to a substantial increase in their fees, although loans are available for those studying 30 credits or more a year. It remains to be seen what impact these changes will have on the demand for distance education among students with disabilities. Nevertheless, the present findings constitute a baseline from which the University can begin to plan provision and support for students with disabilities in the years to come.
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About the Author

John T. E. Richardson received his B.A. degree in philosophy and psychology from the University of Oxford and his D.Phil. from the University of Sussex. He taught psychology at Brunel University for 26 years until 2001. He is currently the Professor in Student Learning and Assessment in the Institute of Educational Technology at the U.K. Open University. His main research interests are concerned with the relationship between students’ perceptions of their courses of study in higher education and the approaches to studying that they adopt on those courses. He can be reached by email at: John.T.E.Richardson@open.ac.uk

Author’s Note

I am grateful to my colleague James Forman for generating the data set that was analyzed in this study.
Examining Career Readiness and Positive Affect in a Group of College Students with Disabilities: A Pilot Study

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Abstract
Data were collected from 47 college students with disabilities at a large Midwestern university using the Career Thoughts Inventory ([CTI]; Sampson, Peterson, Lenz, Reardon, Saunders, 1996) and the Positive and Negative Affect Scale ([PANAS]; Watson, Clark, & Tellegen, 1988). Initial results revealed no significant differences for CTI total, Decision-Making Confusion (DMC), and Commitment Anxiety (CA) subscales when compared to the normative samples of the CTI. However, significant differences were found for the External Conflict (EC) subscale. Results further indicated that individuals who were identified as having the highest level of dysfunctional career thoughts were also found to have significantly higher levels of negative affect and lower levels of positive affect. Overall, the results of this pilot study provide support for the need to address career thoughts in college students with disabilities and the impact of affect on their career decision-making process.

Keywords: College students, disabilities, career readiness, affect

The enrollment growth of students with disabilities in higher education nationally has generated both an interest and an identified need to further explore the implications associated with and faced by college students with disabilities. Research has further suggested that a college degree serves an important role for persons with disabilities (Madaus, 2006a). According to Planty et al. (2008), the percentage of students with disabilities graduating with a high school diploma was 57% in 2005-2006, an increase from 47% from the 1996-1997 academic year, an indication of the positive impacts of the ADA on students in the primary and secondary education systems. However, the U.S. Department of Education’s National Center for Education Statistics ([NCES]; 2011) reports that up to 11% of all undergraduates report having a disability impacting their academics, but the actual percentage of college students who register for and utilize disability services is typically substantially lower. According to Raue and Lewis (2011), all public 2-year and 4-year institutions (99%), and medium and large institutions (100%) report enrolling students with disabilities.

Despite these promising enrollment trends, the national employment rate is only 20.1% (for both full-time and part-time employment) for individuals with disabilities, whereas those without disabilities have an employment rate of approximately 69.5% (Office of Disability Employment Policy, 2011). Although a higher education degree can increase the number of opportunities available for meaningful employment, it is
apparent that the employment outcomes for individuals with disabilities on average remain substantially lower when compared to those without disabilities.

It is evidenced that college students with disabilities encounter obstacles unique to their disability experience. The overall preparedness of college students with disabilities for transitioning from higher education to employment has been shown to be substantially less when compared to their peers without disabilities, as students with disabilities typically have limited experiences with career development activities and little or no meaningful prior work experience (Hitchings & Retish, 2000). Research has suggested that making career and employment decisions is often a difficult, stressful, and time-consuming process and can be negatively impacted by the presence of disability (Peterson, Sampson, Reardon, & Lenz, 1996). Hitchings, Luzzo, Ristow, and Horvath (2001) found that college students with learning disabilities had difficulties in describing their disability and its impact on their career transition needs, and these students’ participation in career development activities were extremely limited. Stodden, Dowrick, Anderson, Heyer, and Acosta (2005) further reports that, while there is a general sense that college students with disabilities believe that postsecondary education increased their self-confidence and marketability, higher education did not prepare them as well for transition from college to employment.

Programmatic support addressing higher education-to-employment transition specifically for college students with disabilities is limited or non-existent on many campuses, and therefore can create perceived barriers for college students with disabilities. College students with disabilities may believe, for example, that career services professionals do not understand the implications associated with their needs or are not proportionately informed of these services as other students. As a consequence, the career transition needs of college students with disabilities are frequently unmet and may contribute to the low participation rates in career development programs and services that result in poor transition and employment outcomes (Hitchings et al., 2001).

Research in the area of career development and transition has found that how people think about and make decisions related to career information and employment is a robust factor that contributes to the career transition process. For instance, the perceptions of employment self-efficacy and use of self-regulatory strategies and accommodations for university graduates with learning disabilities were found to be a significant predictor to employment satisfaction (Madaus, Ruban, & Foley, 2003; Madaus, 2008). People who have positive thoughts related to making career decisions and have the necessary knowledge about how to process and make career decisions, feel better about, and are more engaged in the career transition process (Kleiman, et al., 2004). Therefore, along with addressing systemic and programmatic issues that impact college student with disabilities’ transition, it would also be important to understand from an individual level how college students with disabilities think about making career decisions and the career transition process. This information could provide the theoretical foundation for both systemic and programmatic interventions that can be designed to enhance the career transition process for college students with disabilities.

Theoretical Framework

Cognitive Information Processing ([CIP]; Peterson et al., 1996) provides a theoretical framework for examining and understanding the role of vocational cognitions in career development and employment and has been applied to research in both of these areas (Keim & Strauser, 2002). The aim of the CIP approach is to help individuals make appropriate career and employment choices while acquiring the cognitive, affective, and behavioral skills needed to engage in effective career and employment problem solving and decision making when faced with future career and vocational choices. The CIP approach is based on the following assumptions: (1) career and employment problem solving and decision making involve emotion and cognition; (2) effective career and employment problem solving and decision making involve both knowledge and process; (3) knowledge regarding oneself and the world of work is dynamic; and (4) career and employment problem solving and decision making are skills that can be acquired and improved through appropriate career interventions (Sampson, Reardon, Peterson, & Lenz, 2004; Saunders, Peterson, Sampson, & Reardon, 2000).

Within the framework of CIP, career readiness is defined as the capability of an individual to make appropriate career and employment choices while taking into account the complexity of the contextual factors (family, SES, gender) that influence an individual’s career development and employment. Capability refers to the cognitive and affective capacity of the individual to engage in effective career and employment problem solving and decision making. Individuals who have higher states of readiness possess the necessary cognitive capacity and positive affective states to effectively engage in career and employment problem solving and decision making. Individuals who are less ready for effective career problem solving and decision making may be inhibited by dysfunctional
career thoughts and negative emotions. Complexity refers to the contextual factors originating in family, society, employing organizations, or the economy that make it more difficult to process the information necessary to solve career and employment problems and make decisions. Individuals who are in a higher state of readiness have fewer family, social, economic, and organizational factors that impact their career and employment problem solving and decision making. Individuals who are less ready for effective career and employment problem solving and decision making may be coping with one or more debilitating factors that negatively impact the career and employment problem solving or decision making process. These factors can generate emotional states such as anxiety, depression, and anger that subsequently make it even more difficult to process information necessary for effective decision-making and problem solving.

Given the theoretical foundations and research supporting CIP, and the purported interaction and impact of cognitive and affective variables on the career development transition process, it would appear to be important to examine the impact of career readiness and positive and negative affect on the career development process in a group of college students with disabilities. However, to date existing studies addressing the career transition of persons with disabilities typically have focused on policy such as the impact of school-to-work transition initiatives (Carter, Trainor, Ditchman, Sweeden, & Owens, 2009; Haber, Karpur, Deschênes, & Clark, 2008; Muthumbi, 2008; Shandra & Hogan, 2008), proposed models for effective service provision (Hart, Zimbrich, & Gihloni, 2001; Johnson, Mellard, & Lancaster, 2007; Richard & Patricia, 2000), and predictors related to positive employment outcomes (Kirchner & Smith, 2005; McDonnall, 2010; White & Weiner, 2004). In addition, research in this area has typically included a broad group of individuals with disabilities and has not focused exclusively on college students with disabilities.

Due to the paucity of research addressing the transition and career readiness of college students with disabilities, there is a significant need to conduct further research in these areas. This current pilot study places an emphasis on investigating both the self-reported cognitive and affective perceptions of current college students with disabilities as it relates to career readiness and development. To mitigate the negative factors associated with career indecision for college students with disabilities, further understanding of the reported perceptions of students is an important initial step. The following two research questions guided this pilot study:

1. Do college students with disabilities have a higher or lower levels of career readiness when compared to a normative group of college students without disabilities?

2. Does positive and negative affect differ in a group of college students with disabilities based on level of dysfunctional career thoughts?

**Method**

**Participants**

Participants in this pilot study were undergraduate and graduate students registered for campus disability services at a large Midwestern university. All participants completed the registration process with the institution’s disability services, the office responsible for determining eligibility for services and reasonable accommodations of currently enrolled students under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Participants were recruited during the intake process that all newly registered students who qualified for disability services must complete. Participants include incoming freshman, transfer, and graduate students.

The sample consisted of 47 college students with various types of disabilities. This sample included 55.3% males and 44.7% females, with ages ranging from 17 to 30 years old (M=19.81 years; SD=2.60). A total of 70.2% were Caucasian, 4.3% African American, 8.5% Hispanic, 10.6% Asian American/Pacific Islanders, 2.1% Native American and 4.3% did not report ethnicity information. The sample was composed of freshmen (51.1%), sophomores (12.8%), junior (17.0%), senior (14.9%), and graduate students (4.3%). These students had been reported to have the following primary disabilities: Mobility (36.3%), Systemic/Medical (8.5%), Learning Disability (19.1%), Attention Deficit Hyperactivity Disorder (23.4%), Psychological (6.4%), Deaf/Hard-of-Hearing (4.3%), and Blind/Low Vision (2.1%) (see Table 1).

**Procedures**

The campus disability services office was responsible for assisting in the recruitment of the research participants for this pilot study. This research study was reviewed and approved by the institutional review board of the investigators’ university. The researchers provided a package of information containing two measures along with the demographic sheet to each of the interested participants who qualified for the supports provided by the disability services office.
The reasons and procedures for this pilot study were explained to all participants and consent was obtained from all participants. All participants were informed that they were free to withdraw or not participate in the study with no negative impact on the services they receive or their academic standing at the University. The majority of participants was informed of the pilot study during the initial intake process for disability services and, from there, completed the two measures. Other participants were recruited when expressing a desire to further explore their own career development; therefore, they agreed to complete the two measures to gain an increased understanding of this area.

**Instruments**

Both the *Career Thoughts Inventory* ([CTI]; Sampson, Peterson, Sampson, & Reardon, 1996) and the Positive and Negative Affect Scale ([PANAS]; Watson et al., 1988) were utilized for this study. Despite their age, both the CTI and PANAS are widely used today in career counseling, mental health, and medical centers for persons with and without disabilities. Further, both instruments are deemed the gold standard in measuring constructs in research (Mpofu & Oakland, 2010; Strauser, 2014).

Career Thoughts Inventory ([CTI]; Sampson, et al., 1996) is a 48-item self-reported measure designed to...
assess career thoughts. The CTI’s content is based on the cognitive information processing (CIP) approach of career decision-making (Peterson, Sampson, & Reardon, 1991). For the purposes of the instrument, career thoughts are defined as outcomes of one’s thinking about assumptions, attitudes, behaviors, beliefs, feelings, plans, and strategies related to career problem-solving and decision-making (Sampson et al., 1996, 1998). Respondents are asked to indicate their responses on each CTI item on a 4-point Likert scale ranging from 0 (strongly disagree) to 3 (strongly agree). This measure yields one total and three construct scores. The total score, consisting of all 48 items, is considered to be the single global indicator of dysfunctional career thinking and career readiness. Higher scores indicate higher dysfunctional career thinking (i.e., lower career readiness). The Decision Making Confusion (DMC) subscale, consisting of 14 items, assesses the inability to initiate or sustain the decision-making process as a result of an individual’s disabling emotions and/or lack of understanding about the decision-making process. The Commitment Anxiety (CA) subscale, consisting of 10 items, assesses the impact that anxiety has on an individual’s ability to commit on a career decision. External conflict (EC), consisting of 5 items, assesses an individual’s inability to balance input from significant others with one’s own preference, resulting in a reluctance to assume responsibility for career decision-making. The evidence supporting the content, construct, discriminant, and criterion validity of the CTI was provided by Sampson et al. (1996, 1998). The internal consistency reliability coefficient of the CTI total score for undergraduate college students was reported by Sampson et al. (1996) as .96 with construct scales ranging from .77 to .94.

Positive and Negative Affect Scale ([PANAS]; Watson et al., 1988) is a 20-item self-reported measure designed to assess the affective states. Respondents are asked to indicate the extent to which they experienced each of 20 emotions, with 10 of the emotions reflecting positive affect (PA) and the other 10 reflecting negative affect (NA) within a specified time period, with reference to a 5-point scale. The scale points are: 1 (very slightly or not at all), 2 (a little), 3 (moderately), 4 (quite a bit), and 5 (extremely). Watson et al. (1988) developed the PANAS based on both empirical and theoretical perspectives. From the empirical perspective, they derived items according to Zevon and Tellegen’s (1982) nine mood content categories, including attentive, excited, proud, strong, distressed, guilty, angry, jittery, and fearful. From the theoretical perspective, they conceptualized PA and NA as the dispositional activation of positively and negatively balanced affects (i.e. the lower ends of each affect are typified by its absence), with PA reflecting the extent to which an individual experiences pleasurable engagement with one’s environment and NA reflecting the extent to which an individual experiences subjective distress and un-pleasurable engagement (Watson et al., 1988). The scales were shown to be highly internal consistent reliabilities, with the coefficient alpha ranging from .86 to .89 on PA and from .84 to .87 on NA across a number of different time frames (Watson et al., 1988). Recent results from a study using confirmatory factor analysis also revealed that an orthogonal two-factor model provided the best fit of the data, which further supported that individuals can be both pleasurably engaged and subjectively distressed simultaneously and therefore can score highly on both PA and NA (Tuccitto, Giacobbi, & Leite, 2010).

Data Analysis

To examine differences between college students with disabilities and a normative group of college students without disabilities, a series of t-tests was conducted. To examine differences in positive and negative affect by levels of dysfunctional career thoughts, three statistical analyses were conducted. First, cluster and discriminant analysis was used to group college students with disabilities by their respective levels of career readiness. Second, a univariate ANOVA and Chi-square analysis were conducted to determine if there were any significant differences between the identified groups on key demographic factors. Third, a multivariate analysis of variance (MANOVA) was computed as an omnibus test of significance by entering the PA and NA scores as dependent variables and group membership in the three cluster groups as independent variable. Univariate F-statistics and post hoc multiple comparisons, with Bonferroni adjustment were used to examine difference in the PA and NA scores across the three cluster memberships. In addition to examining significance, the primary locus of evaluation will be on the magnitude of the effect due to the small sample size. This is the preferred, methodological and statistical framework for small sample sizes (Rosenthal & Rosnow, 1991; Rosenthal, Rosnow, & Rubin, 2000).

Results

For Research Question 1, the raw CTI scores of college students with disabilities were first transformed into the standardized T-scores based on a normative group of college students for the Career Thoughts Inventory (Sampson et al., 1996). Results for Research
Question 1 indicated no significant differences for the CTI Total, Decision-Making Confusion (DMC), and Commitment Anxiety (CA) scores when comparing the CTI normative sample and the sample of college students with disabilities obtained in this study. However, the External Conflict (EC) subscale was significantly different from the normative college student sample ($t(46)=2.533$, $p=.015$) (Table 2).

For Research Question 2, a cluster analysis was conducted using the Ward’s (1963) method of minimum-variance clustering and the squared Euclidean distance as the distance metric to group college students with disabilities based on their CTI total score. Ward’s clustering procedure was chosen in this study as it is the most commonly used clustering method and usually gives a near optimal cluster solution (Romesburg, 1990). Romesburg (1990) further suggested that evidence of validity of the cluster analysis can be verified by finding agreement of the classifications produced from the same data set processed by different multivariate methods. Based on the interpretability of the clusters, examination of the dendrogram, and inspection of the fusion coefficients for “significant” jumps, a three-cluster solution was chosen in our study. Discriminant analysis was then followed using the individual’s scores on the three subscales as independent variables and group membership determined by the cluster analysis as the dependent variable. This analysis yielded significant functions for the data: Wilks’ Lambda1 = .102; $\chi^2 (6) = 98.223$, $p < .001$; Wilks’ Lambda2 = .833; $\chi^2 (2) = 7.877$, $p = .019$.

Examination of the Kappa statistic indicated that the classifications produced from these two methods were significant (Kappa=.872, $p < .001$), in which 91.5% of our sample were correctly classified. The final clusters were labeled as follows: (a) Cluster 1: High level of dysfunctional career thought (i.e. low level of career readiness) ($n=16$), (b) Cluster 2: Moderate level of dysfunctional career thought (i.e., moderate level of career readiness)($n=15$), and (c) Cluster 3: Low level of dysfunctional career thought (i.e., high level of career readiness/productive thoughts) ($n=16$). Table 3 shows the demographic characteristics for each cluster and Table 4 shows the mean scores, standard deviations for each of the three clusters on the total score and three CTI subscale scores. No significant differences were found among the three clusters on age, $F(2,44)=1.550$, $p=.224$; gender, $\chi^2 (2) = .035$, $p = .983$; ethnicity, $\chi^2 (8) = 11.487$, $p = .0176$, or education, $\chi^2 (8) = 11.544$, $p = .173$.

Results of the MANOVA indicated that the overall model is significant (Wilks’ Lambda: $F(4,86) = 4.655$, $p = .002$, $\eta^2 = .178$). Follow-up univariate ANOVAs (Table 5) indicated that both PA and NA scores, when examined alone, were significantly different across the cluster memberships ($F(2,44) = 4.353$, $p=.019$, $\eta^2 = .165$ and $F(2,44) = 5.957$, $p = .005$, $\eta^2 = .213$ respectively). Post-hoc comparisons further revealed that Cluster 1 scored significantly lower on the PA score compared to Cluster 3 ($p=.022$). Additionally, Cluster 1 scored significantly higher on the NA score compared to both Cluster 2 ($p=.026$) and Cluster 3 ($p=.008$). No other significant differences were found on other pairs of means comparisons.
Discussion

The purpose of this pilot study was to investigate whether differences in perceived career readiness exists when comparing a sample of college students with disabilities to a normative college sample. Additionally, this pilot study examined differences in positive and negative affect based on a level of dysfunctional career thoughts for college students with disabilities. Initial results revealed no significant differences for Career Thoughts Inventory (CTI) total, Decision-Making Confusion (DMC), and Commitment Anxiety (CA). However, significant differences were found for the External Conflict (EC) subscale. This result is consistent with prior research that found that individuals with disabilities had increased levels of dysfunctional career thoughts, especially in the area of EC when compared to their counterparts without disabilities (Dipeolu et al., 2002). Results of Research Question 2 found that three groups could be identified based on their level of dysfunctional career thoughts and that group one, the group with the lowest level of career thoughts, also had low levels of positive affect and increased levels of negative affect. In contrast, the other two groups that had low to moderate levels of dysfunctional career thoughts did not differ from each in terms of positive or negative affect. This finding provides continued support for the importance of both cognition and affect on the career decision-making process. Overall, the results of this pilot study provide support for the need to address career thoughts in college students with disabilities and the impact of affect on the career decision-making process for college students with disabilities.

Table 3

Characteristics of the Clusters (N=47)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cluster 1 (n=16)</th>
<th>Cluster 2 (n=15)</th>
<th>Cluster 3 (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: M (SD)</td>
<td>19.13 (1.41)</td>
<td>19.60 (1.99)</td>
<td>20.69 (3.70)</td>
</tr>
<tr>
<td>Women</td>
<td>43.8%</td>
<td>46.7%</td>
<td>43.8%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>0%</td>
<td>6.7%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>81.3%</td>
<td>46.7%</td>
<td>81.3%</td>
</tr>
<tr>
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<td>0%</td>
<td>20.0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Asian/ Pacific Islander</td>
<td>12.5%</td>
<td>20.0%</td>
<td>0%</td>
</tr>
<tr>
<td>Native American</td>
<td>0%</td>
<td>0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshmen</td>
<td>62.5%</td>
<td>40.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>12.5%</td>
<td>20.0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Junior</td>
<td>0%</td>
<td>33.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Senior</td>
<td>25.0%</td>
<td>0%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Graduate students</td>
<td>0%</td>
<td>6.7%</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

Note. Cluster 1: High level of dysfunctional career thought (i.e. low level of career readiness), n=16; Cluster 2: Moderate level of dysfunctional career thought (i.e. moderate level of career readiness), n=15; Cluster 3: Low level of dysfunctional career thought (i.e. high level of career readiness/ productive thoughts), n=16. Percentage may not equal 100 because of participants’ not reporting information.
Table 4

Means and Standard Deviations on the Total and Three CTI Subscale T-Scores for the Three Clusters (N=47)

<table>
<thead>
<tr>
<th>CTI T-Scores</th>
<th>Cluster 1 (n=16)</th>
<th>Cluster 2 (n=15)</th>
<th>Cluster 3 (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Total</td>
<td>63.38 (4.56)</td>
<td>52.40 (2.85)</td>
<td>34.81 (4.34)</td>
</tr>
<tr>
<td>DMC</td>
<td>60.31 (7.67)</td>
<td>49.53 (5.03)</td>
<td>36.69 (2.09)</td>
</tr>
<tr>
<td>CA</td>
<td>60.75 (5.77)</td>
<td>54.80 (5.03)</td>
<td>34.63 (6.45)</td>
</tr>
<tr>
<td>EC</td>
<td>63.88 (13.33)</td>
<td>60.60 (10.85)</td>
<td>42.00 (8.25)</td>
</tr>
</tbody>
</table>

Note. CTI = Career Thoughts Inventory (Sampson et al., 1996); Total = Total CTI score; DMC = Decision Making Confusion subscale; CA = Commitment Anxiety subscale; EC = External Conflict subscale. Cluster 1: High level of dysfunctional career thought (i.e. low level of career readiness), n=16; Cluster 2: Moderate level of dysfunctional career thought (i.e. moderate level of career readiness), n=15; Cluster 3: Low level of dysfunctional career thought (i.e. high level of career readiness/ productive thoughts), n=16.

Table 5

Univariate Analysis and Post-hoc Comparisons on the Positive and Negative Affect Schedule. (N=47)

<table>
<thead>
<tr>
<th>PANAS</th>
<th>Cluster 1 (n=16)</th>
<th>Cluster 2 (n=15)</th>
<th>Cluster 3 (n=16)</th>
<th>F (2,44)</th>
<th>p</th>
<th>η²</th>
<th>Post-Hoc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>29.38 (7.30)</td>
<td>35.87 (9.17)</td>
<td>37.63 (8.42)</td>
<td>4.353*</td>
<td>.019</td>
<td>.165c</td>
<td>1&gt;3*</td>
</tr>
<tr>
<td>NA</td>
<td>24.88 (7.14)</td>
<td>18.33 (4.79)</td>
<td>17.44 (7.53)</td>
<td>5.957**</td>
<td>.005</td>
<td>.213c</td>
<td>1&gt;2*, 1&gt;3**</td>
</tr>
</tbody>
</table>

Note. PANAS = Positive and Negative Affect Schedule (Watson al.,1998); PA: Positive Affect; NA= Negative Affect. Cluster 1: High level of dysfunctional career thought (i.e. low level of career readiness), n=16; Cluster 2: Moderate level of dysfunctional career thought (i.e. moderate level of career readiness), n=15; Cluster 3: Low level of dysfunctional career thought (i.e. high level of career readiness/ productive thoughts), n=16. * p < .05. ** p < .01. η² = partial eta2 statistics: a small effect (η² = .01); b medium effect (η² = .06); c large effect (η² = .14). Only significant post-hoc comparisons are reported.
Elevated subscale scores for individuals with disabilities in the area of external conflict (Dipeolu et al., 2002). Elevated scores in the area of external conflict would suggest that college students with disabilities may experience more difficulty managing environmental and context factors related to the career developmental process and may lack the resources to effectively manage and address issues related to this area.

The inability to adequately cope with and manage issues related to external conflict can contribute to emotional states such as anxiety, depression, and anger that further debilitate the career development process (Lustig, Zanskas, & Strauser, 2012) and potentially put students at risk for becoming disengaged with the higher education process. Therefore, the results of this pilot study suggest that career interventions and supports that specifically target issues related to contextual, familial, and societal factors and how they impact the career development process would appear to be important. A study of recent graduates with learning disabilities support such interventions as they report that internship placement, mentorship, and courses/trainings related to the world of work and rights under the ADA were suggestions for how students can be supported for the transition from higher education to employment (Madaus, 2006b). However, interventions and supports addressing contextual, familial, and environmental factors related to career development process are not typically included as part of most disability student programs.

Results related to Research Question 2 indicate that individuals can be grouped according to their respective levels of dysfunctional career thoughts. This finding is consistent with prior research that found similar groupings and is consistent with the central tenets of Cognitive Information Processing Theory (Peterson et al., 1996). This finding is important because, according to CIP theory, being able to group individuals according to the type and intensity of dysfunctional career thoughts is critical in guiding the level of career intervention (i.e., individualized, psycho-education, self-exploration). Of particular interest related to Research Question 2 is the finding that individuals who were identified as having the highest level of dysfunctional career thoughts were also found to have significantly higher levels of negative affect and lower levels of positive affect. In contrast, the groups with low to moderate levels of dysfunctional thoughts did not differ in terms of levels of positive and negative affect. This finding is important because it is theoretically consistent with CIP and provides continued support for the significant role that affect has on career readiness and ultimately the career development process. Clinically, findings related to Research Question 2 point to the importance of addressing emotional and affective issues as part of any career and educational interventions.

Overall, the results of this particular pilot study indicate that college students with disabilities are at increased risk for experiencing difficulty managing contextual and environmental factors related to the career development process when compared to their counterparts without disabilities. In addition, findings point to the significant role that positive and negative affect have on career readiness and the career development process. The results of this pilot study point to the importance of developing and implementing interventions that help manage issues of complexity and affect as it relates to the career development process. It is important to note that students with disabilities often fall between the cracks when it comes to career guidance on postsecondary campuses. Additional research examining career development and the continued inequity in career and employment outcomes between college students with disabilities and their peers without disabilities is clearly needed.

Limitations

There are several issues that limit the generalizability of this pilot study’s findings. First, we were limited by a small sample from a large Midwestern University. The sample participants were limited to students who volunteered to participate during the initial intake process to disability services. The majority of participants had physical disabilities and/or were freshman students. Freshmen represent one of the highest percentages of new incoming students to disability services. At the time, this was deemed the most effective way for recruiting students for our study as students are not required to utilize services even if they qualify for them, nor are they required to meet with their assigned disability services advisor on a regular basis. Therefore, the likelihood of students coming back to the disability services office solely to complete career assessments was highly unlikely. It should be further acknowledged that students who are traditional-aged freshman can impact the overall career readiness of any student regardless of disability status due to their age and life experience. Therefore, to generalize or assume that similar outcomes would result with a larger and more regionally diverse sample is premature at this point. Secondly, our sample is rather homogeneous, as 70.9% of students were white/Non-Hispanic. In addition, the majority of our sample was male and not completely representative of student composition at the lead author’s institution. Third,
the measures utilized in our study are self-reported measures; therefore the response to the assessments may be impacted and include a degree of social desirability. Finally, the data in this study are cross-sectional in nature; therefore, we are not able to determine any degree of causation.

**Implications for Practice**

Based on our findings, the implications for practice are two-fold. First, continual career counseling sessions between advisor/counselor and students with disabilities that address career readiness levels and the dynamics of workplace environments is needed. Secondly, additional collaborative efforts at the organizational level in higher education are needed to create a more seamless approach to service provision for career counseling of college students with disabilities. It appears that college students with disabilities are in potential need of ongoing support to further understand the complexity or contextual factors related to perceived career readiness. Comprehensive career and individual counseling services to inform and increase the management of the environmental factors that may be negatively impacting the career developmental process is needed. For instance, assisting students in career exploration process to have an increased understanding of the work-related requirements for any occupation(s) of interest is needed. This would in turn assist the student in identifying appropriate accommodations in relation to the fundamental job responsibilities of any given occupation(s) of interest. Another important area to address is further educating college students with disabilities and their employment rights under the ADA (Madaus, 2006b). Research has suggested that the disclosure rates of college graduates with disabilities in the employment setting are low (Madaus, 2008). As the impact of globalization and technology in the workforce continues, the degree of complexity that characterizes the workplace will continue to diversify and expand. This will require that employees with disabilities need to be prepared to continually learn, adapt and adjust to increasingly diverse work environments.

Finally, in reference to more collaborative efforts at the organizational level, the initiation and sustainment of working relationships between disability and career services offices are needed to counsel the needs of college students with disabilities in a more holistic rather than a compartmentalized approach. Research suggests that college students with disabilities underutilize career services at the higher education level (Enright, Conyers, & Szymanski, 1996; Frieh & Aune, 1996). Collaboration between career services and disability services can encourage college students with disabilities to be further cognizant of what career services supports provide and to utilize the supports available to them as enrolled students.

**Suggestions for Future Research**

The authors are committed to further their data collection efforts to increase this study’s existing sample size and to have a more representative sample across disability types for a more generalizable sample. The researchers hope that further data collection will serve as the initial phases of a longitudinal study, especially since there were a greater number of freshman student participants who participated in this pilot study. Additionally, utilizing the same instruments and sampling college students without disabilities would provide a comparison sample in order to investigate the similarities and/or distinctions of a sample of college students with and without disabilities. Finally, the possibility of contributing to updating the norms of the study’s data collection instruments is another direction of future research.

**Conclusion**

The overall results of this pilot study found that college students with disabilities reported more difficulty in managing the contextual issues related to career readiness and development. In contrast, there were no differences related to their perceived ability to understand and explore the personal aspects related to making an effective decision. Results indicate the need to provide supportive career and vocational counseling for college students with disabilities. This may be particularly important given prior research that has indicated that college students with disabilities are in need of career services but are unlikely to seek out those services from the traditional career centers on college campuses. Continued research in this area would appear to be important in identifying effective intervention approaches for increasing career readiness levels of college students with disabilities.
References


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Attitudes of Nursing Faculty towards Nursing Students with Disabilities: An Integrative Review

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Marquette University

Abstract
The Americans with Disabilities Act (ADA, 1990) and Americans with Disabilities Act Amendments Act (ADAAA, 2008) provide students with disabilities access to postsecondary institutions and are applicable to nursing education in all learning environments. Nursing faculty members are charged with admitting, educating, and graduating students, with or without disabilities. Since the enactment of ADA and ADAAA, positive and negative attitudes of faculty towards students with disabilities have emerged in nursing literature. This integrative review focuses on the question: “What are nursing faculty’s attitudes towards students with disabilities?” The nursing research was rigorously reviewed and analyzed in order to assess nursing faculty’s attitudes towards students with disabilities. Themes emerged from an analysis of nine sources in relation to admission, accommodation, and perception of the success of students with disabilities in nursing programs and the nursing profession. Implications, recommendations, and a call for future nursing research were identified.

Keywords: Nursing education, faculty attitudes, nursing students with disabilities

Nearly 707,000 students with a disability attended postsecondary institutions in 2008-2009 (National Center for Education Statistics, 2011) and enrollment is projected to increase secondary to improved screening, legislation, and students’ awareness of their rights to equal access through accommodations (National Council on Disability, 2011). There are no available statistics on the number of nursing students with disabilities (NSWD) attending school. However, there are numerous articles and research studies attesting to their attendance in nursing schools that address faculty attitudes and issues surrounding admission, accommodation, academic standards, patient safety, National Council Licensure Examination (NCLEX-RN®) eligibility, and employment of nursing students with disabilities (Aaberg, 2010; Carroll, 2004; Dahl, 2010; Persaud & Leedom, 2002; Rankin, Nayda, Cocks, & Smith, 2010; Sowers & Smith, 2004 a, 2004b). The literature review also found varying degrees of understanding, acceptance and application of ADA laws and requirements amongst nursing faculty. These inconsistencies in attitudes and behaviors of nursing faculty members ranged from the belief that accommodations were not available to the belief that accommodations were inappropriate by virtue of providing an unfair advantage to students with a disability. The results of some of these beliefs and practices create barriers to students with disabilities from entering, progressing, and graduating into the nursing profession.

An increase in enrollment of students with disabilities is attributed to three key federal statutes created to eliminate discrimination and improve access to postsecondary institutions (Leiker, 2008). Section 504 of the Rehabilitation Act of 1973 (Section 504) (29 U.S.C. § 794) is the first legislation prohibiting postsecondary institutions receiving federal grants, contracts, assistance or government-supported loans from discriminating against individuals based on a disability. The second law is the Americans with Disabilities Act of 1990 (ADA) (42 U.S.C. § 12101), which broadens coverage of anti-discrimination for individuals with disabilities in regards to employment, transportation, public accommodation, telecommunications, public services, and goods. Students with disabilities are covered under these laws since colleges and universities are considered public places and may be financed with government funds (McCleary-Jones, 2005; Newsham, 2008). The ADA stipulates that an
educational institution is mandated to provide “reasonable accommodation” (i.e., alternative ways to learn or demonstrate knowledge) to students who satisfy the requirements for such service unless the institution can prove that providing an accommodation creates “undue burden” (i.e., financial costs). There are a number of interpretations of the meaning of “reasonable accommodation” and “undue burden” in the academic setting. Colleges and universities have a difficult time proving “undue burden” based upon the size of their budgets (Newsham, 2008). Some faculty have expressed the misperception that accommodations can “fundamentally alter” course criteria or program outcomes (Betz, Smith, & Bui, 2012).

The Americans with Disabilities Act Amendments Act of 2008 (ADAAA) (ADAAA, 42 U.S.C. § 12102.2, A) is the latest legislation that significantly impacts postsecondary institutions’ policies and procedures regarding the provision of access for students with disabilities. The ADAAA expands the definition of “qualified disability” by addressing “mitigating measures” which cannot be factored in determining a disability (Leiker, 2008). Examples of “mitigating measures” include prosthetic limbs, hearing aids, mobility devices, and other assistive devices. For a nursing student wearing hearing aids, accommodations are still necessary to ensure access to learning activities and skilled performances (e.g., amplified stethoscope, clear surgical masks to facilitate lip reading). As an outcome of the broadening definition of a disability, more students with disabilities are attending nursing school, intensifying the need for reasonable accommodations and sensitivity to disabilities.

All students applying to colleges and universities must satisfy admission requirements, which vary amongst academic institution (e.g., grade point average, entrance examination scores). Schools of nursing, as well as other schools of healthcare (e.g., medicine, physical therapy) may have additional entrance requirements that a student must meet (Cook, Rumrill, & Tankersley, 2009; McCleary-Jones, 2005; Sin, 2009). Students qualify for the program if they meet the admission criteria or for the student with disabilities, reasonable accommodations are applicable and do not require fundamental alteration of the curriculum (Helms, Jorgensen, & Anderson, 2006; McCleary-Jones, 2005). Students with disabilities are “otherwise qualified” when they meet the same academic requirements as students without disabilities (Brinckerhoff, Shaw, & McGuire, 2002). “Otherwise qualified” also has an expectation that students with disabilities meet all of the coursework, class participation, attendance, and knowledge assessments required to remain eligible for enrollment.

**Problem Identification**

Students with disabilities have been denied entrance into nursing programs due to the technical standards or essential functions of performance a student must demonstrate (e.g., ambulate independently, perform CPR, able to lift 50 lbs. or squat for 2 minutes) (Aaberg, 2010; Dahl, 2010; Katz, Woods, Cameron, & Miliam, 2004; McCleary-Jones, 2005). Technical standards establish the non-academic requirements a student must have or possess to enter a program of study (Smith, 2008). A well written technical standard statement focuses on the “what,” not “how” of a skill (Smith, 2008). For example, “must be able to gather vitals using a variety of means” instead of “must be able to hear a heart murmur through a stethoscope” (Smith, 2008, p. 1); the focus is on the general, not the specifics of a skill. The essential functions of a nurse for employment are acquired after a program of study is completed, not before. As such, technical standards for a nursing student are not the same as essential functions for a registered professional nurse (Smith, 2008). Sometimes these concepts are misconstrued. Each nursing program establishes its own criteria for students to meet and fulfill from admission to graduation (Helms et al., 2006; Katz et al., 2004; McCleary-Jones, 2005; Sowers & Smith, 2004a, 2004b). Nursing faculty’s attitudes towards technical standards of performance might be linked to traditional ideals based on their own experience in practice (Christensen, 1998; Katz, et al., 2004; McCleary-Jones, 2005; Newsham, 2008; Persaud & Leedom, 2002). For the purpose of this integrative review, the term “attitude” is defined as a value, belief or perception faculty members have towards a student with a disability (Aaberg, 2010; Dahl, 2010; Ney, 2004).

**Purpose of the Integrative Review**

With nursing faculty regulating entrance into their programs, it begs the question: “What are the attitudes of nursing faculty towards nursing students with disabilities (NSWD)?” An integrative review of the nursing literature was undertaken in order to (a) evaluate the research available on nursing faculty’s attitudes towards nursing students with disabilities in undergraduate programs; (b) extract findings from qualified research; and (c) discuss the implications, recommendations, further research and strategies for the inclusion of students with disabilities to become professional nurses.
Methodology of Review

Design
The framework presented by Whittemore and Knaf (2005) drives this integrative review. Whittemore and Knaf’s integrative review method allows for the combination of diverse review methodologies, including qualitative data analysis in combination with empirical and theoretical sources, for greater evidence-based nursing practice. This methodology improves the rigor of the review and captures the phenomenon of investigation: nursing faculty’s attitudes towards nursing students with disabilities.

Search Methods
A comprehensive computerized database search was conducted using the Boolean operator of “AND” in Cumulative Index of Nursing and Allied Health Literature (CINAHL) which yielded 146 articles. Education Resources Information Center (ERIC) generated 13 articles, 4 papers were produced by Web of Science, Health Science in ProQuest garnered 85 articles, PubMed populated 15 articles, and 6 papers were found in Dissertations and Theses from ProQuest since the enactment of the ADA in 1990 to 2012 using the search terms: “nursing education,” “faculty attitudes,” “nursing student with disab*.” Four additional articles were obtained by using the ancestry approach and hand search to explore possible relevant articles on the topic from citations and abstracts. It was necessary to use the Boolean operator of “AND” and “language” in English to narrow the results from 34,379 entries to 273. Duplicates were removed and abstracts read for appropriateness. Fifty-two articles were advanced and evaluated against inclusion and exclusion criteria established before the commencement of the integrative review.

Review Process
Inclusion criteria were (a) quantitative, qualitative, mixed-method published research studies including dissertations with clearly defined aim, purpose, methodology, results, data analysis, and references; (b) research studies addressing nursing faculty attitudes towards nursing students with disabilities regarding admission, accommodation, academic standards, patient safety, NCLEX-RN® eligibility, and employment of nursing students with disabilities; (c) studies conducted within associate degree (ADN) or baccalaureate degree (BSN) nursing program; (d) research addressing the attitudes of nursing administration and clinical agencies towards nursing student with disabilities; (e) articles classified as curricular commentaries addressing the issue of students with disabilities within nursing education; (f) and studies or articles germinated since the ADA and ADAAA were enacted. Studies meeting inclusion criteria were evaluated again and coded for methodological quality (i.e., 2=high, 1=low), relevance to topic (i.e., 2=yes, 1=no), and identified themes.

Exclusion criteria included (a) nursing faculty’s anecdotal experiences working with nursing students with disabilities; (b) studies conducted on nurses with disabilities in practice or their employers; (c) and studies not meeting the second round of the critique process. As a result of the established criteria and evaluation process, a total of six published studies and three doctoral dissertations (n=9) were analyzed for this review. Four curricular commentary articles were reviewed (n=4) and included in the discussion section in order to provide perspectives from content experts in disabilities and nursing education, but these were not factored into the review of the findings.

Findings
Seventy-eight percent of the articles were dated from 1995 to 2004 (6 publications, 1 dissertation) and only two dissertations were more recent, from 2010 (22%). Most of the studies were quantitative (78%, n=7) and descriptive surveys (n=5), quasi-experimental (pre/post-test) method (n=1) or descriptive comparison survey (n=1) (see Tables 1 and 2). Sample sizes of participants in these studies were identified as either nursing faculty (n=84 to 317) or schools of nursing (n=52 to 247).

One qualitative dissertation (11%, n=1) used semi-structured open-ended interviews to collect data (n=10) that were analyzed for patterns and themes. The other dissertation was a mixed-method study (11%, n=1) in which the data were collected through surveys and five open-ended questions.

Quantitative Research
Christensen (1998) examined admission decisions and attitudes of nursing faculty towards students with a physical disability through the Interaction with Disabled Persons (IDPS), a modified version of the Contact with Persons with Disabilities Scale (CPDS), and the Nurse Educator’s Information Survey (NEIS), which she developed. The IDPS is a 20-item instrument measuring an individual’s attitude toward people with disabilities using a 6-point Likert scale. Christensen reported previous Cronbach’s alpha for IDPS at .74 to .86 and construct validity was evaluated by factor analysis and nomological network of fit. The modified version of the CPDS measured the amount and quality of a participant’s previous interactions with individuals...
<table>
<thead>
<tr>
<th>Author</th>
<th>Purpose</th>
<th>Population/Sample/Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christensen (1998)</td>
<td>Examined nursing faculty’s admission decisions, attitudes toward individuals with visible disabilities, and barriers to admission</td>
<td>Nursing faculty of ADN and BSN programs (n=84) Descriptive Study</td>
</tr>
<tr>
<td>Ney (2010)</td>
<td>Investigated the impact of ADA on nursing education; faculty’s attitudes towards students with disabilities and accommodations provided</td>
<td>Nursing faculty of ADN and BSN programs (n=317) Descriptive comparison study</td>
</tr>
<tr>
<td>Magilvy &amp; Mitchell (1995)</td>
<td>Explored nursing faculty experiences with students with disabilities; measure admittance and accommodations provided</td>
<td>Nursing faculty of ADN and BSN programs (n=69) Descriptive study</td>
</tr>
<tr>
<td>Watson (1995)</td>
<td>Examined nursing schools methods for identifying and accommodating students with disabilities</td>
<td>Schools of Nursing Deans and Directors of BSN programs (n=247) Descriptive study</td>
</tr>
<tr>
<td>Persaud &amp; Leedom (2002)</td>
<td>Studied the impact of the ADA on admission accommodation, and retention of nursing students with disabilities</td>
<td>Schools of Nursing Deans and Directors of ADN and BSN programs (n=52) Descriptive study</td>
</tr>
<tr>
<td>Sowers &amp; Smith (2004a)</td>
<td>Identified nursing faculty’s perceptions of students with disabilities completing their program and success in nursing; assess knowledge of accommodations</td>
<td>Nursing faculty of ADN and BSN programs (n=88) Descriptive study</td>
</tr>
<tr>
<td>Sowers &amp; Smith (2004b)</td>
<td>Evaluated the impact of a professional training program on nursing faculty’s perceptions, knowledge, and concerns regarding students with disabilities</td>
<td>Nursing faculty of ADN and BSN programs (n=112) Quasi-experiment, Pretest-posttest</td>
</tr>
</tbody>
</table>
The participant responded to 20 situations using a 5-point Likert scale. To assess internal consistency, the researcher reported using a split-half and Cronbach’s alpha at .89 to .95 for the five samples. The NEIS (Christensen, 1998) scale consisted of two parts: demographic data and a brief vignette to assess the decision-making process nursing faculty underwent in relation to the accommodation an applicant with a disability would require. Face and content validity were reviewed by five graduate nursing students and revisions were made based upon their feedback. This descriptive study utilized a convenience sample of faculty \( (n=175) \) representing 17 Minnesota nursing programs and resulted in a response rate of 55\% \( (n=84) \) to the mailed survey.

The findings revealed nursing faculty had more positive attitudes towards an individual with a disability than the normative sample. Greater negative attitudes were held among faculty who had less exposure to individuals with a disability. The relationship between nursing faculty’s attitudes towards people with disabilities (IDPS) and degree of contact (CDPS) scores were examined using the Spearman rank correlation coefficient and resulted in a statistically significant, but weak relationship between these variables (i.e., the lower the amount of contact with an individual with a disability was associated with greater negative attitudes towards an individual with a disability). Sixty percent of the faculty preferred the identification of a disability and would base program acceptance on the ability to provide accommodations. The survey also reported that 28\% of the faculty would accept students under a contingency of further assessments, as applicable, and 8\% desired a list of essential functions all students would have to perform in order to graduate from the program (Christensen, 1998).

General limitations of Christensen’s study included no reported power analysis, no pilot study on the combination of scales used, convenience sample from one state, and unexplained missing data \( (n=85\text{ to }79) \). Several limitations to the NEIS were identified. There was no reliability for the vignettes; face and content validity were assessed by five graduate nursing students, not content experts; and a factor analysis was conducted on the IDPS but the factors were not reported in the paper.

Ney (2004) randomly surveyed nursing faculty on their attitudes towards nursing students with disabilities, accommodations, and the impact of ADA on nursing education. The researcher used Bolton’s 50-item (Part A, B, and C) Survey of the Impact of the ADA on Nursing Education Programs in Alabama (1994) for this comparative study. Part A contains 24 items measuring the impact of the ADA on the nursing program using a 5-point Likert scale. Part B (19 items: 5-point Likert scale) was specific to the participant’s attitude towards NSWD. Part C was a seven-item subsection pertaining to accommodations (e.g., sufficient accommodation available, essential skills, criteria for demonstrating essential skills, number of students in clinicals, disabilities officer at the institution) and was yes/no type questions. Content validity was established in Bolton’s pilot study by the review of literature and panel of content experts. Split half reliability for this pilot was provided by the administrators of the National League for Nursing Accrediting Commission (Part A, \( r = .94 \); Part B, \( r = .93 \)). Ney reported the Cronbach’s alpha of .70 to .93 for the program levels and subsections analyzed. The researcher performed a power analysis to calculate sample size of 384 participants \( (n = 192 \text{ ADN}; n = 192 \text{ BSN}) \). The population for this study were ADN and BSN nursing faculty \( (n =

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### Table 2

<table>
<thead>
<tr>
<th>Author</th>
<th>Purpose</th>
<th>Population/Sample/Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahl (2010)</td>
<td>Explored nursing faculty’s perception of admission and education of students with disabilities in their program</td>
<td>Nursing faculty of BSN program ( (n=10) ) Qualitative study</td>
</tr>
<tr>
<td>Aaberg (2010)</td>
<td>Investigated nursing faculty’s implicit attitudes towards students with visible disabilities</td>
<td>Nursing faculty of BSN programs ( (n=132) ) Mixed-method study</td>
</tr>
</tbody>
</table>
534) throughout the United States with a total rate of 58.2% (n = 317). SPSS 10.0.5 was used to calculate the descriptive and inferential statistics.

The findings from Ney’s study were three pronged: Part A data analysis did not indicate a difference between the ADN and BSN nursing faculty groups in regards to impact of the ADA on collegiate nursing education. For Part B, both groups had positive attitudes towards nursing students with disabilities; however, there was a statistically significant difference between the groups means indicating BSN faculty were more positive towards students with disabilities than ADN faculty. In Part C, participants identified accommodations often used by nursing students with disabilities as physical accessibility, special testing, tutors, and rated these accommodations as adequate. Other accommodations provided to students ranged from note takers to adaptive equipment in the classroom and skills lab. Some faculty acknowledged accommodations were not available at their school of nursing (i.e., modified academic load, lecture taping, transition programs, and course waivers). Nursing faculty reported their experiences with students having a disability were often for those with learning disabilities (LD), chronic illness, and auditory loss. Limitations to this study included no content validity index from Bolton’s pilot, faculty at both schools could have responded to questions in a “socially acceptable” manner, and the length of the questionnaire causing participant fatigue.

Magilvy and Mitchell (1995) conducted a random descriptive survey of BSN and ADN nursing school faculty throughout the United States to explore their experiences with students they admit and graduate with visual, hearing, mobility, or LD. These researchers designed a mailed questionnaire consisting of a check-off list, Likert scale, and open-ended questions. Content validity was not established but a pilot study was conducted to examine reliability. No other reliability or validity information was reported. The sample for this study (n = 200) included deans or directors of schools of nursing (Part 1) who selected ADN and BSN nursing faculty members (Part 2) to participate in the study, along with the school’s program admission officer (Part 3). The response rate was 40% (n = 86), representing 44 different states.

The findings of the study reported that most nursing faculty had experience working with students with a disability. The majority of these interactions were with students having LD, followed by social/emotional, auditory or chronic illness. Nursing faculty reported the use of creative problem solving to assist students in meeting criteria (e.g., testing arrangements for a student with LD or alternative experiences in clinical).

The type of accommodations used by the students varied greatly. Most schools reported admitting students with known disabilities (e.g., hearing, mobility, visual), but “learning disabilities, chronic illness, and mental disabilities were hidden impairments, typically diagnosed during the student’s program rather than prior to admission” (Magilvy & Mitchell, 1995, p. 33). Approximately half of the students with disabilities graduated. Deans and directors of nursing hand selected faculty to participate in the study; therefore, bias or “socially acceptable” answers may have been recorded. In addition, the Likert-scale options were not disclosed.

Watson (1995) developed a descriptive survey to examine BSN nursing schools’ trends in admitting students with disabilities, identification, accommodations, and clinical performance criteria. The pilot instrument was reviewed by faculty and clinical specialists for content validity, but no other reliability or validity indexes were performed. The sample for the survey were 420 BSN programs with a response rate of 59% (n = 247).

The findings of Watson’s study revealed nearly half of the schools admit students with disabilities, with LD most prevalent, followed by mobility, auditory, and visual impairment. Accommodations ranged from tutoring to equipment modification. Over half of the nursing programs reported attempts to identify new applicant or transfer student disability status. One-fifth of the schools requested students to voluntarily disclose their disability status on admission forms. Limitations to Watson’s study included the fact that; validity and reliability of the survey were not provided; item types on the instrument were not well defined; no power analysis was conducted; a convenience sample was used; and a restricted sample, as only members of the American Association of Colleges of Nursing (AACN) were invited to participate in the survey.

Persaud and Leedom (2002) studied the impact of the ADA on admission and retention of students with disabilities in BSN nursing programs. These researchers designed a descriptive survey that specifically addressed schools’ methods of identifying students with disabilities and practices used to establish reasonable accommodations. The six part instrument used yes/no responses and provided room for comments. No validity or reliability information was provided. The survey sample was 102 National League for Nursing (NLN) BSN program members (deans or directors of schools of nursing) in California and resulted in a response rate of 50% (n = 52).

According to the survey results, the majority of the schools of nursing had applicants with identified disabilities. Dyslexia, hearing loss, situational depression,
and LD were the most frequently reported. Various types of accommodations were available to students with disabilities (e.g., audio-taped lectures, note takers, testing, and adaptive equipment), however, 19% (n = 10) of respondents reported not providing appropriate accommodations to students who qualified. Some faculty commented on the limitation of providing accommodations in the clinical setting secondary to clinical agency policies. For example, a clinical agency would not allow students or staff to use wheelchairs or crutches. Other schools would not accommodate a severe back injury since students were required to bend and lift. Some participants felt forced to accommodate when they perceived the request as unreasonable; such as, providing extra time for a skill performance or assessment (16%, n = 8). Other schools reported they would opt out of offering the same accommodations in the future. Limitations of this study included the absence of reported validity or reliability data, the lack of a power analysis, and a sample that was restricted to NLN members residing in one state.

Sowers and Smith (2004a) studied nursing faculty in regards to their perceptions, knowledge, and concerns for nursing students with disabilities and their completion of the nursing program, as well as success in subsequent nursing careers. Sowers and Smith developed and sent a descriptive survey with a 38 item 6-point Likert scale to eight selected ADN and BSN programs. The survey sample was 244 ADN and BSN Oregon nursing faculty and resulted in a response rate of 36% (n = 88).

The results of this survey found that nursing faculty perceived students with ADD/ADHD as the most likely to succeed in their program and in the nursing profession. Faculty perceived students who had a vision loss as the least likely to succeed in their program and the profession. Faculty also reported their concerns regarding the time commitment surrounding students needing accommodations. In addition, nursing faculty perceived they lacked the knowledge to teach students with disabilities in the classroom and clinical setting, felt they needed more information on accommodations, and wished to better understand legal obligations to the student. The limitations of this study included a lack of a power analysis, lack of instrument reliability/validity, and a small geographically restricted sample size.

Sowers and Smith (2004b) conducted a quasi-experimental (pretest-posttest) study with nursing faculty who were participating in an educational program specific to students with disabilities. Prior to the program, faculty completed an 18 item 6-point Likert scale questionnaire regarding their attitudes towards students with disabilities and their ability to be successful in their program, as well as in the nursing profession. The questionnaire was piloted in a previous study.

Faculty rated students with a vision loss as least likely to succeed in their program and in the nursing profession, followed by students with mental health issues and wheelchair users. These results replicated their findings from a separate earlier study (Sowers & Smith, 2004a). Upon completion of a two hour educational program, there was a statistically significant change in faculty attitude scores. Faculty members were more positive towards students with disabilities and perceived they would be successful in their program and in the profession of nursing. Faculty concerns in regards to time requirements, patient safety, and academic and clinical standards were reduced. Limitations to this study were the researchers’ use of a convenience sample restricted to institutional affiliations in Oregon, a need to consider a Hawthorne effect secondary to the researchers’ collegial relationship with the participants, and no ANCOVA to assess for covariates.

Qualitative Research

Dahl (2010) explored BSN nursing faculty’s perceptions regarding the entrance of students with disabilities into nursing education and the education of those students once admitted. Two semi-structured audio-taped interviews were conducted using open-ended questions guided from the literature and focused on faculty’s definition of disabilities, explanation of admission criteria, experiences with students with disabilities, and essential function criteria used in the admission process. Data were transcribed, verified, and reviewed with anecdotal notes. After the second interview and reading of the transcripts, data was interpreted and themes were constructed.

Findings indicated that nursing faculty used the medical/individual model as the underpinning of their decision making process for admitting and educating students with disabilities. Faculty lacked experience and knowledge to work with students with disabilities in the classroom and clinical setting, resulting in oppressive behaviors such as making a NSWD perform a pre-skill that the student’s peers were not required to perform. Nursing faculty were the gatekeepers of the admission process, which was based on historical traditions. Some faculty disclosed their own disability, which made them more knowledgeable regarding resources and accommodations for students with a disability. Nursing faculty who had a disability shared negative experiences in their role and the lack of support from administration, peers, and accommodations by the institution. Limitations of Dahl’s study included
the absence of a peer debriefing, member checking occurred during the interview and not after data analysis, and the fact that an inquiry audit by external content experts was not conducted. Additional limitations to the study included a small sample size (n=10) polled from the limited geographic area of metropolitan Minneapolis/St. Paul.

Mixed-Method Research

Aaberg (2010) surveyed BSN nursing faculty to explore their implicit attitudes towards students with visible disabilities. Participants completed the on-line Disability Attitudes Implicit Association Test (DA-IAT), a demographic survey, and open-ended questions. A DA-IAT score greater than zero indicated faculty preference for able-bodied persons. This instrument’s validity (e.g., content, construct, convergent, discriminant, predictive) was historically established. Cronbach’s alpha was reported at .78. The demographic survey was an 11 item, yes/no questionnaire, with content validity established by a panel of experts. No reliability index was given. The last instrument was five open-ended questions in which the construct validity was confirmed by experts in the field and responses evaluated through content analysis. A power analysis was conducted and the required number of participants was exceeded. The sample was 781 BSN nursing faculty with a response rate of 22% (n = 132). SPSS was used for data analysis.

The results from the DA-IAT instrument revealed nursing faculty strongly preferred able-bodied persons, a statistically significant finding when compared with the normative findings. In the demographic survey, only one variable was statistically significant and indicated greater interactions with an individual with a disability affects implicit attitudes. Themes that emerged from Aaberg’s open questions were admission criteria and process, assumptions regarding patient safety, and addressing assessed biases obtained from the survey. Limitations to this study included a restricted population of AACN schools of nursing and users of the Project Implicit website. No pilots for the demographic or open-ended questions were conducted.

Integrative Discussion

Emergent themes from the integrative review were developed through the use of Walker and Avant’s (2011) method of concept analysis. Each article was analyzed for defining attributes, antecedents, and consequences and a concept analysis matrix was completed for each article that met the review criteria. The analysis identified admission, accommodations, and perceptions of ability as key concepts. A synthesis of these main concepts regarding attitudes of nursing faculty towards NSWD was pulled forward for further discussion.

Admission

Admission into an undergraduate nursing program is determined by meeting technical standards and program criteria, with or without accommodations (Aaberg, 2010; Christensen, 1998; Dahl, 2010; Magilvy & Mitchell, 1995; Persaud & Leedom, 2002; Watson, 1995). Essential functions are based on nursing tradition and faculty’s perceptions of the necessary knowledge, skills, and affective behaviors a graduate must master in order to enter the nursing profession (Aaberg, 2010; Christensen, 1998; Persaud & Leedom, 2002; Sowers & Smith, 2004a, 2004b). Christensen’s (1998) study indicated that faculty preferred making their admissions decision based on their knowledge of the applicant’s disability, the ability to determine if accommodations were available or needed, and admissions contingent on further assessment. Some schools identified a student’s disability status through the application form (Magilvy & Mitchell, 1995; Watson, 1995). Requiring self-identification of a disability or the observation of a disability during an admissions interview and use of that observation in the admission decision are barriers to admission for the student with a disability (Helms et al, 2006; Marks, 2000, 2007; Newsham, 2008). Some faculty indicated they were unable to accept students with disabilities secondarily to technical standards policies and procedures of performance established by the nursing program or accommodate at clinical agencies (Dahl, 2010; Persaud & Leedom, 2002). Based on the data available, approximately half of the students admitted with disabilities graduated (Magilvy & Mitchell, 1995).

Accommodations

The retention of nursing students with disabilities is directly related to the accommodations a nursing program provides the student within the classroom and clinical environment (Magilvy & Mitchell, 1995; Persaud & Leedom, 2002). Types of accommodations offered varied by nursing program; however, some faculty indicated accommodations were not available at their school or at the level needed for the student (Magilvy & Mitchell, 1995; Ney, 2004; Persaud & Leedom, 2002; Watson, 1995). Some faculty perceived accommodations as unreasonable and, if given a choice, would not provide them again (Persaud & Leedom, 2002). The process of accommodations was identified as increasing faculty workload since academic adjustments required time to problem-solve with the student
Perceptions of Ability within the Program and the Nursing Profession

The medical model views a person with a disability as sick; therefore, unable to function as well as a person without a disability (Aaberg, 2010; Dahl, 2010; Ney, 2004; Sowers & Smith, 2004a, 2004b). Faculty may use this model as the underpinning of their perception of students with disabilities and view the disability as something that needs treatment or intervention; not as a person capable of delivering nursing treatment or intervention (Aaberg, 2010; Dahl, 2010; Ney, 2004; Ryan, 2011). Concerns for safety and quality care for patients were cited as reasons for not admitting students with disabilities (Aaberg, 2010; Dahl, 2010; Sowers & Smith, 2004a, 2004b); however, there are no studies indicating students with disabilities pose a greater risk to patient safety than students without a disability. These researchers stressed that patient safety is the number one priority in all clinical settings, for students with or without a disability.

Additional faculty concerns were raised regarding academic standards and meeting ADA requirements without changing the curriculum (Aaberg, 2010; Dahl, 2010; Ney, 2004; Sowers & Smith, 2004a, 2004b). Some faculty based their apprehension for professional success of students with disabilities on the erroneous belief that these students would be unable to pass NCLEX® as needed accommodations would not be provided (Aaberg, 2010; Dahl, 2010; Sowers & Smith, 2004a, 2004b). In fact, NCLEX® provides a wide range of accommodations for students with documented disabilities (NCLEX® Examination Candidate Bulletin, 2012). Faculty members in the studies had preconceived attitudes regarding different types of disabilities and a student’s likely success in their program and the nursing profession (Sowers & Smith, 2004a, 2004b). No schools reported any difficulty for graduating nursing students with a disability finding employment. Multiple studies addressed the lack of knowledge and experience faculty had with students with disabilities and its effect on their attitudes towards these students (Aaberg, 2010; Christensen, 1998; Magilvy & Mitchell, 1995; Sowers & Smith, 2004a, 2004b). As nursing faculty were exposed to and given more in-services on disability awareness, perceptions towards students with disabilities became more positive and concerns decreased (Christensen 1995; Ney 2004; Sowers & Smith, 2004a, 2004b).

Though there are many complex elements surrounding nursing faculty attitudes towards students with disabilities, the research supported that nursing faculty perceptions varied depending upon their degree of experiences with individuals having a disability (Christensen, 1998) and the type of program in which they taught (ADN or BSN) (Ney, 2004). BSN faculty had statistically significant more positive attitudes towards students with disabilities than ADN faculty (Ney, 2004). Perceived hierarchy of success in a program was based on the student’s type of disability (Sowers & Smith, 2004a; Persaud & Leedom, 2002). In some cases, faculty lack of experience and knowledge of working with students with disabilities resulted in negative attitudes towards these students (Aaberg, 2010; Dahl, 2010; Ney, 2004; Sowers & Smith, 2004a, 2004b). However, faculty who completed an educational program regarding sensitivity to disabilities and accommodations were more positive towards students with disabilities (Sowers & Smith, 2004b).

Recommendations

Nursing education has focused on diversifying nursing practice from many perspectives and this diversification must also embrace individuals with disabilities (Dupler, Allen, Maheady, Fleming & Allen, 2012). Strategies to accomplish this goal include active recruitment of nursing students with disabilities (NSWD), publicizing services provided to students with disabilities in recruitment materials and during student orientation, and a standardized statement in syllabi regarding accommodations and links to the Office of Disabilities (Betz et al, 2012; Dupler et al., 2012; Rosenberg & O’Rourke, 2011; Sowers & Smith, 2004a, 2004b). On campus, the scheduling of formal in-services, held in conjunction with the Office of Disabilities, addressing disability awareness, sensitivity, background and application of ADA and ADAAA, along with awareness training and appreciation of the technology and services available to students with disabilities will give faculty greater knowledge, comfort
and competence teaching NSWD (Lombardi, Murray, & Gerdes, 2011; Sowers & Smith, 2004a, 2004b). Off-campus, conducting workshops at local and national conferences to discuss teaching strategies for students with disabilities, assistive technology, and the use of Universal Design Principles in nursing education can play a significant role in further influencing nursing faculty attitudes towards NSWD (National League for Nursing, 2003; Mareyjanik & Zorn, 2011).

Future Research

There is a paucity of current empirical research regarding disabilities in nursing education; especially, regarding nursing faculty’s attitudes towards this student population. Research money needs to be increased to fund development of evidence-based teaching strategies for students with disabilities in the classroom, clinical, skills and simulation labs. Recruitment of nurse researchers who have disabilities needs to be supported, as they may have a deeper understanding of the complexity of the disability experience and can possibly provide a unique insight for faculty development.

Conclusion

This integrative review explored the attitudes of nursing faculty towards nursing students with disabilities since the enactment of the ADA and ADAAA. Analysis of the nursing literature suggests that faculty generally have positive attitudes towards students with disabilities. Many themes were identified relating to faculty attitudes in the admission, accommodation, and success of nursing students with disabilities in their programs and the nursing profession. Faculty’s experiences with students having a disability and participation in awareness programs improved their attitudes and decreased their concerns towards educating this population. Additional research is needed in this area. The implications and recommendations provided in this integrative review for the inclusion of students with disabilities in nursing education hold the promise of diversifying and strengthening the profession.

References


About the Author

Janet A. Levey, R.N. earned her B.S.N. with honors from De Paul University in 1982 and her M.S.N. from Concordia University Wisconsin in 2008. She is currently working on her doctorate in Nursing at Marquette University. She is a National League for Nursing Certified Nurse Educator and is Board Certified in Ambulatory Care Nursing by the American Nurses Credentialing Center. Janet has taught in classroom, simulation lab, and clinical settings. She is an active member of Sigma Theta Tau International Honor Society of Nursing, Wisconsin League for Nursing, National League for Nursing, International Nursing Association for Clinical Simulation and Learning, Society for Simulation in Healthcare, National Organization for Nurses with Disabilities, and the Association of Medical Professionals with Hearing Losses. Janet is an advocate for inclusive teaching pedagogies as a means to meet professional nursing organizations’ call to diversify the nursing workforce and reduce the nursing shortage. As a nurse educator who is deaf and teaching with a service dog, she has a personal interest in ensuring knowledge and practice access for all students, with and without disabilities. She can be reached by email at: janet.levey@marquette.edu

Author’s Note

Janet Levey would like to acknowledge her advisor and dissertation chair, Dr. Marilyn Frenn, for her steadfast support on this paper.
PRACTICE BRIEF
Interdisciplinary Support Services for Students with Autism Spectrum Disorders

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Abstract
This Practice Brief describes a grant-funded pilot program at an urban four-year public college, developed to address the needs of students with Autism Spectrum Disorders (ASD). This Interdisciplinary Collaborative Support Services program provided (1) more clinical assistance for students with ASD to promote their academic and social success; (2) education, training, and supervision for graduate student mentors; (3) in-service training for faculty, staff, students, and administrators; and (4) a resource library related to the target population. This article describes the work among the different program partners to offer interdisciplinary, collaborative services for the students who elected to participate in the initiative and reports both the positive outcomes and challenges of the program. This article concludes with suggestions for expansion of the practice and research opportunities on the efficacy of the model.

Keywords: Autism Spectrum Disorder, college students, interdisciplinary supports

An increasing number of individuals with high functioning autism (HFA) and Asperger syndrome (AS) currently attend college (Graetz & Spampinato, 2008; Smith, 2007; Taylor, 2005). Although the exact numbers are not known, more students with HFA/AS are likely to enroll in institutions of higher education (IHE) in the coming years. Anecdotal reports among those working in college settings further support this increase. Despite the lack of formal data regarding the number of postsecondary students with HFA/AS, colleges should prepare to serve this growing population (Davis, 2012). The success of these students could be enhanced by the degree to which they can be supported by their IHE (Welkowitz & Baker, 2005). Educational experiences for students with disabilities involve collaborations among families, educators, and therapists through the high school years. However, college students with disabilities are essentially responsible for their own needs (Longtin, 2014). By law, such otherwise qualified students cannot access the reasonable accommodations mandated by the Section 504/ADA unless they self-disclose their disability to a designated entity, usually the disabilities services office at their college, and then self-advocate for those accommodations.

The need for college programs specifically designed for students with HFA/AS is critical but, the number of such university-sponsored programs is relatively small (Smith, 2007). Several of these programs, some in their pilot stages, have been described in the emerging literature. A compilation of some of these programs can be found on the website of the Higher Education and Autism Spectrum Disorders, Inc. (2012). These programs can be costly and pose an economic hardship to families already burdened by rising tuition costs. For example, a program that costs $5,000 at a college that charges $25,000 in tuition adds 20% to the annual costs. Moreover, programs would be prohibitive to students from lower income levels, who are more likely to attend a public IHE where tuition costs are relatively lower than in private schools. Using, adapting, and expanding postsecondary supports that are already in place can minimize the cost of supporting students with HFA/AS. Longtin (2014) describes how the contributions of such resources (such as disabilities services, a health clinic, personal counseling, and a speech-language-hearing center) can support students on the spectrum.
**Depiction of the Problem**

This Practice Brief describes a grant-funded pilot program conducted in an IHE that was developed to (1) support college students with ASD; (2) provide education and practical experience to graduate students in clinical fields who served as mentors; 3) provide in-service training to faculty, staff, students, and administrators; and 4) provide resources related to the target population. While otherwise qualified students with HFA/AS who self-disclose their disability have access to reasonable accommodations established by law, these students often have unique needs that, typically, are not fully addressed through traditional accommodations. For example, the areas of developing social skills and managing executive functions often continue to challenge these students at the college level. Without the interdisciplinary supports that this project provided, participating students may not have had a positive educational experience.

**Participant Demographics and Institutional Partners/Resources**

The Interdisciplinary Collaborative Support Services program for students with Autism Spectrum Disorders was conducted at a four-year public IHE located in a large metropolitan area. This IHE is part of the largest urban university system in the United States consisting of 24 institutions including eleven senior colleges, seven community colleges, an honors college, and a doctoral-granting university center. The pilot project was funded at $18,968 though the central Office of the University Dean for Health and Human Services. The director of the college health clinic and a full-time member of the faculty in the speech-language pathology program responded to a request for proposals that could enhance clinical competencies of students in health professions programs or provide educational resources for students. Recipients received funding for the project one month after the semester had already begun with the constraint that the funds be utilized by the end of the fiscal year, which occurred one month after the end of the semester.

The IHE is situated in one of the most dynamic and diverse communities in the country. The college is committed to student success and the historic mission of providing an affordable, high-quality education to students of all backgrounds. Over 16,000 students (approximately 80% undergraduate students and 20% graduate students) enrolled at the college at the start of the program.

The six college offices that collaborated on this project were disability services, the health clinic, personal counseling, the speech-language-hearing center, career counseling, and the learning center. In addition, several clinically-oriented academic departments, Mental Health Counseling, School Counseling, and Speech-Language Pathology, participated. Approximately ten students on the autism spectrum had disclosed to disability services prior to the grant period. Of these, five students, four males and one female, participated in the program. These students ranged in age from 21-27 years. Two students self-identified as Black, two as White, and one as Hispanic.

**Description of Practice**

A flyer that listed the name, campus address, website, and phone number of each of the six offices partnering for the initiative was created to publicize the program. Posters announcing the initiative were placed in strategic locations around campus. An article posted on the college website further increased project visibility. In addition, the program partners led a round table discussion at an annual end-of-year faculty conference at the college.

An Internal Release of Information form was developed to allow members of the interdisciplinary team to communicate with each other regarding the participating students. The form authorized the release of information between disabilities services and the other five aforementioned offices. The participating students were each assigned to a graduate student mentor who met individually with his/her mentee on a weekly basis to provide guidance on college life, social pragmatics, executive function, study habits, relationship building, job search, and self-advocacy. As needed, the mentors directed their mentees to the appropriate on campus services.

The mentor program provided training and weekly supervision for graduate students enrolled in three of the college’s clinically oriented programs: Mental Health Counseling, School Counseling, and Speech-Language Pathology. A clinical psychologist, employed full-time at the college, served as mentor supervisor. The mentors were recruited initially through email, requesting that practicum and clinical professors announce an opportunity for graduate students to gain experience as mentors in the grant-funded pilot. Interested students emailed the mentor supervisor, who ultimately selected the mentors based on interview, availability and recommendation. Five first-year, full-time graduate students from the above-mentioned programs served as mentors, one to each of the five participating students. The graduate student mentors, who received stipends for their service, were trained through participation in (1) a webinar that focused on mentoring relationships, (2) ten weekly one-hour group supervisory sessions, (3)
at least one day of an on campus in-service workshop (discussed below), and (4) a conference on “Issues in Independent Living for Adolescents and Adults on the Autism Spectrum” sponsored by a local HFA/AS advocacy organization.

The grant funded two half-day in-service workshops on “Helping College Students on the Autism Spectrum” that were led by a psychologist with expertise in HFA/AS who had previously developed training courses in coaching and supporting these students. The first workshop, “An Introduction to Asperger Syndrome and High Functioning Autism,” examined the (1) social, emotional, cognitive, and executive function features that impact academic achievement and (2) issues of time management, sensory overload, and self-regulation. The second workshop, “How to Support College Students on the Autism Spectrum,” addressed (1) methods for supporting friendships other social relationships, and faculty/staff interactions; (2) recognizing problems that need referral; (3) collaborating on campus to coordinate and enhance resources; and (4) strategies for use in the college classroom.

Finally, members of the interdisciplinary team selected print resources that would benefit the students with HFA/AS and other members of the college community. In addition to books, the team selected two rating scales to assess executive functions that could be used in the campus clinical facilities (i.e., Gioia, Isquith, Guy, & Kenworthy, 2000; Guy, Isquith, & Gioia, 2004). The program partners decided that most of the other resources should be located in the disability services office. Appendix B lists the resources that were purchased through the grant.

**Evaluation of Observed Outcomes**

Evaluation forms consisting of five-point Likert scales and additional questions were developed to assess the outcomes for the in-service and mentor program from the perspective of the mentors and the mentees. In addition, the mentor supervisor provided written evaluative feedback about her experiences in that role.

Four of five students with HFA/AS reported that they would choose to continue their participation if the project were extended through the next academic year. The other student was “neutral” in responding to most of the items on the evaluation form. All attended at least one additional clinical or academic service during the program. In terms of the support services used during the grant period, three attended disabilities services, three career counseling, and five personal counseling. One student attended the speech-language-hearing center prior to the grant period but was no longer actively involved with those services. The participants acknowledged that the collaborative support services promoted their academic and social success, allowing them more fully to engage in the college experience. Table 1 lists the students’ comments in response to the evaluation form question, “What contributed to making the term an academically successful semester?” Finally, two incoming freshman on the spectrum planned to enroll at the college for the following academic year because of their awareness of this program.

Using another five-point Likert scale to evaluate the mentor program, the five mentors rated their overall experience in the program, the supervisory meetings, and the supervisor’s effectiveness as “very beneficial.” Four of the students rated their interactions with their mentee as “very beneficial” and one as “fairly beneficial.” The five mentors “strongly agreed” that the program provided useful information and enhanced their clinical training. Three “strongly agreed” and two “agreed” that the program seemed to help their mentee. The mentors unanimously agreed that the weekly group clinical supervision they received was an asset of the program. Other noted strengths included the opportunity to meet individually with their mentee and to connect with other support services at the college. The mentors unanimously agreed that the program could have been improved had it started at the beginning of the semester, which was not possible because of the funding constraints. Table 2 lists the responses to three questions on the mentor evaluation form regarding the knowledge, skills, and strategies they gained as graduate student clinicians.

The mentor supervisor’s evaluative comments noted that the mentors’ “enthusiasm” and “dedication” to the project contributed to its success. She reported that the mentors collaborated with and provided useful feedback to each other. She also noted that the mentors effectively directed their mentees to the appropriate campus resources such as career counseling or the health clinic.

In terms of the in-service workshops, more than 25 members of the college community, including graduate students, faculty, administrators, and clinical support staff, were trained to help college students with HFA/AS. Faculty and clinical support staff across a variety of disciplines expressed appreciation for the greater opportunity to collaborate. Feedback on the in-service evaluation form was overwhelmingly positive. Participants noted that the presenter was “exceptionally knowledgeable,” “comprehensive,” and provided “numerous practical examples” to assist them in their work. All attendees rated the workshop content, or-
Table 1

_HFA/AS Students’ Responses to the Question “What Contributed to Making This an Academically Successful Semester?” on the Mentee Evaluation Form_

I prioritize what to do each day.

I have more confidence in college.

My mentor was very helpful in directing me to institutions that will help me with my schoolwork as well as institutions that will help me financially.

My class note takers sometimes contributed to my academic success.

I spoke with counselors rather than give in to impulsive reactions when things were not going well.

Table 2

_Sample Graduate Students’ Responses to Three Questions on the Mentor Evaluation Form_

What skills have you acquired from participating in this mentor program for college students on the autism spectrum?
  - Patience
  - Effective interaction skills
  - How to provide advice
  - How to plan for individual meetings
  - How to develop realistic goals
  - How to assist with executive functions such as time management and organization
  - How to assist with self-advocacy such as accessing services at the college

Did you learn any strategies to support the student(s)?
  - Segmenting tasks into smaller units
  - Providing facilitative cues
  - Using schedules for time management
  - Using a timer to limit excessive focus on a single topic of conversation
  - Providing effective feedback to the mentee

What specific knowledge or skill(s) did you acquire that is applicable to your future work as a clinician?
  - Increased knowledge about high functioning autism and Asperger Syndrome
  - Greater awareness about the everyday challenges of these individuals
  - The difficulty in trying to gauge my mentee’s feelings
  - The importance in establishing a trusting relationship
ganization, presentation, and handouts as either “very beneficial” or “fairly beneficial.” All participants “agreed” or “strongly agreed” that the in-service was useful and would influence their professional growth. All but two “agreed” or “strongly agreed” that the workshop would influence them professionally. For each day of the in-service, the participants were requested to provide examples of how they would apply specific information gleaned from the workshop to their work. Sample attendee responses to this question are listed in Table 3.

Implications and Portability

We learned that the infrastructure of the four-year public IHE has adequate resources to provide collaborative clinical services to students with HFA/AS, but that the future of such a program would require further financial commitment from the college administration to cover fees for general program participation or fees for specific services. Other outside funding could supply additional resources. A program such as the one described here would likely cost administrations (or other funding agencies) between $15,000 and $20,000. Table 4 lists a breakdown of selected start-up and maintenance costs for this project.

During the brief grant period, disabilities services and the clinical staff from the different divisions and academic departments established common ground in the provision of services to students on the spectrum. While these services would likely continue and be more collaborative than prior to the project, ongoing formal coordination and the continuation of the mentoring program would require resources for a program coordinator, mentor supervisor, and the graduate student mentors.

Major challenges of the program were the lack of planning time and the short-term nature of the funding. This required that the pilot be initiated immediately and concluded within a four-month period. As such, the co-applicants and other program partners did not have the benefit of a planning period. This precluded significant outreach and the development of more detailed outcomes assessment. The pilot was essentially “up and running” one week after the co-applicants received notification that their proposal was funded, which was already one month after the start of the semester. In fact, the students with HFA/AS expressed concern about having sufficient time to work with their mentors, given the short-term, one semester limit of the funding.

Challenges the mentor supervisor reported were the “unknown expectations” of her role and insufficient “support staff” to “meet the needs of the mentees and mentors.” All of the program partners accepted the added responsibilities of the initiative while being fully engaged in their regular full-time commitments at the college. Despite the short planning time, the project was deemed successful by multiple sources. Based on what we learned, disabilities service providers in the future could try to identify additional students with HFA/AS who are not known to their office. This could be done through freshman seminars, student services orientations, and by providing a link to an online self-assessment tool, The Autism Spectrum Quotient (ac. server8.org), which might result in self-referrals for further evaluation and services.

The program could be enhanced if the various program partners offered additional services geared toward the target population, which could help increase graduation and retention rates. For example, career counseling could provide students with HFA/AS with individualized advisement and guidance through regularly scheduled appointments, which would also benefit relationship building for these students. This expanded role for career counseling would be important given that students with HFA/AS, including those with college degrees, are often unemployed or underemployed (Hurlbutt & Chalmers, 2004). Further, program partners could regularly schedule individual and group social skills training sessions that could address social communication needs for college and career. Speech-language-hearing, personal counseling and career counseling could collaborate in this area. The resource library could also be expanded to include several first person narratives written by individuals with HFA/AS that address their college experiences and career paths. The strength-based perspective of many of these autobiographies, most published within the past decade, could benefit the students on the spectrum, the program partners, and the graduate student mentors. Discussion of these narratives in an informal campus “book club” venue, led individually or collaboratively by the program partners, could serve as the basis for practicing social interactions among the students with HFA/AS (and education for the mentors, faculty, and clinical staff) while they learn about the lives of others from this target population. Appendix C lists suggested titles.

Future research needs to address the efficacy of the programs by including pre-assessment baseline data, as well as post-assessment outcome data, better to evaluate the in-service and mentor components of the program. For example, the assessments for the in-service could measure the attendees’ specific knowledge about HFA/AS both before and after the workshops. The assessments for the mentees could be expanded to include quality of life measures and the acquisition of specific knowledge and skills that made a difference in their
Table 3

Sample Attendees’ Responses to the Question, “What Specific Information Did You Acquire That is Applicable to Your Work” on the In-Service Evaluation Form

- The Behavior Rating Inventory for Executive Functions (BRIEF).
- I can use this information when counseling my future clients and in mentoring settings.
- As a career academic counselor for students with disabilities, it is useful to learn about the importance of executive functions and how they affect students. I can utilize this knowledge to plan for academic success by developing appropriate career goals.
- Coaching strategies; difficulties that the AS population faces.
- I may incorporate a reflection process at the end of each session.
- How to set up coaching activities and strategies.
- I learned more than just the diagnostic criteria of AS in the DSM but other underlying important issues as well as how to implement the interventions. This will be very helpful to me in the mental health field.
- The information on executive functions was very useful; I have more of an understanding that people with AS may not be lazy and noncompliant; they may have difficulty planning and organizing.
- How to provide referral to disabilities services.
- Consider individual needs of students.
- It will help me in training my staff to better meet the needs of our students.
- Working better with these students and ones that may need additional support or referrals.
- Many of my students struggle with management. I will try to utilize the strategies from this workshop to assist students such as creating a visual master plan/calendar.
- A thorough understanding of AS which helps with differential diagnosis.
- I really appreciated the discussion regarding interpretation of “classroom rules.”
- Pragmatic suggestions that would apply to any student with executive function issues (including those with attention deficit disorders and learning disabilities).
college experience. The students with HFA/AS could also be followed over time to evaluate their retention, graduation, and eventual career paths. Assessments for the mentors could include specific clinical knowledge and skills gleaned from their experiences.

Finally, because the number of participants in this pilot was small, identifying other colleges with similar infrastructures where the model could be implemented would provide a larger participant base for broader support for the interdisciplinary model. By employing a comparison control group of students with HFA/AS with similar demographic characteristics who elect not to participate in such support programs, research could begin to explore questions related to the efficacy of these support programs across different campuses.

Table 4

*Selected Start-up and Maintenance Costs for the Project*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start-up</strong></td>
<td></td>
</tr>
<tr>
<td>Project Coordinator</td>
<td>3,900</td>
</tr>
<tr>
<td>Consultant/In-service Workshops</td>
<td>3,000</td>
</tr>
<tr>
<td>Resource books and tests</td>
<td>1,000</td>
</tr>
<tr>
<td>Printing of flyers and posters</td>
<td>100</td>
</tr>
<tr>
<td><strong>Subtotal Startup</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td></td>
</tr>
<tr>
<td>Mentor Supervisor</td>
<td>3,500</td>
</tr>
<tr>
<td>Mentor Stipends (5 x $800)</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Subtotal Maintenance</strong></td>
<td>7,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15,500</td>
</tr>
</tbody>
</table>

*Note.* Personnel costs such as the project supervisor, consultant, and mentor supervisor would likely vary with experience, faculty rank, institutional practices, and geographic location.
References

Davis, J. (2012, September). Three ways to support the academic performance of students who are neurologically atypical. Recruitment and Retention, 5-6.


About the Author

Susan Longtin received her B.A. and M.A. degrees in speech-language pathology and audiology from Hunter College and Ph.D. from the Graduate School of the City University of New York. She is a state licensed, nationally certified speech-language pathologist with experience working in school settings and supervising graduate student clinicians in university clinics. She is currently assistant professor in the Department of Speech Communication Arts and Sciences at Brooklyn College of the City University of New York and co-director of the Advanced Certificate Program in Autism Spectrum Disorders at the college. Her research interests include parent-professional partnerships, mindfulness-based interventions, and the first person narratives of adults with autism spectrum disorders. She can be reached by email at: slongtin@brooklyn.cuny.edu

Author’s Note

I wish to thank my colleagues who collaborated on the development of the Interdisciplinary Support Services Program described in this Practice Brief: Ilene Tannenbaum who co-authored the proposal, Gail Gurland who alerted us to the Request for Proposals (RFP), Valerie-Stewart Lovell of Disabilities Services, Adriana DiMatteo of Personal Counseling, and Susan Bohne and Michael Bergen of the Speech-Language-Hearing Center. The City University of New York Office of Academic Affairs: Health and Human Services funded the pilot program.
Appendix A

Resources Purchased Through the Grant Funding


Appendix B

Selected First Person Narratives Published by Individuals with HFA/AS Relevant to College and Career


Journal of Postsecondary Education and Disability
Author Guidelines

The Journal of Postsecondary Education and Disability welcomes submissions of innovative and scholarly manuscripts relevant to the issues and practices of educating students with disabilities in postsecondary educational programs. Manuscripts must be submitted electronically via email to jped@ahead.org

Guidelines for authors:

Content
Manuscripts should demonstrate scholarly excellence in at least one of the following categories:

• Research: Reports original quantitative, qualitative, or mixed-method research
• Integration: Integrates research of others in a meaningful way; compares or contrasts theories; critiques results; and/or provides context for future exploration.
• Innovation: Proposes innovation of theory, approach, or process of service delivery based on reviews of the literature and research
• Policy Analysis: Provides analysis, critique and implications of public policy, statutes, regulation, and litigation.

Format
All manuscripts must be prepared according to APA format as described in The Publication Manual (6th ed.), American Psychological Association, 2010. For responses to frequently asked questions about APA style, consult the APA web site at http://www.apastyle.org/faqs.html

• Manuscript length typically ranges between 25 and 35 pages including figures, tables, and references. Exceptions may be made depending upon topic and content.
• Include 3-5 keywords.
• Write sentences using active voice.
• Authors should use terminology that emphasizes the individual first and the disability second (see pages 71-76 of the APA Manual). Authors should also avoid the use of sexist language and the generic masculine pronoun.
• Manuscripts should have a title page that provides the names and affiliations of all authors and the address of the principal author.
• Include an abstract that does not exceed 250 words. Abstracts must be double spaced on a separate page of the manuscript, between the cover page and the first page of the body of the manuscript. List 3-5 key terms immediately beneath the text of the abstract.
• Provide a cover letter asking that the manuscript be reviewed for publication consideration and that it has not been published or is being reviewed for publication elsewhere.
• Tables and figures must conform to APA standards, and must be in black and white only. All tables and figures should be vertical and fit on the page, no landscape format.

Manuscripts must be submitted as email attachments in Microsoft Word format to: jped@ahead.org

Upon acceptance for publication
For manuscripts that are accepted for publication, the following items must be provided to the Executive Editor:

• An electronic copy of the final manuscript as an email attachment.
• A 40-50 word bibliographic description for each author.
• A signed and completed Copyright Transfer form.

Manuscript submissions by AHEAD members are especially welcome. The JPED reserves the right to edit all material for space and style. Authors will be notified of changes.

Practice Brief Manuscripts
JPED invites practitioners and/or researchers to submit Practice Briefs that can inform readers of innovative practices that could, in time, become the basis of an empirical study. Practice Briefs will describe new or expanded programs, services, or practices that support postsecondary students with disabilities.

The overall length of a Practice Brief will be limited to 12 double-spaced pages, which includes separate title page, abstract, and references pages. Tables and/or figures may be submitted, too, above and beyond the 12 page limit. Practice Briefs should be organized using the headers/sections listed below. For a fuller description of each header/section, please refer to the complete Practice Brief Author Guidelines at http://www.ahead.org/publications/jped-guide.

• Title Page
• Abstract
• Summary of Relevant Literature
• Depiction of the Problem
• Participant Demographics and Institutional Partners/Resources
• Description of Practice
• Evaluation of observed outcomes
• Implications and Portability
• References

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