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A Tribute to the Commitment to Disability Studies
Academic Literature: From the Editor

Dr. Stan Shaw (Professor Emeritus, University of Connecticut), a member of our journal’s research review board, and a former editor of the Journal of Postsecondary Education and Disability, has decided it is time to step away from some of his academic work. For over four decades Stan’s work has improved the lives of students with disabilities through his commitment to the literature in disability studies. How do you measure the contribution of such an esteemed educator? Dr. David Parker (Postsecondary Disability Specialist/ADD and Life Coach, Children’s Resource Group), shared some thoughts about his former professor and mentor.

Dr. Stan Shaw has always wanted to change the world and, in many ways, he has. I met Stan at one of my first AHEAD conferences in the early 90’s when he and Dr. Joan McGuire led an informational session about this journal. Co-editors of JPED at the time, they spoke with expertise and passion about the importance of researching higher education’s efforts to promote the inclusion of students with disabilities. Stan emphasized JPED’s tradition of encouraging new scholars while describing the University of Connecticut’s Center for Postsecondary Education and Disability (CPED). He and Joan also co-directed that think tank. As a new disability service provider from the University of North Carolina at Chapel Hill, I was thrilled to meet these two widely-respected leaders in our field. They inspired my desire to offer the most evidence-based practices I could and maybe, just maybe, find a way to give back to this dynamic professional community I had recently joined.

Nearly thirty years later, I’ve had the privilege of getting to know, work with and learn from Stan in numerous ways. Like countless others who can say the same thing, his mentoring has guided my head and heart and opened many important professional doors. I welcome the chance to share this brief tribute because Stan would be the last person to speak publicly about his influence on a generation that has embraced his zeal about changing the world...or at least changing the way postsecondary education provides meaningful access for individuals with disabilities.

Similar to CPED, Stan founded UCONN’s Postsecondary Disability Institute (PTI) and ran it for more than two decades. PTI has only gotten better under the direction of Dr. Joe Madaus, who worked closely with Stan and Joan. Stan always ended his welcoming remarks at the Institute by inviting participants to make at least three new friends while there. Whether you presented a single session or a three-day strand at PTI, you could count on seeing Stan in the back of the room, smiling and nodding with silent encouragement. I was incredibly fortunate to have Stan as my major advisor during my Ph.D. program at UCONN. He helped me clarify my professional goals and pursue relevant courses and research opportunities with world-class faculty. Along with Joan and Dr. Sally Scott, he gave me the chance to study Universal Design for Instruction (UDI) as the UCONN team researched this emerging paradigm. He brought me onto the editorial boards of several research journals, including this one. Stan taught me how to write grants, publish research, influence public policy, and teach well. He showed me, through word and deed, how to be a leader. I watched him do the same with many peers and came to appreciate the joyous enthusiasm Stan experienced when we succeeded. With his retirement from the JPED board, Stan’s voice will no longer help inform the journal’s research mission, but his example, passion, and vision will always light our way.

In addition to Stan Shaw, Liz Neault, Kay Lesh, Martha Ozer, Joan McGuire, Charles Hughes, Anna Gajar, Nicole Ofiesh, Jim McAfee, Sally Scott, Jim Martin, and David Parker have served as editor of the Journal of Postsecondary Education and Disability. For the hundreds of authors whose manuscripts have been improved because of your careful review, and for the thousands of students with disabilities whose lives have been enhanced because of your commitment to the field, thank you for your commitment to the literature in disability studies. Additionally, special thanks to Valerie Spears, Editorial Assistant, and Richard Allegra, Managing Editor, highly skilled professionals, for your long-term commitment in making this journal successful.

The lead article in this issue of the Journal of Postsecondary Education and Disability focuses the development of a first year success seminar for college students with disabilities. Allison Fleming, Wendy Coduti, and James Herbert (The Pennsylvania State University) gathered qualitative data from students with disabilities attending a four-year university to determine what information would complement a more traditional first year student program (FYS) to address needs and concerns of this population. Multiple themes emerged to inform FYS programs includ-
ing experiences with campus integration, disability experience, and student strategies. In the next article, Lana Stermac, Jenna Cripps, Veronica Badali, and Touraj Amiri (University of Toronto) examined the types and methods of sexually coercive behaviours that women undergraduates with disabilities reported while attending universities in Ontario, Canada. The results of this study support previous research indicating high rates of sexual coercion among women with disabilities. Compared to women without disabilities, a greater proportion of women with disabilities reported sexual harassment as well as completed sexual acts committed through arguments and pressure, the use of physical force, or while intoxicated or incapacitated and unable to consent. These results are discussed in terms of understanding sexual victimization on campus and the needs of students with disabilities.

In the third article, factors that contribute to their self-predicted likelihood of graduation for university students with disabilities is discussed. Julia Schechter (Seattle University) explores what college planning practices or demographic characteristics are associated with confidence in degree completion for college students with disabilities at a public doctoral-granting university. Among the findings are the suggestions that making a connection to a campus representative while still in high school, and registering early-on for campus level disability services, are associated with students who predict a higher likelihood of college graduation. In the next article, Sunjung Kim (University of Central Arkansas), Rebecca Wiseheart (St. John’s University), and Patrick R. Walden researched if multimedia instructional designs enhanced comprehension in college students with dyslexia. Their findings showed that students with dyslexia can learn as easily from multimedia instruction as their peers, and multimedia combinations can be manipulated to optimize specific learning outcomes.

In the fifth article, social group membership and risk-taking behaviors among college students with ADHD symptoms was examined. Brittany Pollack, George DuPaul (Lehigh University), Lisa Weyandt (University of Rhode Island), and Arthur Anastopoulos (University of North Carolina Greensboro) found that more significant ADHD symptoms are associated with increased risk-taking behaviors, including harmful alcohol consumption, illicit drug use, and risky sexual behavior. Additionally, social group membership was predictive of increased risk-taking in some cases, particularly for students affiliated with Greek organizations. In the next article, Genia Bettencourt, Ezekiel Kimball, and Ryan Wells (University of Massachusetts Amherst) sought to understand how STEM faculty think about and respond to students with disabilities in order to shape effective interventions. Key findings illuminated the impact of a formal accommodations process, individual approaches to providing support, and perceptions of the STEM climate towards students with disabilities.

The issue concludes with a practice brief on promoting inclusive teaching among college faculty, a framework for disability service providers. Allison Lombardi, Joan McGuire, and Emily Taronish (University of Connecticut) present a framework for disability service providers to utilize and guide instructors to create accessible class materials and assessments. Following a “plan, deliver, assess” structure, the framework includes multiple tools, including self-assessments, check lists, and work sheets, that instructors can use following professional development activities to continue to make their teaching more accessible.

The editorial team and review boards associated with the Journal of Postsecondary Education and Disability (JPED) are proud to recognize the contributions of multiple educators, just as Dr. Stan Shaw and other former JPED editors, whose commitment to the academic literature has informed our practice.

David R. Parker, Ph.D.
Past Executive Editor
Roger D. Wessel, Ph.D.
Executive Editor
Development of a First Year Success Seminar for College Students with Disabilities

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Abstract

Students with disabilities are enrolling in colleges and universities at increasing rates, but not completing degrees with comparable success as their peers. First Year Seminars (FYS) are commonly employed by colleges and universities to address retention, strengthen connections between the student and the institution, and enhance the likelihood for academic success. Descriptions of FYS programs that address the needs of students with disabilities are very limited in the higher education literature despite the expressed need to improve supports to students with disabilities. In the current study, we gathered qualitative data from students with disabilities attending a four-year university to determine what information would complement a more traditional FYS program to address needs and concerns of this population. Four themes emerged to inform program development: experiences with campus integration, disability experience, student strategies, and suggestions for FYS programs. Implications for program development and evaluation are presented.

Keywords: first year success, college transition, students with disabilities

Approximately 11% of college students report at least one disability (National Center for Educational Statistics [NCES], 2016). These data are likely underreported, since many students who have disabilities do not disclose for several reasons, most of which are associated with disability stigma (Newman et al., 2011). Longitudinal data shows a trend of increasing college attendance by students with disabilities (SWD), particularly following the passage of the Americans with Disabilities Act (ADA) in 1990. Despite an increasing presence, national data on SWD show lower college completion rates (34%) than for students without disabilities (mid-50% range; NCES, 2015). The economic advantages of completing a college degree are clear, in both lifetime earning potential as well as job stability (U.S. Department of Labor, 2013). College-educated SWD are twice as likely to find employment than those without a degree (Dutta, Kundu, & Schiro-Geist, 2009). For those without a college degree, there will be fewer job prospects and lower likelihood of economic self-sufficiency.

Prompted by a need to improve persistence and graduation rates of college students, First Year Success (FYS) programs have been introduced for specific populations including low income students (e.g., Anselmo, 1997), first generation students (Wilkie & Kuckuck, 1989), international students (Andrade, 2009), ethnic minorities (e.g., Starke, Harth, & Sirianni, 2001), and students at-risk (Colton, Connor, Schultz, & Easter, 1999; Potts & Schultz, 2008) but, to our knowledge, only one has been developed specifically for SWD. This program was a modified FYS course for students with Autism Spectrum Disorders, with additional information on social skills and adapting to the college environment (Wenzel & Rowley, 2010). The purpose of the present study was to provide a framework that could be used in the development of a FYS program specifically targeted for SWD, inclusive of students of all disability populations. We propose that targeted information based on the needs and experiences of SWD is a valuable addendum to more typical information presented in FYS designed to orient students and ease their college transition for our population of interest. The following literature review includes a background of FYS programs and highlights issues of retention, integration, and academic success specific to college SWD.

¹ The Pennsylvania State University
First Year Success Programs

FYS programs were developed to address retention, strengthen connections between the student and the institution, engage students in skill building (e.g., health, academic, personal), and enhance academic success (Jamelske, 2009). These programs are argued to be the most studied innovation in higher education (Porter & Swing, 2006); and although results regarding their effectiveness are mixed, historically, they have shown positive impact in several ways including improvements with college persistence, academic achievement, self-management skills, knowledge of campus resources, and social integration (Porter & Swing; Starke et al., 2001). Despite this evidence, research supporting efficacy of FYS programs is fraught with methodological weaknesses (Institute of Education Sciences [IES], 2016; Jamelske, 2009). The IES found that many studies were limited to a single institution, failed to include a comparison or no-treatment group, or adequately describe pre-existing sample differences that may represent confounding variables. Despite limited empirical support for the effectiveness of FYS programs, their value and utility appears well accepted as their ubiquitous presence is evident on 95% of colleges and universities in the United States (IES). As these programs have grown, discussion has intensified regarding topics and methods used in developing effective FYS programs. In essence, the argument has shifted from whether FYS programs should be offered to what type should be offered (Henscheid, 2004).

Integration, Retention, and Academic Success of College Students with Disabilities

Research on SWD indicates that in many ways, they share commonality with their peers without disabilities (Coduti, Hayes, Locke, & Youn, 2016; Fleming & Fairweather, 2012) but there are unique barriers and challenges impacting their satisfaction, performance, and retention. In broad terms, college SWD experience additional academic, personal, and social challenges in meeting postsecondary demands and, as a result, they are more likely to struggle in these areas (Hong, Ivy, Humberto, & Ehrensberger, 2007). Commonly reported barriers are disability-related challenges such as difficulty navigating academic accommodations and related environmental barriers (Kurth & Mellard, 2006; Marshak, Van Wieren, Ferrell, Swiss, & Dugan, 2010; Yssel, Pak, & Beilke, 2016). Perhaps even more problematic are societal attitudes toward SWD and, in particular, faculty perceptions as students have reported difficulty negotiat-
Observations that Tinto’s theory was originally developed with middle- or upper-class, White, full-time students who enter directly from high school prompted revision to his views on integration. The importance of felt belonging was recognized in persistence of students, as well as the interactive relationship between the student and the environment in perceptions of whether a person would be accepted or welcomed in the university (Braxton, Hirschy, & McClendon, 2011; Fischer, 2007; Hurtado & Carter, 1997). Leading scholars in higher education research have argued that belonging is an “especially necessary, but challenging, endeavor for students from historically marginalized self-identity groups” as there are some students at greater risk for feeling unwelcomed, lonely, or left out (Vaccaro, Daly-Cano, & Newman, 2015, p. 670). Preliminary studies of SWD have been mixed in belonging perceptions, with some authors finding no differences in social integration (Shepler & Woosley, 2012) and others finding higher incidence of not fitting in and thoughts of dropping out among SWD compared to their peers (Adams & Proctor, 2010).

Researchers have highlighted the role of individual student factors in retention, success, and satisfaction. Personal factors such as self-efficacy and self-rated ability are linked with college adjustment which contributes to grade point average (Brady-Amoon & Fuertes, 2011). Getzel and Thoma (2008) identified critical themes and activities related to student self-advocacy including: seeking disability services, forming relationships with faculty, developing a support system, and gaining awareness of their own needs. Self-advocacy is recognized as crucial to meeting one’s needs, in educational pursuits and in adult life (Adams & Proctor, 2010). Students typically develop these skills throughout childhood and young-adult years, through intentional experiences provided by parents, family members, and teachers (Daly-Cano, Vaccaro, & Newman, 2015). Self-advocacy skills and approaches can also be introduced by college faculty and staff.

To inform our framework for a FYS program for SWD, we gathered information from SWD on topics, resources, and skills they found most helpful during their college experience. These students provided direct input on a FYS course for students like themselves, and also shared strategies they used in absence of an existing program. We present these data to inform development of FYS programs inclusive of SWD so that instructors may integrate this information and augment typical transition-focused information with information that addresses specific needs of SWD.

Method

Participants
Participants were recruited from a large, public, research intensive university with an enrollment of 47,000 undergraduate and graduate students. During academic year 2016, when data were collected, the university offered over 100 FYS courses. Typically, courses are organized according to college or major study area and each undergraduate student is required to take at least one credit of FYS. Twenty-six students, recruited from the university disability office and an academic department listserv, volunteered to participate in this study. Most participants were female (18), and White (20), two were African-American, three were multi-racial, and one reported an international cultural identity. Five students were in their first year, four were sophomores, seven were juniors, seven were seniors, and three were graduate students. The mean age of the participants was 22.2 years. Students reported their disability type(s) as one or more of the following: mental health (10), learning disability (9), attention disorder (8), visual impairment (3), physical health (3), Autism Spectrum Disorder (2), and hearing impairment (1). Five students reported more than one type of disability. Students were represented by a variety of major areas of study: engineering (6), science-related fields (5), education-related fields (5), and health related fields (4). Students were asked to rate their satisfaction with the university and the majority (18 students) reported feeling satisfied or very satisfied.

Procedures
Data were collected through a series of five focus groups. Groups were led by the authors, in pairs. Authors have previously received training in focus group methodology, and have led or co-led groups before. All group interviews were audio-recorded (with participant permission) and transcribed for analysis. Groups lasted for approximately 2 hours each, and followed a semi-structured protocol with questions about students’ experiences at the university, consideration of their own strategies for success, services and individuals who were helpful to them, and suggestions for programs or a proposed course that would be useful to first-year SWD. Data collection stopped after the fifth group as authors agreed that saturation was reached.

Researcher Biases and Expectations
Given the importance of recognizing experimenter bias when collecting (e.g., observer-expectancy effects) and analyzing data (e.g., confirmation bias;
Fischer, 2009), the authors recorded and shared their biases and expectations as they pertained to the study. The first author has worked in higher education for five years, and the disability and rehabilitation field for thirteen years. The second author has worked in higher education for eight years, and has seventeen years of experience in labor relations, human resources, higher education, and rehabilitation services. The third author has worked in higher education for thirty-one years, and prior to this experience, worked for thirteen years in mental health, medical rehabilitation, and research settings. None of the authors have worked directly in the student DSO but, as faculty members, worked in partnership with these offices at several universities. Authors reported the following biases and expectations based upon their professional backgrounds: students would report both positive and negative experiences addressing disability-related barriers, including DSO, faculty, and peers; students would discuss apprehension or negative experiences with approaching faculty to discuss accommodations. We anticipated that students would discuss challenges related to college integration that were both similar to and different from what has been reported by students without disabilities. We also expected that students would be candid with us given our lack of affiliation with DSO and any prior relationship with participants as well as our educational training and work experience with disability concerns.

Analysis

We used an inductive process to analyze transcript data (Patton, 2002). Each author contributed to the analysis by working both independently and together using a five-step process: (1) extracting relevant data from transcripts (e.g., substantive participant statements pertaining to the goals of the study); (2) identifying and defining patterns and broad themes; (3) initial coding of data using themes; (4) rechecking themes for consistency and defining subcategories within broad themes; and (5) synthesizing coded data back into descriptions of themes and categories (Creswell, 2009; Patton, 2002). During the coding process, differences or discrepancies with respect to themes were addressed during group meetings in order to reach consensus. The iterative process of developing and defining themes took place over the course of five meetings, lasting about 10 hours.

Once themes that adequately addressed the data emerged (step 2), the first author typed the summary and sent this narrative to the other two authors for further review. Researchers coded data independently using theme definitions and met weekly to review and address areas of disagreement (step 3). This process took 13 meetings and approximately 26 hours. During these meetings, we often referred to the transcripts to check context and interpretations particularly to resolve discrepancies in coding decisions and built consensus. In an effort to quality check, we reviewed the data in each theme once all data were coded to ensure consistent coding decisions on similar data-reassignment to more appropriate themes as necessary (step 4). We also considered emerging categories from the themes during this review. Reviewing themes took approximately 18 additional hours of coding time. Finally, we created summaries of the themes and categories and selected representative data to illustrate meaning (step 5).

Results

Four broad themes emerged from the data with respect to understanding student needs and developing appropriate content for a FYS program for our population of interest which are represented in Figure 1. Two themes provided rich data on relevant student experiences and highlighted needs to be addressed in an FYS program: College Integration and Disability Experience. These data provide context for understanding positive and negative experiences students have with integrating into a large university, as well as how their disability status adds an additional dimension to their student experiences. Two other themes emerged highlighting recommended content areas and suggestions for instruction as part of an FYS program: Student Strategies and First-Year Seminar Recommendations. A definition of each theme and specific examples of student generated data follows.

College Integration

This theme was defined by students’ descriptions of their early experiences at the university, specifically those reflecting efforts to get involved in campus life, make friends, connect with faculty and staff, and engage in academic and social programs. Data coded in this theme reflected either satisfaction or dissatisfaction with the process of college integration. Within this broad theme, a number of topics were addressed by student responses. Four sub-themes emerged: orienting to campus, adjusting to higher academic demands, making friends and joining activities, and describing how disability impacted students’ integration. With respect to getting oriented to a large campus with a large student body, students had varying perspectives. Some students found this feature exciting, and connected with other students easily. Several indicated an appreciation for “variety” and “diversity” of opportunities and people, and in meeting new
people, an opportunity to recreate one’s identity, if desired. One student described the phenomena this way:

No one cares who you used to be, they don’t know your past unless you tell them. I think it’s amazing to see that you can just change as a person. I used to be kinda’ quiet, wouldn’t really voice my opinion, and then I came to college and you just speak out and say what you want to say.

Others described struggling with the “bureaucracy” associated with a large university, and feeling overwhelmed with choices and possibilities. Some students recalled early days on campus as confusing and daunting:

Coming here as a freshman you get fliers, you start classes, you don’t know where [building name] is…. And you are like how do I get to [building name] and why is it [shaped like] a giant circle? All of these questions, everything is overwhelming.

Several students discussed difficulty transitioning to a higher academic standard associated with college level courses. Some lamented poor study skills and having to work hard to develop academic strategies. Others recalled a “honeymoon period” at the beginning of classes where the material is familiar and then experiencing a “shock” when deadlines all occur simultaneously or when more difficult material is introduced.

Participants who started their first year at this campus (non-transfer students) described a common social experience of being “new,” where it was relatively easy for them to approach other students to make connections. Most people did not come with an existing large social network, and they found others to be relatively receptive to simple introductions. Students who transferred in to the university after the first year or changed majors described a different social dynamic – where students seemed to have more cohesive social groups and students felt less comfortable approaching their peers. A student described the perception this way:

I just try to join other things and stuff, but it seems like everyone already has their own groups and, I don’t know, after freshman year, I guess freshman year it was not weird to just walk up to someone like hey, you wanna’ be friends, and now if you do that people would be like go away, who are you?

At a large institution, there are many different kinds of activities and social groups to join. Students in our sample were by and large active in groups, ranging from more academically oriented (e.g., business or engineering clubs, cultural groups), special interest hobby groups (e.g., exercise, dance, photography) to philanthropic groups and Greek societies. Several students described a university event held at the beginning of each academic year to encourage students to get involved with campus activities. A few students expressed appreciation for this event because it brought all of the diverse activities together and made them aware, while others found it overwhelming and found that they wanted to join everything, but could not. Students who were involved in activities often referenced these organizations as a way to make friends, and students who were less involved often expressed some difficulty connecting with peers without these similar activities and interests. For example, “I feel like it was really hard. Not like I don’t have friends, I just feel like it was difficult making friends not joining a sorority or anything.”

Some students discussed their perception of the campus climate as it pertained to disability-specific concerns during their initial enrollment. In these instances, students felt relief when they became aware of others in their classes or major who also receive disability accommodations and a few noted that they became friends with these individuals because of their common experience. One student described it this way:

I am so relieved when I find out and, of course, it’s not until the day of an exam when I sit down and see everybody, I look around the table and I am like you guys were all in my class and I know you. You are in my major and I am just figuring this out now, it would be nice to know the people who are in your class and have accommodations because it makes you feel less alienated, a little bit more part of the [University] community.

A few students discussed how their disability compounded other factors and impacted their engagement, for example a student who was a commuter, and another student who had to negotiate disability accommodations with peers in order to complete a group project. Other students discussed the campus climate related to disability, comparing the awareness of and investment in disability-related issues to attention to other student groups (e.g., LGBTQA, athletes) noting that disability does not seem to be as well recognized on campus.
Disability Experience

Living with a disability provides a unique experience as evidenced by positive and negative statements internalized by students. Although there were descriptions that reflected a continuum of personal reactions, they tended to be more negatively weighted as a result of social stigma often associated with having a disability that, for some students, represents a devaluation process. For example, students mentioned terms or feelings to describe their experiences such as “demeaning,” “not [being] understood,” “frightening,” or “self-conscious.” For students who spoke about their disability experiences, in succinct terms, life seems harder. For example, a student who requires medication to regulate mood indicated that one of the side effects from the medication is that it contributes to being tired and lethargic. Trying to explain this situation to their friends is difficult and, from the student’s perspective, contributed to further confusion. As the student explained, “I guess they just don’t understand. They would be like, ‘what do you mean your medicine makes you sick?’ I am like, I am sick. …You can’t explain like how your medicines make you feel too numb to them.”

At the same time, other students report that as a result of lived disability experience, it impacted them in positive ways and enhanced their college experience in other unexpected ways. For these students, there is pride and value about having a disability and how it has influenced them in positive ways and enhanced their college experience as evidenced by positive and negative statements internalized by students. Although there were disclosures of life challenges can be uplifting, in many cases, students reported that it is not necessarily more important than any other aspect of their identity. For example, one student exemplified this belief with the following statement:

I don’t think it’s something that we should be screaming out to the top of our lungs but I feel like other people should realize what’s here and it’s not like something to be ashamed of. It’s something to be like oh, it’s ‘cause I am. It’s not my fault my brain has some weird functions happening that no one even figures out about; but it happened so we have to deal with it and we deal with it how we can. And I mean we’re here at college, meaning we’re just as credible as anyone else who got into [name of university].

The consequences of having a disability are also manifested within the context of social relationships. Depending upon these interactions, SWD sometimes resort to strategies that will mask the impact of disability given existing stigma. As a result, there is a conscious effort to contain the impact of disability and for students with more “invisible disabilities” such as having a learning disability or mental illness, the impact of disability can be even more challenging and, in order to avoid disclosing information about one’s disability, SWD have to resort to alternate explanations. This situation often occurs when academic accommodations are provided where, for example, when asked by another student why the student with a disability receives extra time given for examinations, the reason given was because of “class schedule conflicts” rather than disclosing the nature of one’s disability. Containing the impact of disability effects occurs in social situations outside of the classroom as well as another student noted:

I love to dance, I’m part of the (name of dance club) where I’m going to shows almost all the time, and while I know it’s not good for my ankle, I’ll still go. And like there are days where, if it’s raining my ankles a little swollen, so I won’t dance and everyone’s like why aren’t you dancing? I go, ‘just my ankle hurts’, I keep it very like, low-key or whatever.

Making the decision about what information to share, with whom, and in what situation is a personal choice for each student. To the degree each student wishes to disclose the effects of living with a disability ranges on a continuum from something that is devalued to something that should be celebrated just as any other unique aspect that defines each person.
Student Strategies

This theme included students’ descriptions of their own personal strategies for succeeding and detailed specific approaches for how they successfully navigated college as a SWD. In our discussions, students provided recommendations and advice they would offer to other SWD. These strategy descriptions and advice provide important material for FYS program development. Within this broad theme five sub-themes emerged, including: making connections, accommodations and self-advocacy, disability specificity, education specific, and employment.

Strategies for making social connections were cited often by study participants. With respect to faculty, one student commented, “What people don’t really see is having good relationships with at least one professor is key to getting a good job or key to getting into a good career.” This relationship, as noted by other SWD, meant that students should visit professors during office hours and work on building relationships one-on-one. Connecting with others was seen as important on multiple levels including campus connections with academic advisors, tutors, office of disability specialists and career service personnel. Students also recommended connecting with advanced students who were second year and beyond, as a way to gain and share valuable information about student and college life.

Although classroom and related accommodations are necessary elements that contribute to success, it was clear from narrative comments that students indicated that getting accommodations is something that they must initiate. For example, one student stated, “I didn’t know any of those things about the [disability services office] unless I went and asked.” This resource, as well as what students knew from prior learning experiences, generated a series of classroom accommodations students found useful such as “wearing earplugs during test,” “video-taping class sessions,” and “sitting in front” as a way not only to minimize distractions but also because the “professor sees you.” In terms of note-taking, students suggested to “rewrite notes in your own words” and “get notes from other students to compare against your own notes.” Other recommendations included getting a tutor and enrolling in the summer session rather than waiting until the usual fall semester to begin classes. By starting in the summer students enjoyed having classes with smaller enrollments and fewer students on campus, which they believed made it easier to get acclimated to college life. Students also expressed the importance of having an awareness of individual preferences for learning environment. For example, knowing which courses are better suited to study with other students as well as knowing which students to study with are important accommodations that must be considered. For other students taking online courses is a better way to learn “because it helped me cope with my disability and manage my classes better.” Other recommendations involved “getting a planner,” setting “small goals every day,” and using a color-coding calendar and email reminders of assignments that are due in order to “stay organized.”

Another important accommodation necessitating self-initiated action was finding medical and pharmaceutical professionals at or near the college to manage medical concerns. The ability to receive monthly prescriptions seemed to be an issue students experienced and, as a result, identified strategies on multiple fronts. First, students discussed how to navigate prescriptions that allowed for only one month refill at a time which was problematic for both students who had to arrange a monthly trip home and for those who lived so far away that regular trips were not feasible. Solutions included finding local health care professionals (who would fill prescriptions), using university-based services (health and mental health) to monitor and fill prescriptions, and pursuing “vacation overrides” from insurance companies that would allow for refills for more than one month at a time. Students’ strategies for discretion in medication use included having medications sent to a “post office box” off campus (“not dorm”), and using cotton balls in packing (to avoid “pill rattling”) so medications would not get stolen by other students and so that other students would not see medications being delivered or picked up.

Employment strategies and recommendations were also presented during interviews. Students discussed the importance of focusing on professional development including going to conferences, joining university clubs and organizations that offered leadership opportunities relevant to career goals, and completing internships. Working with companies “outside the university” was also recommended as an important way to get information that internal university staff (e.g., advisors, faculty) may not have but would be important in the future workplace. Attending career fairs during their first year was another recommended strategy as students could “talk with recruiters,” “have others look at your resume,” and, by doing so, students may not be “as nervous the next go round” (i.e., attending next career fair). Information about the job seeking process and, specifically, whether and how to address questions regarding disability within an employment interview represent real concerns for students.
First-year Seminar Recommendations

A major theme in the focus group protocol was to solicit suggestions for program development of a FYS course specifically related to disability issues. Students were very forthcoming in their suggestions for a possible course, and five sub-themes emerged from the data within this larger theme: academic, transportation and campus resources, employment, advocacy, and structure.

Students’ recommendations for academic content in an FYS program included information on classroom success such as how to take lecture notes, how to identify individualized strategies for studying, and how to select compatible student groups for class assignments. Participants also suggested teaching FYS students the importance of establishing effective working relationships with professors. One student stated, “start talking to these advisers, these professors now because you can develop different relationships that can lead your career, your interests, your passions in different directions than you may not necessarily know.” Participants also believed that connecting FYS students to peers with and without disabilities who have successfully negotiated the college transition could be an important resource as well.

Another content area students would like to see addressed in a FYS program was related to transportation and campus resources. Students suggested sharing information regarding transportation resources including apps that had campus maps, information on bus routes, and where different relevant businesses (e.g., mobility services, pharmacies, wheelchair repair) and resources were located in the community (off campus). Students also suggested various faculty present in the seminar not only to highlight aspects within a given academic majors but also to learn about educational and employment opportunities and resources available within these fields. Students felt these presentations would allow them to connect directly with faculty as a way to begin mentoring relationships. Specific to disability services, students said it was important to have someone from this office to present in the class and share resources they have available to students (e.g., accessible technology, alternate textbook formats, housing, note-taking, scholarship information). One student stated, “I mean if I knew some more of them, I would know there are more things that I can get ‘cause I am sure there is more that could be done.” Students also recommended offering information and strategies on how to work with disability services throughout the college experience, but especially as a first-year student.

Information about career planning and employment was another area students wanted included in an FYS program. Students advocated for providing SWD strategies for working in “the real world.” One student comment highlighted the lack of knowledge and confidence some SWD feel when navigating employment as a person with a disability. They stated, “I am terrified about disclosing to potential employers my issues.” Several students wanted information on evidenced-based practices to assist them beyond graduation and recommended that perhaps alumni with disabilities come in to speak with students as part of the program.

In terms of how the FYS should be structured, students offered mixed opinions as to whether it should be offered by specific major or semester status. Recognizing that student needs may be different according to academic standing (e.g., first-year v. fourth-year), students believed that programmatic offerings could be tailored accordingly. For example, students reflected the importance of knowing about resumes and job search strategies, which would be important information for students in their third or fourth year while first-year students may want to focus more on navigating the structure of the university as a SWD (e.g., accommodations, resources). Finally, students believed that the FYS class should foster a sense of pride regarding individual differences and cultivate empowerment for students.

Discussion

The purpose of this qualitative study was to inform development of a FYS program inclusive of issues pertinent to SWD. Although FYS programs are widespread and have been tailored to specific student groups, it does not appear that SWD have been routinely included in these efforts. Because of their lived experience, SWD are an important source of information to determine aspects (e.g., structure, content) of a useful model of FYS inclusive of disability issues. Students in our sample provided rich detailed accounts of their experiences of their college transition, lived experience of disability, strategies they have used to be successful, and suggestions for the FYS program. Themes drawn from our data will be used to propose a disability-focused model of FYS.

Students, based on their experiences, made several suggestions related to structural and procedural points for a potential FYS program. Although students expressed support for the idea of an initial FYS that included both typical college integration and disability-focused issues, they also recommended other times that supplemental instruction might be useful. Students noted that once the initial transition to college occurred, more advanced students have other needs...
that could be addressed through a series of workshops or classes aimed at SWD. For example, topics such as the importance of internships, how and if one should disclose disability during a job search, financial management and student loans, and finding mentors were noted as desirable topics, but falling outside of the FYS model. Other student comments suggested the importance of identifying desirable instructor qualifications. Based on students’ discussion of accommodations, self-advocacy, and classroom experiences, it seems important that the instructor possess a working knowledge of disability, universal design, and accessibility to ensure an inclusive learning environment (c.f., Zeff, 2007). The instructor should also be well informed of disability and general resources on campus for students. Peers and professionals with disabilities were also highlighted as individuals who could provide valuable contributions to a FYS class. It was clear that students seek out information from other students, and value perspectives of other individuals with disabilities who have successfully navigated the college and professional environment.

Recommended content ranged from information that all new students can benefit from to information that was more disability-specific. When students described their initial experiences on campus, they emphasized many similar themes to those found in traditional models of student integration. Orienting to campus, connecting with peers, finding both academic and non-academic activities to join and connecting with other students and faculty were all noted as prominent initial tasks by respondents. Students highlighted methods for getting involved, making friends, and connecting with faculty when they discussed strategies that helped them to be successful. These are important areas to cover in an FYS program to help new students understand the importance of these initial experiences, and how they might go about approaching these tasks. Disability issues were also present in student narratives of initial college experiences. Students described wanting to connect with other SWD in order to feel more connected to the campus community. Students also described several strategies related to accommodations and self-advocacy that they believed contributed to their success. Narratives suggest that FYS content should include disability related resources (campus and community), general student resources, and opportunities for students to develop a peer group to serve as a place to feel connected as well as a possible source of advice and information sharing.

A question remains on whether it would be more beneficial to offer this kind of course only to SWD or whether there is value to including students who do not have disabilities as well. SWD narratives about the disability experience often concerned their relationships with other people; including feeling misunderstood and that at times, their greatest barriers came from the attitudes and behaviors of other people (e.g., friends, faculty). In terms of campus culture related to disability, some participants noted that they felt that disability as an issue was invisible, and did not receive the same attention as other student issues (e.g., issues relevant to the LGBTQA community, student-athletes). Discussing disability in an integrated course could be a valuable learning experience for all students, regardless of disability status. Additionally, SWD are often hesitant to disclose, and a more open enrollment policy might remove some of the potential stigma associated with taking the class. Providing this course only to students who have identified as having a disability may be limiting and, perhaps more problematic, inconsistent with federal mandates promoting inclusion. For these reasons, we suggest a course that targets disability issues, but is not exclusively for SWD.

Findings from our study share several common themes with other investigations related to FYS programs for other underrepresented groups and provide a useful context for professionals working in disability support or student affairs positions. Our participants discussed the value of finding community which is an earlier theme underscored in FYS groups for students from lower income backgrounds. For example, Anselmo (1997) found that greater benefit of FYS came with the opportunity to reconnect with classmates after the end of the course. Benefits were described as both social and academic. Starke et al. (2001) found an increase in retention success for students from minority backgrounds after FYS programs were introduced, particularly notable in a majority White institution. The program described content designed to orient students to the college environment, as well as addressing broader social issues in higher education related to gender and multicultural diversity. Including discussions of diversity and intersectionality (culture, sexuality, and ability) may be a way to find community across the study body.

Limitations

Study results, while informative, must be understood within the context of several limitations. Our sample was recruited through advertising to the DSO, and was composed of volunteers from one university. Participants received a token incentive for their time, and this may have impacted who self-identified. We also advertised to students within the academic home
college of the research team, and at least one participant who ultimately attended one of the focus groups was recruited this way. While participant comments were in many ways consistent with the current literature in this area, we cannot generalize responses to all SWD, particularly those not registered with the DSO, or those attending different colleges or universities. Although the research team pursued the analysis approach carefully, as with any qualitative study, alternative interpretations of the results may have been drawn by other researchers. We attempted to be transparent about our biases and expectations by sharing them with each other during coding, and as shared in this report but there may be others beyond our awareness. Future work with other participants and different research teams is needed to confirm our findings.

Conclusions and Future Research

FYS programs have shown promise for addressing retention issues, strengthening connections between the student and the institution, promoting skill building (e.g., health, academic, personal), and enhancing academic success (Jamelske, 2009). FYS programs are commonly offered, and in some cases required for first year students. However, programs are not available to meet the needs of SWD, a growing population with well-defined barriers to educational success. Our study provides input from SWD on their experiences with college integration, strategies they have used to be successful, and their recommendations for content and structure of a useful FYS program for students like themselves. This information is important for educators and support professionals looking to build programming for students.

Building on this proposed model for a FYS program, the next logical step is to pilot the course and evaluate efficacy. Formative evaluation at initial stages should address topic and format selection, determining whether content and structure meet student needs. Pilot study should include seeking input on additional topics for inclusion and/or removal of unnecessary material. Additional study of participants’ academic performance, well-being, campus integration, self-efficacy, and retention/graduation rates would provide more objective indicators of program efficacy. Comparison studies of this model with traditional FYS course would be useful to determine whether the additional disability-related content adds value for students. Assessment of differential impact on students who do not have a disability would also be interesting to note, particularly as programs make decisions about enrollment.

References


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Figure 1. Themes to be represented in a First Year Seminar
Sexual Coercion Experiences Among Canadian University Students with Disabilities

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Abstract

Many young women attending post-secondary education report high rates of sexual coercion and other forms of sexual violence on campus; however young women with disabilities may experience even higher rates of these behaviours. While researchers have investigated some types of violence, in particular intimate partner violence, little of this work has examined the broader forms of sexual victimization that may impact young women with disabilities. This study examined the types and methods of sexually coercive behaviours that women undergraduates with disabilities reported while attending universities in Ontario, Canada. Eighty-eight women with disabilities responded to an online survey about any unwanted sexual behaviour they experienced during their undergraduate program, including sexual harassment, touching/kissing, and attempted as well as completed sexual acts. The results of this study support previous research indicating high rates of sexual coercion among women with disabilities. Compared to women without disabilities, a greater proportion of women with disabilities reported sexual harassment as well as completed sexual acts committed through arguments and pressure, the use of physical force, or while intoxicated or incapacitated and unable to consent. These results are discussed in terms of understanding sexual victimization on campus and the needs of students with disabilities.

Keywords: Disability, sexual coercion, university students

Sexual assault and all forms of sexually coercive behaviour present a risk for many young women in Canada; however women with disabilities may face increased rates of sexual coercion due to prejudice, discrimination, and stereotyping (Ontario Women’s Directorate, 2013). Young women with disabilities may experience unique physical, cognitive, or emotional challenges that increase perpetrators’ perceptions of vulnerability, which may place them at greater risk of exploitation (Newroe, 1999). Approximately 15% of Canadian women aged 15 years and older lives with a disability (Statistics Canada, 2012) and a growing number of these women are pursing post-secondary education. Despite this, the unique vulnerabilities and challenges faced by all women with disabilities and particularly young women within educational settings are only recently being addressed in research and with little attention to their multiple intersecting identities.

Violence against Persons with Disabilities

Most research studies as well as anecdotal reports on interpersonal violence find that women with physical and cognitive disabilities, language impairments, and other disabilities are more likely to experience physical, sexual, and emotional forms of abuse as well as stalking compared to both men and women without disabilities (Curry, Hassouneh-Phillips, & Johnston-Silverberg, 2001; Hassouneh-Phillip & Curry, 2002; Krnjacki, Emerson, Llewellyn, & Kavanagh, 2016; Olofsson, Lindqvist, & Danielsson, 2015). In a review of violence against women with disabilities, Perreault (2009) states that findings from the Canadian General Social Survey (Statistics Canada, 2004) indicate that rates of violent victimization including sexual and physical assault as well as robbery were two times higher for persons with activity limitations than for persons without limitations. In a meta-analysis of 26 studies examining the
rates of violence against male and female adults with disabilities, Hughes and colleagues (2012) conclud-
ed that adults with disabilities are at a greater risk of experiencing violence compared to adults with-
out disabilities, and those with mental illnesses are particularly at risk. A more recent review of litera-
ture on abuse of women with disabilities (Plummer & Findley, 2012) states that women with disabilities
are abused for more extended periods of time, are at greater risk for abuse by multiple perpetrators, report
abusive strategies by multiple types of perpetrators as well as strategies that specifically target the indi-
vidual’s disability. While a minority of researchers reported mixed findings on the comparative rates of
victimization for women with disabilities and those without (e.g., Young, Nosek, Howland, Chanpong, &
Rintala, 1997), these equivocal findings may reflect methodological differences in defining disability as
well as failure to take account of women’s multiple disability statuses.

Studies specifically examining sexual violence, commonly defined as any sexual act committed
against someone without that person’s freely given consent, have largely supported findings of increased
rates of violence among women with disabilities. A survey of 6,450 young women in the United States
demonstrated a relationship between having a phys-
ical disability and the likelihood of experiencing physically forced rape (Haydon, McRee, & Tucker
Halpern, 2001). Women with a physical disability were approximately one and a half times more like-
ly to report forced sex compared to women without a physical disability. Similarly, a study by Powers,
Curry, Oeschwald, and Maley (2002) surveyed women with physical, as well as both physical and cognitive
disabilities and found that women with disabilities were approximately two times more likely to report
abuse. An early study using the National Violence
Against Women Survey (Tjaden & Thoennes, 2000)
found that women with severe disabilities (i.e., ac-
quired physical disabilities, chronic disease or health
conditions, or chronic mental health conditions inter-
fering with activities of daily living) were four times
more likely to report sexual assault compared to
women without disabilities and were also more like-
ly to report physical assault (Casteel, Martin, Smith,
Gurka, & Kupper, 2008). More recently and using the
reported that individuals with disabilities reported
rape and sexual victimization at a rate three times
higher than individuals without disabilities.

Several Canadian studies have supported these
findings. Using data from the Canadian General So-
cial Survey, Brownridge (2006) found that women
with physical or cognitive disabilities were approxi-
mately twice as likely to report being slapped, kicked,
and sexually assaulted by an intimate partner com-
pared to women without disabilities. Additionally, Ca-
nadian women with language impairments were four
times more likely to report sexual assault compared
to women without language impairments (Brownlie,

**Sexual Violence Against Persons with Disabilities on Campuses**

While research on sexual violence against women with disabilities is increasing, focus on postsecond-
ary students with disabilities has received limited atten-
tion. This is in spite of the fact that the number of
students with disabilities enrolled in North American postsecondary institutions has increased dramatically
(e.g., Hill, 1996). Individuals with disabilities are
graduating from postsecondary institutions in Canada
at increased rates – from 11% in the 2001 Canadian
Census report to 16% in the 2012 Canadian Cen-
sus report (Statistics Canada, 2003; 2012). As well,
during the past three decades postsecondary institu-
tions have increasingly recognized and addressed
the need for enhanced services to students with dis-
abilities (Fichten, Bourdon, Creti, & Martos, 1987;
Hill, 1992). The importance of services and a positive
institutional environment is supported by a study of
negative social interactions on campus (Tremblay et
al., 2008) which found that students with learning or
psychiatric disabilities reported greater psychologi-
cal, social, and health-related effects of negative cam-
pus experiences compared to other students. Campus
services for students with disabilities commonly in-
clude a range of academic accommodations, the use
of assistive technologies and learning strategy tech-
niques, as well as transportation services and active
referrals to other support agencies.

Much of the existing research on sexual victimi-
ization of students with disabilities has focused on
intimate partner violence (IPV) and indicates that
students with disabilities report increased rates of this
form of physical and sexual violence. A study by Por-
ter and Williams (2011) found that college students
with hearing impairments were more than twice as
likely as college students without hearing disabilities
to have experienced psychological and physical abuse
by an intimate partner. Similarly, female postsecond-
ary students with hearing impairments were twice
as likely to experience physical assault, psychological
aggression, and sexual coercion by an intimate
partner compared to female students without hearing
impairments (Anderson & Leigh, 2011). In a large
survey of 20,000 postsecondary students in the Unit-
ed States, Scherer, Snyder, and Fisher (2016) reported that students with disabilities were twice as likely to experience IPV compared to students without disabilities and students with multiple disability types were the most likely to experience IPV, followed by those with cognitive disabilities. A recent study by Findley, Plummer, and McMahon (2016) that was not specific to only IPV found that 22% of college students with disabilities reported some form of abuse over the last year and 62% reported some form of physical or sexual abuse before the age of 17. These initial studies indicate that students with disabilities report high rates of abuse by others and support the need for further investigation.

The scarcity of literature addressing the various forms of sexual violence against women with disabilities on campus and particularly the types of sexual violence at universities needs to be addressed more urgently by researchers, service providers, and policy makers. Given the overall high rates of sexual victimization of women enrolled in postsecondary studies and that women with disabilities may face increased rates of sexual violence (e.g., Findley, Plummer, & McMahon, 2016; Krnjacki et al., 2016), it is imperative that researchers address the intersectionality and experiences of individuals who are members of both these groups.

**Purpose of Study**

The purpose of this study was to examine sexual violence reported by women with disabilities on university campuses in Ontario. Specifically, this study documents the methods of coercion used and the types of unwanted sexual behaviours that women with disabilities attending higher education experienced.

**Method**

**Participants**

Data for this study was collected as part of an investigation examining the range and impact of unwanted sexual experiences on academic performance and campus social engagement among undergraduate students in Ontario. The data presented here consisted of 88 students who self-identified as having a disability. Disabilities included any form of physical, emotional, or cognitive disability that was reported as disabling for the individual. A sample of 842 women undergraduates within the same study who did not report a disability was used as a comparison.

Participants with disabilities ranged in age from 18 to 54 years and were older (\( M_{\text{age}} = 22.49 \) years, \( SD = 4.56 \)) than women not reporting disabilities, \( t(91.07) = 3.92, p < .001 \) (see Table 1). For women without disabilities the average age was 20.56 years (\( SD = 2.14 \)). Women with disabilities described their sexual orientation as straight/heterosexual (44.3%), bisexual (22.7%) queer (11.4%), lesbian (9.1%), other or not mentioned (5.7%), and asexual (4.5%). The majority of women without a disability described their sexual orientation as straight/heterosexual (83.6%) and 9.1% as bisexual. This was a significant difference, \( \chi^2 (6) = 68.75, p < .001 \), with individuals without disabilities significantly more likely to identify as heterosexual compared to individuals with disabilities. At the time of the study, 43.2% of women with disabilities were single, 39.8% were in a relationship, and 12.5% were dating. This was similar to women not reporting disabilities (45.1% single, 42.3% in a relationship, and 11.0% dating), \( \chi^2 (3) = 3.99, p = .263 \).

Twenty-eight respondents with disabilities (31.8%) described themselves as racialized (i.e., identifying as non-Caucasian) compared to 48.7% of those not reporting a disability. This was a significant difference, \( \chi^2 (1) = 9.47, p = .002 \). For women with disabilities, ethno-cultural background included European (48.9%), East Asian (15.9%), South Asian (5.7%), African (1.1%), and mixed (4.5%) or other (21.6%); 2.3% did not disclose their race. This was significantly different from women not reporting a disability, \( \chi^2 (7) = 20.65, p = .004 \), whose reported backgrounds included European (28.6%), East Asian (24.0%), South Asian (14.7%), African (3.2%), mixed (7.2%) or other (18.9%); 3.4% did not disclose their race. A small number of participants did not answer this question.

All participants were undergraduates and the majority was in years one to four of their programs; however women with a disability were less likely to be first year students than women without a disability, \( \chi^2 (5) = 14.42, p = .013 \). A small percentage, 10.2% of women with disabilities and 8.4% women not reporting a disability were attending beyond the fourth year. While the majority of all students were at university full-time, students with disabilities were attending full-time (73.9%) less often than other students (94.5%; \( \chi^2 (1) = 31.79, p < .001 \)). The majority of students with disabilities (62.5%) were enrolled in a faculty of Arts & Science, similar to those not reporting disabilities (46.6%). A majority of respondents reporting a disability lived off-campus with others including roommates or family (69.3%) or off-campus on their own (10.2%) similar to a majority of the respondents without a disability who lived off-campus with others (70.8%) or off-campus on their own (8.8%).
Measures

Women students attending universities in Ontario were asked about unwanted sexual experiences and coercion as well as sexual harassment they had experienced during their undergraduate years. Sexual coercion was defined in this study as any unwanted sexual behaviours using arguments and pressure, threats of harm, physical force, or committed when unable to consent through incapacitation. The following measures were included.

Background and demographic information. A background questionnaire specific to this study was used to obtain demographic information. This included participants’ age, sexual orientation, relationship status, ethno-cultural membership, year and program of study, and living situation at the time of study.

Sexual victimization. An abbreviated Revised Sexual Experiences Survey (Testa, Hoffman, & Livingston, 2010) was used to collect information on students’ experiences of sexual coercion. The measure asked respondents to indicate whether they had experienced each of four methods of coercion or tactics in sexual victimization including (1) arguments and continual pressure to obtain sex, (2) threats of physical harm, (3) physical force, and (4) sexual behaviours while incapacitated or intoxicated and unable to consent. Respondents were asked also to indicate the type of unwanted sexual behaviour that occurred for each method of coercion. For this study these included (1) fondling, kissing, or touching; (2) attempted sex (intercourse, oral sex, other penetration); or c) completed sex (intercourse, oral sex, other penetration). A question was included on a fifth topic, incidents of sexual harassment since entering university. Frequency scores were calculated for each type of behaviour and method of coercion.

Procedures

Following review and study approval from the university ethics review board, participants were invited to a survey link that provided information about the study. Advertisements for the study were posted electronically through student groups as well as in hard copy in universities in southern Ontario. Those interested in participating were linked to a consent form and an online survey questionnaire. This could be completed at one time or over any number of sessions as determined by each participant. The approximate time for completion was 20 minutes. All participants were provided with a list of support services and resources which they could copy or print for their use.

Results

Sexual coercion reported by women with disabilities and those who did not report disabilities was examined through logistic regression analyses using disability as the independent variable. Analyses of sexual victimization reported by women with disabilities and women not reporting disabilities revealed that, while both groups of women experienced various forms of victimization, there were differences in the types of coercive behaviours experienced between the groups of women.

Coercion Using Arguments and Continual Pressure for Sex

Examination of the use of arguments and pressure for sex (Since you entered university has anyone ever overwhelmed you with arguments about sex or continual pressure for sex in order to…) revealed that a higher percentage of women with a disability (31%) reported completed sex that was unwanted following arguments and continual pressure (...succeeded in making you have sex) than those with no disability (17%). A test of the full model versus null was statistically significant $\chi^2(1, N = 929) = 8.850, p = .003$. Table 2 shows the logistic regression coefficient, Wald test, and the odds ratio for the predictor. For women with disabilities, the reported odds of completed sex after receiving arguments and continual pressure were over two times that of women without disabilities. The 95% confidence interval for the odds ratio was .880 – 2.181 and does include 1 (which confirms the non-significant result). There were no differences between groups in reported fondling, touching, or kissing or attempted sexual behaviours through the use of arguments and pressure (see Figure 1).

Coercion Using Threats of Physical Harm

No differences in the use of threats to harm an individual (Since you entered university, has anyone ever threatened to physically harm you or someone close to you in order to…) were seen among respondents to the survey. Women with disabilities did not differ in their report of threats used against them from women who did not disclose having disabilities (see Table 2).

Coercion Using Physical Force

When the use of physical force in sexual victimization (Since you entered university, has anyone ever used physical force [such as holding you down] in order to…) was examined, women with self-identified disabilities reported a higher frequency of completed unwanted sexual acts compared to women who
did not self-identify with a disability. Completed and unwanted sex (succeeded in making you have sex) using physical force was reported by 15% of women with a disability compared to 7% for those not reporting disability. A test of the regression model was statistically significant \( \chi^2(1, N = 927) = 5.322, p = .021 \) (see Table 2). For women with disabilities, the reported odds of completed sex using physical force were two times that of women without disabilities. The 95% confidence interval for the odds ratio was 1.112–2.995, and does not include 1 (which confirms the significant difference). The use of physical force to fondle, touch, or kiss participants as well as attempted sexual behaviour using physical force did not differ among women with and without disabilities (see Figure 2).

Coercion While Incapacitated or Intoxicated

In examining sexual coercion during intoxication or when the individual was incapacitated and unable to consent (Since you entered university, when you were incapacitated or very intoxicated [e.g., by drugs or alcohol] and unable to object or consent has anyone ever...), 22% of women with a disability reported completed sexual acts compared to 11% of women without a disability (see Figure 3). A test of the full regression model was statistically significant \( \chi^2(1, N = 928) = 7.51, p = .006 \) (see Table 2). Accordingly, for women with disabilities, the reported odds of coercion while incapacitated or intoxicated were over two times more than that of women without disabilities. The 95% confidence interval for the odds ratio runs (1.30–3.94), and does not include 1 (which confirms the significant difference). No differences were noted in fondling, touching, and kissing or attempted sexual acts while intoxicated or incapacitated by women with disabilities and women not disclosing disabilities (see Table 2).

Sexual Harassment

A large majority of participants with disabilities reported sexual harassment. When asked “Since you entered university, has anyone ever harassed you in a sexual manner?” nearly three-quarters (74%) of participants with disabilities had reported sexual harassment. A test of the full regression model was statistically significant \( \chi^2(1, N = 928) = 6.09, p = .014 \), indicating that women with disabilities reported sexual harassment more often than women without disabilities (61%). For women with disabilities, the reported odds of victimization through sexual harassment were almost twice more likely than for women without disabilities (see Table 2). The 95% confidence interval for the odds ratio was 1.112–2.995 and does not include 1 (which confirms the significant difference).

Discussion

This study examined sexually coercive behaviours reported on university campuses in Canada by undergraduate women with self-reported disabilities. The study revealed that women with disabilities reported a range of sexually coercive experiences that occurred while they were students. Specifically, more women with disabilities reported completed sexual acts using arguments and pressure, physical force, or while intoxicated or incapacitated, as well as sexual harassment, than women not disclosing disabilities. These results suggest that women with disabilities experience higher rates of the most extreme forms of sexually coercive behaviours (i.e., completed acts of intercourse, oral sex, or other penetration) through various methods of coercion compared to women not reporting disabilities.

The findings from this study support previous research indicating increased rates of sexual violence targeting women with disabilities (Curry et al., 2001; DisAbled Women’s Network of Canada, 2014; Hasseuneh-Phillip & Curry, 2002; Hughes et al., 2012). As noted in a report by the Canadian Federation of Students (2015), a vast majority of women with disabilities will experience some form of violence over their lifespan and are more likely to be forced into sexual activity by the use of threat or force. This study expanded previous research to include findings on sexual violence among university undergraduate women with disabilities on Canadian university campuses.

Although the victimization of women with disabilities shares many common characteristics with the victimization of all women, the intersectional category of gender and disability may expose women with disabilities to greater emotional, physical, and sexual exploitation (DisAbled Women’s Network of Canada, 2014). Researchers and activists have postulated several reasons for this added risk on college and university campuses. Stereotyped perceptions and misconceptions of women with disabilities who may be seen as more easily overpowered or as easier targets of unwanted sexual behaviours may contribute to these findings. For instance, individuals with physical disabilities may be seen as less able to physically protect themselves (Nosek, Foley, Hughes, & Howland, 2001; Powers et al., 2002) and individuals with cognitive disabilities may be seen as less able to appropriately respond to and deter coercion strategies (Curry et al., 2001). Individuals with any form of disability including disabilities not visible to others may...
also face stigma that places them in less powerful social roles (Nosek, 1996).

As noted by Currie (1994), some women find campus to be a dangerous place where safety concerns may shape decisions on campus and academic engagement. Fear of sexual violence may result in women trying to avoid night classes or classes in certain designated areas that could be viewed as dangerous for them. As well, students may avoid extracurricular activities that lead to unwanted interactions they view as potentially dangerous. This may be increased for women with disabilities. While some universities have taken steps to provide safe space and gendered-space on campus, the support needs of women with disabilities and those with other intersectionalities may still not be adequately addressed within the physical environment of the institution.

Other intersectionalities related to sexual victimization for women are important for understanding risk and vulnerability. More women with disabilities in this study identified as lesbian, queer, or bisexual than women not reporting disabilities. Studies have found greater rates of victimization for individuals with sexual diversities. For example, Martin, Fisher, Warner, Krebs, and Lindquist (2011) found that bisexual and lesbian women are more likely than heterosexual women to report being sexually assaulted during university. Higher rates of victimizations for individuals identifying as transgender, gender-queer, and non-conforming are also documented in the recent Association of American Universities survey (Cantor et al., 2015). While these identities are associated with generally increased rates of sexual victimization on campus, the unique factors that may contribute to higher rates for women with disabilities need further investigation. In particular, it is important to recognize and address the role of prejudice, discrimination, and stigma to sexual violence against women with multiple identities and intersectionalities.

The question of how specific disabilities are related to methods of sexual coercion and rates of victimization on university campuses is raised by this research. While the types of disabilities among participants are not specified, various forms of disabilities are likely represented among students in this study and across campuses in general. Students with learning disabilities account for the largest proportion of students with disabilities attending postsecondary schools in Canada (Stewart, Cornish & Somers, 1995) and may be represented within this population. As well, mental health issues and resulting disabilities are prevalent among students and may be seen in this study also. Current data on the mental health profiles and needs of university students indicates high rates of psychological distress among the student body (American College Health Association, 2013). Participants in this study may have a range of disabilities related to emotional distress and mental health that may cause them to be perceived as targets and as more reluctant to confront perpetrators of sexual violence as a result of feelings of shame and guilt often associated with the stigma of mental health problems.

The mechanisms used by perpetrators that target individuals (Scherer et al., 2016) may be used differentially depending on forms of disability. Some students with disabilities may be reluctant to disclose or discuss their disabilities for various reasons including insecurity about being believed. Others may be unable to recognize risky environments or resist threatening situations. As noted by Baker, Boland, and Nowik (2012) students with disabilities may see the classroom environment as less inclusive or supportive. As such, women students with disabilities may be more limited in access to or knowledge for assistance.

Although this research is an important step in documenting and detailing the sexual violence experiences of university women with disabilities, the study contains several limitations that need to be addressed. Firstly, information is not available on the precise nature of students’ disabilities, thus inferences cannot be made regarding the relationship between specific disabilities and sexual victimization. Secondly, despite the researchers’ efforts in recruiting a broad and representative sample of university students, female students with and without disabilities in this study differed significantly in some respects, thus raising the question of other characteristics being associated with the likelihood of reporting sexual violence. Specifically, individuals with disabilities were more likely to identify as sexual minorities and were significantly less likely to report being in their first year of postsecondary studies and being enrolled full-time compared to female students without disabilities. Students with disabilities may be attending school for longer periods of time and more often on a part-time basis. Greater understanding of what campus experiences, in particular sexual violence, may contribute to these patterns of attendance will be important to address.

While the context of sexual victimization needs to be investigated further to understand and prevent sexually coercive behaviours, universities may need to develop even more support structures for people with disabilities. The results of this study indicate the need for further investigation and research on the sexual victimization of women with disabilities in the context of higher education. As universities and colleges commit to providing safe environments for the
education and health of their students, understanding the risks of sexual coercion for women with disabilities on campuses is imperative in the design of both intervention and prevention programs.

References


Newroe, K. (1999, March). A cautionary tale. If you are a victim of abuse, it’s not your fault. New Mobility, pp. 53–64.


About the Authors

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<th>Women without Disabilities</th>
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<td>$N = 842$ (%)</td>
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<td>$M = 20.56$  $SD = 2.14$</td>
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<tr>
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<tr>
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<tr>
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<td>Full-time students</td>
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<tr>
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### Table 2

Logistic Regression Analysis for Methods of Sexual Coercion

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<th>Wald</th>
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<th>Sig.</th>
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<th>95% CI for Odds Ratio</th>
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*Figure 1. Use of arguments or continual pressure as methods of coercion for women with disabilities and women without disabilities.*
Figure 2. Use of physical force as method of coercion for women with disabilities and women without disabilities.

Figure 3. Coercion while incapacitated or intoxicated for women with disabilities and women without disabilities.
University Students with Disabilities: Factors that Contribute to Their Self-Predicted Likelihood of Graduation

Julia Schechter¹

Abstract

The purpose of this article is to explore what college planning practices or demographic characteristics are associated with confidence in degree completion for college students with disabilities. A survey was used to gather retrospective data from undergraduate students with disabilities registered with a disability services office at a large doctoral-granting public four-year university (n = 260). A series of t-tests were conducted to test for significant differences in students’ confidence of graduation by demographic factors and practices while in high school. Certainty in graduation was measured by students’ self-reported likelihood of graduation on a five-point Likert-type scale. Results demonstrate that students at that university, who predict a high likelihood of graduation, report certain individual characteristics, attitudes, practices and activities as important to their eventual degree attainment compared to students not in those groups. These include talking with a college representative while in high school, registering with the disability service office during the first year of college, receiving special education services in high school and students who are deaf or hard of hearing self-report a higher likelihood of graduation. Students who were beneficiaries of the free and reduced lunch program in high school had a lower self-prediction of college graduation than non-free and reduced lunch program students.

Keywords: Degree completion, disabilities, high school experience, postsecondary education

In the four decades since passage of the Individuals with Disabilities Education Act (IDEA) and codification of the transition process with the renewal of IDEA in 1997 and 2004, there remains a need for research to understand how to better prepare students with disabilities to complete postsecondary education (Newman, Madaus & Javitz, 2016). Overall, students with disabilities are attending college in growing numbers, but they remain behind their peers in earning baccalaureate degrees and their enrollment varies widely by disability category from 30 to 75 percent, with learning disabilities most commonly represented. (Newman et al., 2011). According to the U.S. Department of Labor, in 2014, 16.4 percent of people 25 and older with a disability had completed at least a bachelor’s degree compared to 34.6 percent of those with no disability (Bureau of Labor Statistics, 2015). This statistic is based on the BLS Current Population Survey (CPS), a monthly sample survey of 60,000 U.S. households that uses a series of six questions to identify the people with disabilities. Policy-makers and educators have focused on improving transitions after high school with less attention paid to investigating best strategies at the secondary level that will lead to postsecondary degree completion. Research concentrating on how better equip high school students with disabilities for college graduation is important since postsecondary education has been linked to improved employment opportunities (Newman et al., 2011; Pepnet 2, 2017).

Literature Review

While there is significant research about the educational status of students with disabilities, less is known about students who persist to graduation or drop out (Fichten et al., 2014). Astin’s model (1977, 1993) of student involvement recognized that students arrive in college with a set of demographic characteristics and previous experiences that form “inputs” such as disability, income and gender status that impact their engagement. In their study of students enrolled at a large mid-western university, Wessel, Jones, Markle & Westfall (2009) found that female students, and those that were better academically in high school (as measured by SAT scores)
more prominently influenced years taken to graduate than disability type. Correlational research to determine predictors of post secondary success for students with disabilities conducted by the National Secondary Transition Technical Assistance Center (NSTTAC), identified 16 evidence-based indicators of employment, education and independent living (Test & Cease-Cook, 2012). Since only two of the 16 areas (teaching life skills and purchasing skills) presented a strong level of evidence, and those pertaining to postsecondary education were considered too generic to impact secondary school practice (Shaw & Dukes, 2013), NSTTAC called for more research, disaggregated by disability type and around the areas of Family Involvement, Program Structure and Interagency Collaboration (Test & Cease-Cook, 2012).

Bolt, Decker, Lloyd and Morlock (2011) reported that early success requesting accommodations in high school by students with reading and writing related disabilities might add to their confidence level in seeking similar supports in college. Other research such as the archival review of 1,289 inactive student files at three Midwestern public universities, conducted by O’Neil, Markward, & French (2012), found that students who received university based accommodations such as distraction-reduced testing, alternative format tests and flexibility in assignment and test dates were significant predictors of graduation. In their study of students at a large competitive state university, Lightner, Kipps-Vaughn, Schulte, and Trice (2012) posited that students delayed seeking services for four reasons: (a) lack of time, (b) lack of knowledge, (c) desire to establish a disability-free identity and (d) a general feeling that things were going well. Students with learning disabilities may not seek accommodations they need to succeed in college because they want to deny their learning problems and distance themselves from the special education label they carried in K-12 (Field, 1996). Mamiseishvili and Koch (2011) used national data from the Beginning Postsecondary Longitudinal Study to understand what factors impede or facilitate first-to-second-year college persistence of students with disabilities and found that access to accommodation, involvement on campus, full-time attendance, on campus-living, degree aspirations, GPA and net price of attendance are significant predictors. The impetus for their study was in part based on earlier research (Horn & Carroll, 1998), which demonstrated that students who persist beyond their first year are more likely to graduate. Based on a meta-review of literature, Garrison-Wade and Lehmann (2009) created a framework to summarize research about effective secondary school interventions for youth with disabilities that emphasized ongoing communication across institutions, goal-setting for the high school student and goal statement for his or her college experience.

**Theoretical Framework**

Kohler’s Taxonomy for Transition Programming (1993, 1996) has been foundational to research on effective classroom or school-based practices that can be used to foster student success after high school and is widely recognized as a framework for comprehensive secondary school transition education and services (Dukes, Madaus, Fagella-Luby, Lombardi, & Gelbar, 2017; Test, Fowler, White, Richter, & Walker 2009). The Taxonomy defined five domains that included specific interventions and skills that a student should acquire throughout K-12 that are essential for transition from high school: Student-Focused Planning, Student Development, Interagency Collaboration, Family Involvement and Program Structure. This review is limited to the three components of the Taxonomy most aligned with this study’s research question of what college planning practices or demographic characteristics make a difference to college students’ with disabilities self-reported likelihood of college graduation: Student-Focused Planning, Interagency Collaboration and Family Involvement.

**Student-focused planning.** Student-Focused Planning is an approach to transition programming activities and practices that supports students to develop self-determination and awareness skills necessary to make educational decisions based on their own objectives (Kohler, 1993). An example is incorporating students’ postsecondary goals into the Individualized Education Program (IEP) and including the student in decision-making and evaluation of progress toward meeting those goals (Field & Hoffman, 2007; Martin & Williams-Diehm, 2013). Actively engaging students in the IEP process helps them develop knowledge of their disability, awareness of postsecondary support services available, and the ability to self-advocate (Cawthon & Cole, 2010; Milsom & Hartley, 2005). Prior research demonstrates that understanding and being able to explain the nature of one’s disability and what strategies and supports best enable learning is imperative as students bear the responsibility to advocate for their specific needs in higher education (Shaw, Madaus, & Banerjee, 2009). Research has shown that self-advocacy and self-determination skills are linked to improved postsecondary education outcomes (Field, Sarver & Shaw, 2003; Janiga & Costenbader, 2002; Martin, Portley & Graham, 2010; Morningstar et al., 2010; Wehmeyer, 2015).

**Interagency collaboration.** Interagency Collaboration is a requirement of the IEP process since
IDEA of 2004 mandated that every eligible student must have appropriate measurable postsecondary goals, a connection to an agency to assist in reaching those goals, and transition services outside of the local education agency [34 CFR 300.321(b)(1)] and (3)] [20 U.S.C. 1414(d)(1)]. These linkages are critical to successfully bridging the gap to success beyond high school (Kohler & Field, 2003), yet because of differing laws and expectations governing K-12 and higher education, creating institutional exchanges continues to be a challenge (Shaw & Dukes, 2013). Although the legal context for the IEP and 504 plan differ, both are vehicles for ensuring equal access to education for students with disabilities and both can serve to connect students with postsecondary education institutions and other organizations to help the transition from high school. For example, as part of the IEP process, the Summary of Performance (SOP) document is intended to include student’s postsecondary goals and should include accommodations that would be allowed under Section 504 and the ADA in postsecondary education (Shaw, 2010). By creating the SOP at the end of their high school years, students are able to practice self-determination, develop an awareness of their disability, strengths and needs as well as include family in the process of establishing linkages to higher education institutions (Shaw, 2009).

Postsecondary institutions, unlike schools, are not required by law to create linkages to other education institutions for the purpose of facilitating the transition of special needs students. Instead, institutions wait for students to self-identify by requesting accommodations or services at the campus disability service office. The initial interface between the institution and student comes by way of verifying their disability. For purposes of granting accommodations, postsecondary institutions surveyed by the U.S. Department of Education (Raue & Lewis, 2011) reported the most common forms of documentation accepted: the IEP (44%), the 504 plan (40%) and comprehensive vocational rehabilitation agency evaluation (80%). Visiting a college campus to gain information from the disability service office and to select an environment that best meets a student’s interests and needs is an example of an agency connection (U.S. Department of Education Office of Civil Rights, 2011). Institutional exchanges can take place without leaving the high school such as when college representatives visit high school campuses. For example, a pilot study of 43 high school seniors suggested that a mentoring intervention was associated with a substantial and significant decrease in negative attitudes toward requesting accommodations (Barnard-Brak, Schmidt, Wei, Hodges & Robinson, 2013).

**Family involvement.** Family Involvement is a cornerstone of policy and legislation related to transition programming for students with disabilities in schools. The IDEA of 2004 mandates parent involvement specifying that public agencies ensure that one or both parents have the opportunity to participate in IEP meetings (§300.322). Inclusion of parents or guardians in transition programming is based on research that demonstrates family involvement is critical in fostering educational growth in children (Newman, 2005). For example, one retrospective study of 19 college students who had IEPs in high school reported that they learned about their rights as a college student and how to advocate for their needs in a postsecondary setting from their families, not special education teachers or high-school counselors (Anctil, Ishikawa & Scott, 2008). While families have a legally mandated role to support their child in high school, this status changes when the student enters an institution of higher education. Once in college, where it is incumbent on the student to establish their own supports, the discontinuation of family participation may partially explain why many students with disabilities do not seek accommodations in higher education, i.e., almost two-thirds of postsecondary students who were identified by their secondary school as having a disability did not consider themselves to have a disability by the time they had transitioned to a postsecondary institution (Newman et al., 2011). While laws are in place to provide support to students with disabilities at postsecondary institutions, these resources are underutilized because students are often unaware of their rights and responsibilities regarding how to gain accommodations (U.S. Government Accountability Office, 2009). Thus, family training and awareness around these differences can be critical in preparing students to take advantage of these supports.

This retrospective study that surveyed undergraduates’ perceptions of their high school experience, is significant because it focused on investigating secondary school transition practices that support degree completion. Specifically, this study tied high school students’ activities and characteristics to their own self-prediction of eventual college graduation. Research about what factors contribute to postsecondary degree attainment of students with disabilities is limited (Dukes et al., 2017), in part because federal policy regulates preparation of high school students for graduation and transition to independent living, but does not monitor degree completion. Specifically, states are required under IDEA to report the (a) percent of youth aged 16 and above with an IEP that includes coordinated, measurable, annual IEP goals and transition services that will reasonably enable the
child to meet the postsecondary goals [20 U. S. C. 1416 (a)(3)(B)], and (b) the immediate post-school outcomes of young adults who had an IEP one year after leaving high school (20 U.S.C. 1416(a)(3)(B)). Investigating the high school practices and attributes of students who were registered at their university disability services office, may provide strategies for postsecondary institutions to better prepare to educate this growing population of students. Thus, this study explores the question of what college planning practices or demographic characteristics are associated with university students’ with disabilities self-reported likelihood of college graduation.

Method

Participants

Participants were undergraduate students with disabilities enrolled at a public doctoral-degree granting university located in the Pacific Northwest. For purposes of the survey, a student with a disability was defined as a student registered to receive services at the university’s disability student services office (DSO). The sample was limited to the 1,275 undergraduate students registered with the university DSO during the academic quarter when the study was administered in 2016. A total of 286 students responded; 26 responses were omitted due to incomplete or missing data. The overall response rate was calculated based on 260 responses (20%).

Design

This study was conducted while this researcher was a doctoral research assistant at the Center for Change in Transition Services. The CCTS is federally mandated under Indicator 14, 20 U.S.C. § 1416(a) (3)(B) of IDEA, to collect and analyze state level data collected about special needs students after they leave high school. The web-based survey used in this study was created by this author and guided and reviewed multiple times by researchers at the Center as well as piloted at a private four-year university. Three components from Kohler’s Taxonomy (1996): Student-Focused Planning, Interagency Collaboration and Family Involvement, were used to inform the development of the 33-item survey. The survey was designed to gather information about each of the three domain areas (See Figure 1) but was not structured according to these categories. To limit the study, two Taxonomy areas that focus more on the school environment or work force preparation were omitted. These were (a) Program Structure, which are features of the K-12 environment that relate to the planning and delivery of transition services and (b) Student Development, which emphasizes life, employment and occupational skill development through school- and work-based learning experiences (Kohler & Field, 2003). In addition, Objectives to Use for Postsecondary Education Goals, a list of transition programming practices and goals established by the Connecticut State Department of Education (2007), helped shape the development of the questionnaire. The survey instructed students to reflect on their high school years to assess how their different attributes, experiences and activities impacted their self-predicted likelihood of college graduation.

The survey included five sections: (a) Demographic Information, (b) Student Status, (c) Student Experience in High School with Special Education Services, (d) Student Experience in High School Planning for College, (e) Three survey items at the end of the questionnaire provided respondents with open-ended text boxes to record their perceptions about which aspect of their high school experience best prepared them for college graduation. Questions were formatted as categorical (“yes-no”), or continuous Likert-type scaled (e.g., Never to Always), when rating their level of self-advocacy or ability to explain their disability. Toward the end of the survey, respondents were asked to gauge their likelihood of graduating from college using a 5-point Likert-type scale (from 1- Very likely to 5-Very unlikely). Asking students to estimate their chances of completing a degree has been used with accuracy by Astin (1977, 1993) in his survey of student attitudes. The graduation prediction item was asked toward the end of the survey to make the response more meaningful. According to Patton (2002), opinions and feelings are more likely to be grounded once the respondent has relived the experience through preceding survey items. In addition, survey items about the past tend to be more difficult for respondents than questions about the future, so these were placed first. Because the study participants were enrolled at a selective (grade point average [GPA] in high 3.0 range) university, an assumption was made that respondents had attained a high standard of academic achievement. As such, this study did not request students’ high school GPA or other measures of high school academic achievement.

Procedures

The survey was first piloted at a private university with an undergraduate enrollment of about 4,500. The content of the questionnaire was reviewed by the disability services directors where both the pilot and final survey were administered as well as researchers at the CCTS. To administer the pilot, a staff person in the DSO sent an email to 53 undergraduate stu-
dents (18 students were members of the Coalition for Students with Disabilities and the others were randomly selected from the DSO database of registered students). A gift card incentive was offered. In total, there were 10 responses (19% response rate) and eight of the surveys submitted contained complete responses, which indicated that instructions were understood. At the end of the pilot survey, a text box was provided for students to answer whether they had any concerns, suggestions, or comments about the format, construction, or content of the survey (Gall, Gall, & Borg, 2007). Responses (e.g., adjust skip logic questions, add “other” to the gender category, modify duplicate questions) were used to shape the final questionnaire. The final survey was administered after the pilot testing, and when the project was granted exemption from the need for Institutional Review Board approval (based on compliance with 45CFR46.101(b) confidentiality requirements). Undergraduate students at the large public university were invited (in an email) to participate in the final study by the director of the university’s disabilities services office during a two-week period that included spring break. The director viewed this as an opportunity to garner more responses, as students would be checking their email and have the time to complete the 10-15-minute survey. A chance to win a gift card was offered as an incentive to take the final survey.

Data Analysis
Quantitative research techniques that included descriptive and inferential statistics were selected to explore the data (Gall, Gall & Borg, 2007). The Statistical Package for the Social Sciences (SPSS) was used to conduct a series of $t$-tests to determine whether there was a statistically significant difference between the means in two unrelated groups. In these tests, the dependent variable was the respondents’ self-reported likelihood of eventual college graduation as indicated on a five-point Likert-type scale. Independent samples testing was chosen in this study because it allowed for the use of a Likert-type scale to be treated as a continuous scale, whereas other forms of analyses such as the logistic regression require a binary variable (Norman, 2010). Finally, because this was an exploratory study, the contrast in means provided by the $t$-tests offered a clear initial method for evaluating results.

Responses from survey items regarding demographic characteristics and student experience in high school planning for college were coded as indicator variables where a value of 1 indicates inclusion in the described group, and 0 indicates the respondent is not in that group. The demographic characteristics for which indicator values were coded, and $t$-tests were run were: Gender, English as a first language status, first-generation (other than a sibling) in family to attend college status, race/ethnic background, free and reduced lunch benefit recipient status (FRLP), whether or not gap time was taken before enrolling in college or the student had transferred, and received special education services in high school (an IEP or 504 plan). Nine categories of disability type (according to the university’s classifications, see Table 1) were similarly created as indicator variables. The following were used to create indicator variables representing students’ experience planning for college while in high school: Had help planning for college from a representative of an outside agency; was aware of the legal differences in gaining accommodations in high school versus at the college level; visited a college campus; talked to a college representative; contacted a college campus disability service office to see what services were offered; when the student signed up for disability services and had assistance determining how to afford college. Finally, there were two items on the survey that addressed students’ experience at the university: whether anyone helped the student apply for accommodations when first enrolled in college and whether the student registered for accommodations within one year of attending college. All $t$-tests reported in Table 2 assume an unequal variance between groups. The $p$ values reported in Table 2 are not corrected for multiple comparisons in the $t$-tests because of the study’s small sample size. Multiple comparison corrections like Bonferroni’s would introduce a large potential increase in Type II errors. With this in mind, the correction was left out and the $p$ values should only be used as rough indicators to highlight groups with a large difference in means (Gelman, 2012).

Findings

Student Characteristics
Respondents were undergraduates registered with the university's disability resource office during spring quarter 2016. Of the participants ($n = 260$), the majority was female (65%) and 32% were male (the remainder selected “other” or were transgender). Table 2 includes respondents’ self-reported demographic characteristics and affiliations. In response to the survey item, “Now that you’re in college, how confident are you that you will graduate?” respondents were asked to self-predict their likelihood of graduation on a Likert-type scale. Seventy-four percent of respondents reported that they were very likely to graduate from college followed by 13%
(Likely), 9% (Not sure), 0% (Unlikely) and 1% (Very unlikely). Overall, 87% predicted that they were Very likely or Likely to graduate from college. It is important to note that this strong prediction of graduation may be influenced by volunteer bias. In addition, over 90% of respondents self-reported as enrolled beyond freshman year. Therefore, the sample may not be representative of all students with disabilities attending the university because it is skewed by an abundance of students who persisted past their first year and sought assistance by registering for disability support services.

**Results Reported by Components of Kohler’s Taxonomy**

Quantitative analysis provided clear information about which characteristics of respondents’ socio-economic status and high school activities were associated with a higher self-prediction of college completion. Specifically, statistical testing revealed differences at the $p < .05$ level between the means in six of the groups tested in independent samples tests (see Table 2). In interpreting results, the mean represents the dependent variable, which was derived from Likert-type scale responses (1 = Very likely, 5 = Very unlikely) to the survey item: “Now that you’re in college, how confident are you that you will graduate?” When interpreting the results, the reader should take note that a lower mean ($M$) score result (closest to 1) indicates a higher self-prediction of graduation on the scale used, where 1 – indicates “Very Likely” to graduate. Each $t$-test provided a way to explore which variables are most related to the prediction of graduation.

**Student-focused planning.** Results related to IEP development, participation and planning strategies are reported under the Student-Focused Planning domain. Most respondents did not receive special education services in high school or could not remember if they had. When asked about their special education status in high school, 66% received no special education services, 13% had a 504 Plan, 7% had an IEP and 14% could not remember. Of the 17 respondents who indicated they had an IEP in high school, 72% attended an IEP meeting some of the time. When they attended their meetings, they were sometimes an active participant and of those who attended their meetings, 41% used the time to plan or prepare for college and 23% created a Summary of Performance (SOP) document. Most respondents (59%) had never heard of a SOP. Students who had an IEP in high school had a higher prediction of college graduation ($M=1.07$) than those who did not ($M=1.44$) as did students who had a 504 plan ($M=1.14$) and those that did not ($M=1.46$).

**Interagency collaboration.** Findings assigned to this domain link students’ self-prediction of college completion to Interagency Collaboration, which involves developing relationships with multiple parties outside of the school (Test, Bartholomew & Bethune, 2015). Independent samples testing revealed two activities related to outside agencies practiced by students in high school who indicated a higher likelihood of college graduation. The first was students who talked to a representative of a college while still in high school. Specifically, the survey question asked “either in person when they visited your high school, by phone, or video chat”. These students had a higher self-predicted likelihood of college graduation ($M = 1.22$) than those who did not talk with a representative of a college ($M = 1.58$). The second was the only finding related to students once enrolled at the university. Those students who registered at the disability services office when they first started or during their first year had a higher self-predicted likelihood of college graduation ($M = 1.26$) than those who waited and registered sometime after their first year ($M = 1.62$). Specifically, the survey question asked, “When did you sign-up for services at the disability service office?” and the respondents could respond by selecting either: (a) When I first started the university, (b) during my first year, (c) during my second year, and (d) sometime after my first two years. For purpose of the analysis, (a) and (b) were combined and (c) and (d) were combined to represent sometime after my first year. The accommodations most frequently received by participants were accessible instructional materials, alternative testing services and priority registration.

**Family involvement.** In this study, whether or not the student had received the free and reduced lunch benefit in high school was used as an indicator for family socioeconomic background. Participation in the federally funded National School Lunch Program is widely used as a proxy for low-income status since eligibility for this subsidy requires poverty level family income (Snyder & Musu-Gillette, 2015). Most of the sample (78%), did not receive free or reduced priced meals. Results of independent samples testing conducted showed that the students who did not receive the free and reduced lunch benefit in high school ($M = 1.33$) had a higher self-predicted likelihood of college graduation than those who did receive the benefit ($M = 1.79$). The survey item that queried, “Who helped you figure out how to afford college,” was not significant in statistical testing in relation to the dependent variable of students’ prediction of eventual graduation. Nonetheless, descriptive results indicated that family helped 59% of respondents with college affordability, 22% indicated that
they “did it myself” and 16% received helped from others who might have been a counselor, teacher, IEP team or an agency representative.

Discussion

The purpose of this study was to assess the characteristics and the college preparation activities and practices of university students with disabilities who have a higher self-prediction of college graduation. A majority of respondents in this study received no formal special education services in high school and waited until college to document their disability. Nonetheless, this result may be reflective of the population of college students with disabilities where students are less likely to have had special education in high school, i.e. only 19% of postsecondary students who were identified as having a disability by their secondary schools were reported to receive accommodations or supports from their college or university (Newman et al., 2011). While Kohler’s Taxonomy is a framework for organizing transition services for those who had an IEP in high school, it also serves as a valuable structure for shaping the discussion of best practices to support the success of students with disabilities in college. The following discussion by Taxonomy level will focus on strategies for post-secondary institutions to be better prepared to serve young adults who identify for the first-time in college as having a disability.

Disability Type

Students with less detectable or apparent disabilities (e.g., learning, ADD/ADHD, mental illness/psychological or psychiatric conditions) are most common on college campuses nationally (Raue & Lewis, 2011). This study affirms this paradigm as about 80% of respondents had psychological/emotional, learning disabilities or chronic health conditions that are often undiagnosed or misunderstood in high school. The result that deaf and hard of hearing children have a higher self-prediction of college graduation is inconsistent with findings by Newman et al., that between seventy and seventy-five percent of hearing impaired students who begin a program do not persist to completion. Nonetheless, while young people who are deaf or hard of hearing are a low-incidence population in postsecondary education (Erickson, Lee & von Schrader, 2012), research based on national data, has found high parental expectations for future educational and occupational attainment of deaf or hard of hearing children (Cawthon, Garberoglio, Caemmerer, Bond, & Wendel, 2015). In some cases, parents expected more from their children than from what children with hearing loss have historically had the opportunity to attain (Newman et al., 2011). This study’s finding regarding students who are deaf and hard of hearing may not be generalizable because quality and types of accommodations can vary dramatically, depending on the campus (Pepnet 2, 2017) and deaf and hard of students accounted for only 4.2% of the sample.

Student-Focused Planning

This study’s finding that respondents who had an IEP or 504 plan in high school had a higher self-prediction of college graduation should be considered in the context that most students with IEPs who do continue to postsecondary, do not attend four-year institutions. Their confidence affirms the importance of special education services especially where the IEP or 504 plan can be a vehicle for preparing students for postsecondary education by connecting students early with disability service offices, ensuring that evaluations that will be used to gain accommodations are current, and understanding how disability rights and responsibilities change between high school and college. While a student with a disability is entitled to accommodations in high school under Section 504 of The Rehabilitation Act of 1973, which requires a Free Appropriate Public Education (FAPE), in higher education it is incumbent on the student to secure their own accommodations (U.S. Department of Education, Office of Civil Rights, 2011; U.S. Government Accountability Office [GAO], 2009). The high confidence of graduation reported by special education students in this study suggests that skills acquired in high school through these services such as increased self awareness and understanding one’s disability (Field and Hoffman, 1994; Kohler & Field, 2003) prepare students to act on their own behalf in college environments. This is especially important, as young adults who identified as having a disability in high school are unlikely to report their disability and seek accommodations from postsecondary institutions (Newman et al., 2011).

Interagency Collaboration

IDEA 2004 defines the term “transition services” as a coordinated set of activities for a child with a disability that is designed within a results-oriented process to facilitate the movement from school to post-school activities, including higher education [20 U.S.C. 1401(34)]. The premise of this legislative directive is that schools and families cannot successfully promote the transition of youth with disabilities into adulthood without the support of community agencies such as institutions of higher education.
(Grossi, Gilbride & Mank, 2014). This study demonstrates that students who did not self-identify as having a disability until arriving in college benefited from such collaborative efforts; that is, connecting with a college representative while in high school; either in person during a school visit or by phone or video chat. This type of outreach can be an especially important intervention strategy to reach at-risk populations such as low-income students and the disabled who may be geographically, financially or physically challenged to visit a campus. Incorporating disability services information universally in college visits to high schools could benefit special education students as well as those who may have a disability, but wait to seek support once in college. Furthermore, this study’s finding that students who registered their first year at college to receive disability services had a higher self-prediction of graduation than those who registered sometime later, (Lightner, Kipps-Vaughan, Schulte & Trice, 2012) underscores the importance of increased outreach services so that students arrive on campus prepared to register for support services. Since the majority of respondents in this study had progressed beyond their freshman year, this finding has added import because it suggests that respondents had maintained an ongoing relationship with the disability services office. Thus, increasing students’ awareness in high school of college disability service office resources and eligibility criteria is a likely strategy for increased persistence.

Family Involvement

Within this domain, empowerment strategies include specific methods to identify family needs (Kohler & Field, 2003). This study’s finding that students who received the free and reduced lunch benefit in high school had a lower self-predicted likelihood of graduating from college was included in the Family Involvement domain because of research that demonstrates that higher family income is associated with higher levels of family involvement for students with disabilities (Newman, 2005). Even when low-income students gain access to college, they are less likely to complete college than their high-income peers (Executive Office of the President, 2014) and having more family resources, either higher incomes or higher levels of parental educational attainment, is associated with higher levels of involvement of all kinds (Newman, 2005). Specifically, one study based on a secondary data analysis of the National Longitudinal Transition Study 2 (NLTS2) found that among students with autism, parental expectations were a significant predictor of graduation from high school for students and there was a significant relationship between parental education and annual household income (Chiang, Cheung, Hickson, Xiang & Tsai, 2012).

Strengths and Limitations

Despite the speculative nature of students’ self-prediction of eventual college graduation, the use of this estimate as the dependent variable in statistical testing is robust since 87% of respondents reported that they were “Very likely” or “Likely” to graduate from college. The strong graduation predictor score either inspires further confidence in that at least 76.8% of this study’s respondents had continued past their first year, and students who persist beyond their first year are more likely to graduate (Horn & Carroll, 1998), or could be considered inflated since the majority of respondents are closer to completion and thus more confident in their graduation. It is important to note that this strong prediction of graduation may be influenced by volunteer bias and because respondents constituted a sample of students with disabilities who were exemplary in that they had already sought out accommodations on campus and had gained admission to a selective university campus. While this study has a strong 20% response rate (n=260), its generalizability is limited in that participants were from one large, public doctoral-granting institution in the Pacific Northwest and because of reliance on self-reported retrospective data, which might have been distorted by time and other factors.

Implications for Practice

With passage of the Every Child Succeeds Act in 2015 (Pub. L. No. 114-95 § 114 Stat. 1177), there is renewed focus on preparing students for college and careers. Four-year degree completion becomes increasingly important since most students with disabilities who pursue postsecondary education choose community colleges (Newman et al., 2011). Research shows that students who initially enroll at a four-year college are more likely to graduate compared with their counterparts who start at a two-year college (National Symposium on Postsecondary Success, 2006). Strategies based on this study’s findings can be employed by university practitioners to support college persistence and graduation of high school students who are receiving special education services, have yet to document their disability or who are enrolled but are not yet registered with the campus disability service office.
Student-Focused Planning

Postsecondary institutions may consider providing increased opportunities to orient students through pre-college activities such as summer bridge programs, e-mentoring, and postsecondary academies. These programs have been described as valuable opportunities to improve students’ understanding of the differences between secondary and postsecondary settings (Burgstahler & Crawford, 2007; Conner, 2012) as well as to prepare students for unstructured college environments and other independent learning conditions such as decreased student-teacher contact, long-term projects, infrequent evaluations, increased free time, and loss of familiar friend groups (Lerner, 1997; McGuire 2010). Such changes have implications for students in all of the disability areas. For example, peer mentoring can address the needs of students with Asperger syndrome, as those students tend to become isolated and reluctant to ask for help, thus jeopardizing their level of engagement (Korbel, Lucia, Wenzel & Anderson, 2011). By supporting student engagement in preparatory activities such as these, postsecondary institutions may also provide the platform for students to develop and practice critical college success skills.

Interagency Collaboration

Informing prospective students about resources provided by campus disability services offices and procedures for how to access them is recommended as a way to encourage students to access disability accommodations early on. This should include specific information about how to document your disability. The Association on Higher Education and Disability (AHEAD) recommends, as best practice, that postsecondary institutions exercise flexibility and professional judgment in evaluating students’ needs, especially since the intent of the ADA Amendments Act of 2008 was to make it easier for people with disabilities to obtain protections by expanding the definition of which conditions impose a substantial limitation of a major life activity to include learning, reading, concentrating and thinking as major life activities (Shaw & Dukes, 2013). While 79% of postsecondary institutions nationally reported distributing materials designed to encourage students with disabilities to identify themselves to the institution (Raue & Lewis, 2011), intentionally integrating this information when college representatives visit high schools, during students’ campus visits and through high school career and counseling centers may provide a more comprehensive approach.

Family Involvement

This study found that students who had received the free and reduced lunch benefit in high school had a lower self-prediction of eventual college graduation. To address this inequity, postsecondary institutions should consider building awareness of college level disability services to students and their families through targeted outreach to school-based organizations that offer college access supports to low-income families. This could include potentially offering to pay for assessments when necessary to document a student’s disability. To the extent that postsecondary institutions can encourage family participation in gaining accommodations is important as 60% of respondents in this study reported that it was family who helped them figure out how to afford college. As such, family may play a critical role in encouraging students to meet with disability service personnel to secure supports and accommodations during the first-year of attendance. Through admissions and outreach efforts, universities have an opportunity to increase retention by educating families and their adult children about available disability support services and the opportunity to put them in place early.

Conclusion

With a growing, disability-diverse undergraduate population on college campuses, it is increasingly important to educate students about the distinct differences between high school and college disability rights and to connect students with supports early on in their undergraduate program (Korbel et al., 2011). This study demonstrates that activities such as making a connection to a campus representative while still in high school and registering early-on for campus level disability services are associated with students who predict a higher likelihood of college graduation and can be promoted by both school and college practitioners as best practices. Increasing awareness of disability supports to incoming low-income students who may be Pell Grant recipients is another important implication of this study for postsecondary institutions. Finally, since most of the respondents in this study had no formal accommodations in high school, colleges and universities may consider providing disability services information to all prospective and admitted students during pre-college and orientation activities as a way to encourage students to seek supports early on and thus prevent failure. More research to test the results of this survey based on a sample of undergraduate students with disabilities as they complete their degree rather than a self-prediction of graduation would be valuable. In addition, the series
of t-tests was intended as an initial exploratory way to gather information, therefore further testing using other statistical methods is recommended. Because this study was conducted at a single four-year public institution, the results are limited and by replicating the study at similar campuses, results could potentially be generalizable.

References


About the Author

Dr. Julia F. Schechter completed her Ed.D. in Educational Leadership at Seattle University in 2018. She holds a B.A. degree in Politics from the University of California, Santa Cruz, and a Masters from Stanford University in Education Administration and Policy Analysis. Her experience includes working as a doctoral research assistant at the Center for Change in Transition Services at Seattle University as well as teaching at the Center for Experiential Learning and Diversity at the University of Washington. She is the founder of College Access Now and is currently a Completion Coach at South Seattle College. Her research interests include transition of students to higher education, student success and retention and completion. She can be reached by email at: schechte@seattlue.edu.

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### Domain and Sub-Item

#### Survey Item

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<th>Domain and Sub-Item</th>
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<td><strong>Student-Focused Planning</strong></td>
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<tr>
<td>IEP Development</td>
<td>• College expressed as a goal in IEP meeting.</td>
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<td>• IEP attendance, Frequency of IEP attendance.</td>
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<td>• Participation Level at IEP meeting.</td>
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<td>Planning Strategies</td>
<td>• Summary of Performance created.</td>
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<td>• Could explain disability and how it impacted learning.</td>
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<td>• Advocated for self to compensate for disability and get help.</td>
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<td>Collaborative Service Delivery</td>
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</tr>
<tr>
<td></td>
<td>• Talked to a college representative while still in high school.</td>
</tr>
<tr>
<td></td>
<td>• Registered for disability services at the university.</td>
</tr>
<tr>
<td>Collaborative Framework</td>
<td>• Awareness of difference between gaining accommodations under IDEA or 504 in K-12 and ADA in college.</td>
</tr>
<tr>
<td><strong>Family Involvement</strong></td>
<td></td>
</tr>
<tr>
<td>Family Involvement</td>
<td>• Assisted with gaining accommodations.</td>
</tr>
<tr>
<td>Family Empowerment</td>
<td>• Received Free and Reduced Lunch support.</td>
</tr>
<tr>
<td>Family Training</td>
<td>• Understood differences in disability rights between high school and college.</td>
</tr>
<tr>
<td></td>
<td>• Provided college affordability assistance.</td>
</tr>
</tbody>
</table>

*Figure 1. Areas Surveyed Within Kohler’s Taxonomy Domains (1996)*
Table 1

Survey Respondents’ Disability Type and Accommodation Received at University

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>Percent (n = 260)</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Disability Type *, **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deaf/Hard of Hearing</td>
<td>11</td>
<td>4.2</td>
</tr>
<tr>
<td>Mobility</td>
<td>16</td>
<td>6.2</td>
</tr>
<tr>
<td>Speech Language</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Learning Disability</td>
<td>71</td>
<td>27.3</td>
</tr>
<tr>
<td>Blind/Visual Impairment</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>Chronic/Acute Health</td>
<td>36</td>
<td>13.8</td>
</tr>
<tr>
<td>Neurological/Nervous System</td>
<td>20</td>
<td>7.7</td>
</tr>
<tr>
<td>Psychological/Emotional</td>
<td>103</td>
<td>39.6</td>
</tr>
<tr>
<td>Multiple Disabilities</td>
<td>18</td>
<td>6.9</td>
</tr>
<tr>
<td>Other</td>
<td>35</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Accommodation Received (by &gt; 40 students)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessible Instructional Materials</td>
<td>41</td>
<td>15.8</td>
</tr>
<tr>
<td>Alternative Testing Services</td>
<td>152</td>
<td>58.5</td>
</tr>
<tr>
<td>Audio Recording Lectures</td>
<td>56</td>
<td>21.5</td>
</tr>
<tr>
<td>Note-taking Services</td>
<td>44</td>
<td>16.9</td>
</tr>
<tr>
<td>Priority Registration</td>
<td>121</td>
<td>46.5</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian/Native American</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td>Asian</td>
<td>60</td>
<td>23.1</td>
</tr>
<tr>
<td>Black</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>23</td>
<td>8.8</td>
</tr>
<tr>
<td>White</td>
<td>187</td>
<td>71.9</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 17 and 22</td>
<td>154</td>
<td>59.2</td>
</tr>
<tr>
<td>Between 23 and 30</td>
<td>60</td>
<td>23.1</td>
</tr>
<tr>
<td>Over 30</td>
<td>20</td>
<td>7.7</td>
</tr>
<tr>
<td>No Response</td>
<td>26</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>First Generation to College (other than a sibling)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>60</td>
<td>23.1</td>
</tr>
<tr>
<td>No or No Response</td>
<td>200</td>
<td>76.9</td>
</tr>
<tr>
<td><strong>Free and Reduced Lunch (FRL) Benefit Recipient in High School</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>18.5</td>
</tr>
<tr>
<td>No or No Response</td>
<td>212</td>
<td>81.5</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>Percent (n = 260)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gap Time Between High School and College</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No gap time</td>
<td>197</td>
<td>75.8</td>
</tr>
<tr>
<td>1-3 years</td>
<td>22</td>
<td>8.5</td>
</tr>
<tr>
<td>&gt;3</td>
<td>25</td>
<td>9.6</td>
</tr>
<tr>
<td>No Reponse</td>
<td>16</td>
<td>6.2</td>
</tr>
</tbody>
</table>

**Self-Reported Class Standing**
- Freshman                           | 26     | 10.0              |
- Sophomore                          | 45     | 17.3              |
- Junior                             | 78     | 30.0              |
- Senior and >                        | 76     | 29.2              |
- No Response                         | 35     | 13.5              |

*Notes.* *The university where the survey was conducted determined disability type categories.*
** Indicates the respondent was allowed to select more than one response.

Table 2

*Results of Independent Samples Test at the p < .05 Level (where a mean score closer to 1 indicates a higher prediction of college graduation)*

<table>
<thead>
<tr>
<th>High School Student Practice or Characteristic</th>
<th>Yes</th>
<th>No</th>
<th>p</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaf or hard of hearing</td>
<td>1.09 0.301</td>
<td>1.43 .843</td>
<td>.005</td>
<td>19,614</td>
<td>3.182</td>
</tr>
<tr>
<td>Had an IEP</td>
<td>1.07 0.258</td>
<td>1.44 .849</td>
<td>.000</td>
<td>42.615</td>
<td>4.223</td>
</tr>
<tr>
<td>Talked with a college representative</td>
<td>1.22 0.593</td>
<td>1.58 .958</td>
<td>.001</td>
<td>202,011</td>
<td>3.424</td>
</tr>
<tr>
<td>Signed up for disability services during their first year at university</td>
<td>1.26 0.648</td>
<td>1.62 .976</td>
<td>.002</td>
<td>163.093</td>
<td>3.13</td>
</tr>
<tr>
<td>Had a 504 Plan</td>
<td>1.14 0.351</td>
<td>1.46 .870</td>
<td>.001</td>
<td>91.878</td>
<td>3.554</td>
</tr>
<tr>
<td>Received Free and Reduced Lunch (FRL) benefit recipient</td>
<td>1.79 1.059</td>
<td>1.33 .739</td>
<td>.009</td>
<td>52,161</td>
<td>2.713</td>
</tr>
</tbody>
</table>
Do Multimedia Instructional Designs Enhance Comprehension in College Students with Dyslexia?

Sunjung Kim¹
Rebecca Wiseheart²
Patrick R. Walden²

Abstract

The current study tested the effects of multimedia instructional designs (text+picture, audio+picture, and text+audio+picture) on retention and transfer of information in college students with and without dyslexia while tracking students’ eye movements. After controlling for verbal ability, the dyslexia group differed from controls only in the text+picture condition. Retention performance for the dyslexia group was optimal in the no written text (audio+picture) condition. Eye-tracking data showed that the dyslexia group spent significantly more time viewing the picture when audio augmented written text. These findings show that students with dyslexia can learn as easily from multimedia instruction as their peers and multimedia combinations can be manipulated to optimize specific learning outcomes.

Keywords: Dyslexia, multimedia instruction, eye-tracking, retention task, transfer task

Historically defined as the ability to communicate and learn through written modalities of language, literacy has evolved to encompass skills that go well beyond text reading and writing. Multimodality or multimedia learning environments are now commonplace in colleges and universities and technological advancement, such as e-learning and online platforms, requires that virtually all students engage in multimedia modes of instruction. However, it is currently unknown how students with dyslexia compare with their non-disabled peers in these multimedia instructional environments. Considering that the number of students with dyslexia entering postsecondary institutions has been steadily increasing in the last several decades (Government Accountability Office, 2009), understanding how multimedia instruction affects learning outcomes in students with dyslexia is an important endeavor.

Multimedia instruction is defined as the combined use of several media to promote learning (Mayer, 2009). The most common type of multimedia instructional design combines text with pictures. A commonly held belief is that pictures facilitate comprehension of concepts through text presentation. For students with dyslexia who have had a difficult time in text-dominant educational environments, the addition of visual modalities may significantly enhance their academic success. However, this remains an open question. The purpose of this study was to investigate whether students with dyslexia differ from their peers when learning science content from instructional designs that combine verbal and nonverbal representations of the same concept.

Effects of Multiple Representations on Learning Outcomes

A primary aim of dyslexia research has been to understand how affected individuals process phonological and orthographic representations, especially with regard to learning to read. The current study focuses instead on how individuals with dyslexia integrate multiple representations of the same concept in learning academic content. Using a classic multimedia learning experiment (Mayer, 1997), students were first presented with instructional lessons under varying multimedia conditions. Learning outcomes were then assessed through retention and transfer questions. Retention questions require simple recall of learned material whereas transfer questions require that recently learned material be applied in new ways or situations (Mayer, 1997).

Multimedia effects on learning were examined through Ainsworth’s (2006) Design, Functions, Tasks (DeFT) framework.
[The DeFT framework] proposes that the effectiveness of multiple representations can best be understood by considering three fundamental aspects of learning: the design parameters that are unique to learning with multiple representations; the functions that multiple representations serve in supporting learning and the cognitive tasks that must be undertaken by a learner interacting with multiple representations.” Within the DeFT framework, the present study explored how instructional designs (i.e., text+picture, audio+picture, text+audio+picture) can affect the pedagogical function (learning) across two different cognitive tasks (retention and transfer task).

Regarding the relationships between the design and function aspects of the DeFT model, research suggests that students learn better from multimedia lessons containing words and pictures than from lessons containing only words (e.g., Mayer, 1997; Moreno & Valdez, 2007; Schnozt & Bannert, 2003). This advantage, known as the multimedia effect (Mayer, 2009; Mayer, Heiser, & Lonn, 2001), has been documented in both book-based and computer-based learning environments (Mayer, 2003). For example, in a series of Mayer’s studies (Mayer, 1989; Mayer & Gallini, 1990), students were randomly assigned to a word-only group or a words-and-pictures group and read on paper about how brakes work. The words-and-pictures group provided 79% more creative solutions on problem-solving questions than the word-only group.

In a follow-up study (Mayer & Anderson, 1991), when presented with the same content (i.e., how brakes work) and questions on computer screen, students in the word-and picture group generated 97% more creative solutions than students in the word-only group. Mayer (2003) posits that multimedia presentation may result in deeper learning because the learner is encouraged to build both verbal and visual mental models as well as to build connections between the two models. However, research also suggests that the notion, “more is better,” is not always correct. Kalyuga, Chandler, and Sweller (2004), for example, reported that students who received audio with diagrams outperformed students who received audio and text with diagrams. This finding is called the redundancy effect (Mayer, 2009). Mayer and Johnson (2008) explained that when learners have to spend their limited cognitive resources processing the redundant material, such as written and spoken text, they are less able to coordinate and integrate the necessary information needed for learning.

To study the task aspect of the DeFT model, researchers have analyzed student performance across closed-ended questions and open-ended questions. Close-ended questions are useful for obtaining specific pieces of information but, by their nature, they limit learners’ responses and are influenced by the multiple choice options (Foddy, 1994). Conversely, open-ended questions do not limit learners’ responses and elicit, instead, learners’ generative processing during comprehension (Ozuru, Briner, Kurby, & McNamara, 2013). The types of open-ended questions can range from simple retention and recall of facts to more complex responses requiring problem solving and transfer of knowledge (Mayer, 1997). The addition of pictures may have different effects on different levels of learning. Mayer and Gallini (1990), for example, found that students performed better on transfer tasks when they read passages with illustrations about how scientific devices work than when they read passages without illustrations. However, no difference was found in the retention task. Consistent with the principles of the DeFT model, these findings suggest that retention and transfer tasks tap different levels of learning and that the advantage of including illustrations may vary according to cognitive demands of the specific learning outcome task. Accordingly, valid measurements of multimedia learning must include both retention and transfer tasks.

Effects of Multiple Representations on Learning for Students with Dyslexia

In addition to considering the effects of different representations or task requirements on learning (i.e., extrinsic variability), it is also as important to consider the learner’s ability to process different types of representations (i.e., intrinsic variability) (Ainsworth & Lowe, 2012). For example, Adesope and Nesbit (2012) included reading level, education level, and prior domain knowledge as individual differences which affect learning with multiple representations. Reading level is a particularly important consideration in the present study because while adults with dyslexia often develop compensatory skills to overcome many of their reading deficits, learning difficulties remain (Simmons & Singleton, 2000). College students with dyslexia often fail to adapt to the academic demands of higher education (Kirby, Silvestri, Allingham, Parrila, & La Fave, 2008). Compared to typical peers, for example, college students with dyslexia experience more difficulty learning from lectures, complete fewer assignments (Fuller, Healey, Bradley, & Hall, 2004), and are more likely to withdraw from their course of study, especially during their first year (Richardson & Wydell, 2003). Thus, it is not surprising that college students with dyslexia also experience increased anxiety and low self-es-
teem (Nelson, Lindstrom, & Foels, 2015). To provide a learning environment in which these students can be successful, educators and student support service providers need to know how college students with dyslexia learn compared to their peers with typical reading skills (Pino & Mortari, 2014).

A few studies have experimentally tested the effects of multimedia instruction on learning in poor readers and the results from related studies have been mixed. For example, Beacham and Alty (2006) compared learning outcomes of young adults with and without dyslexia across three formats in which only the design was altered: sound and diagrams, text and diagrams, and text alone. Although students with dyslexia stated that they preferred the two designs that included diagrams, results from recall and transfer questions showed they performed best in the text alone condition. Rello, Saggion, Baeza-Yates, and Gaella (2012) explored whether the use of a graphic organizer could improve dyslexic students’ text comprehension. They found that using graphic organizers improved students’ reading speed but did not improve students’ ability to answer closed-ended comprehension questions about the central ideas in the text.

Taylor, Duffy, and Hughes (2007) presented animated data flow diagrams to college students with and without dyslexia and asked open-ended comprehension questions. Overall, the animated diagrams improved students’ comprehension; however, students with dyslexia reported that the animated material was difficult to use. Additional empirical data is needed to determine whether multimedia instruction optimizes learning for students with dyslexia.

**Present Study**

Previous studies have focused primarily on understanding whether adding graphics (pictures, graphs, tables, etc.) to learning designs improves comprehension for students with dyslexia. Considering that recorded books are often prescribed for students with dyslexia (Esteves & Whitten, 2011), the present study focused on whether the addition of auditory input (i.e., recorded voiceover) as well as non-linguistic visual input would help or hinder learning in college students. Recall that the multimedia effect posits that multiple representations of a concept should facilitate learning, whereas the redundancy effect posits that the redundant multiple representations of a concept should hinder learning due to limited processing capacity. Thus, the goal of this present study was to test these effects in college students and to ultimately determine whether there is an optimal way to combine multiple representations of a concept to enhance retention and transfer of knowledge for college students with dyslexia. To do this, the instructional designs were experimentally manipulated to include various combinations of spoken language (audio recording of text), written language (text), and non-linguistic (picture) modalities. In addition, the study also explored whether varying the modalities of the instructional design would interact with different levels of learning across dyslexic and non-dyslexic groups. Several studies exploring multimedia effects in typical readers have included different question levels (Ginns, 2005 for review); however, it is unknown whether students with dyslexia would respond in the same way.

To provide further insight into the attention and cognitive processing load associated with integrating multiple representations of a concept, behavioral (comprehension questions) and physiological (eye movement) data were combined. The first objective was to compare comprehension on open-ended questions in response to three different multimedia designs (i.e., text and picture vs. audio and picture, vs. text, audio, and picture) and types of questions (i.e., retention and transfer questions). The second objective was to compare the two groups’ eye fixation times for specific subregions on the presentation screen (picture and text) and eye movements between the subregions (picture and text) corresponding to the specific types of representations.

**Methods**

**Participants**

In total, 161 college students (55 students with dyslexia, 106 students with typical reading skills; mean age = 21.72 years old) participated in this study. Of the 55 students with dyslexia (DR), one was excluded from analyses due to technical problems with the eye-tracking equipment. Of the 106 students with typical reading skills (TR), three were excluded due to incomplete data collection and technical problems with the eye tracking equipment. The final cohorts of participants were composed of 54 college students with DR and 103 college students with TR. Students with DR were recruited through emails distributed by the university disability service office, announcements in undergraduate classes, and posters on campus. Students in the TR group were recruited through a university research participation website. All participants were native speakers of English and reported negative histories for pervasive cognitive deficits, behavioral disturbance, neurological illness, psychiatric illness, hearing impairment, or uncorrected visual impairment.

All potential participants were individually assessed to ensure that they met the inclusion criteria...
for this study. To be included in the DR group, students reported a history of reading difficulties beginning in childhood and scored at or below one standard deviation of the mean on word reading from the Test of Word Reading Efficiency ([TOWRE]; Torgesen, Wagner, & Rashotte, 1999). To be included in the TR group, students reported an absence of a history of reading difficulties at any time while in school. Their normal reading status was confirmed by their average or above average performance on the tests administered to the students in the DR group.

Verbal ability was assessed using the Woodcock Johnson III Test of Cognitive Abilities ([WJ-III-COG]; Woodcock, McGrew, & Mather, 2002) and visual sequential memory was assessed using the Test of Memory and Learning, second edition (Reynolds & Voress, 2007). Because the topic of the instructional lesson was lightning, a prior knowledge questionnaire developed by Moreno and Mayer (2002) was used to assess the students’ background knowledge on meteorology. Students were asked to rate on a five-point scale (1 = very low, 5 = very high) their level of knowledge of meteorology and to place check marks next to each of seven weather-related items that applied to them (e.g., “I know what a low pressure system is” or “I can explain what makes the wind blow”). On the basis of F-tests with α at .05, the two groups did not differ on the mean age, education, visual sequential memory, or prior knowledge score; however, the students in the DR group had significantly lower reading and verbal scores (see Table 1). Low verbal ability in dyslexia has been frequently reported in previous literature (Ramus, Marshall, Rosen, & van der Lely, 2013; Rispens & Been, 2007; Robertson & Joanisse, 2010). Therefore, in the present study, comprehension and eye gaze data are reported after controlling for the verbal ability.

Finally, since students were randomly assigned to three experimental conditions (described in detail below), it was confirmed prior to subsequent analyses that there was no significant difference within DR groups across three conditions (text+picture, audio+picture, or text+audio+picture) for age, education, reading score, verbal ability, or prior knowledge (ps > .05). Similarly, there was no significant difference within TR groups across three conditions for age, education, reading score, verbal ability, or prior knowledge (ps > .05).

Materials

Instructional materials and comprehension questions used in the present experiment were adapted from Mayer and Johnson (2008). The experiment included a single lesson, comprising 11 PowerPoint slides which explained the formation of lightning. The slides advanced automatically. The total lesson lasted 88.02 seconds with an average viewing of 8.00 seconds per slide. The content was presented as either text+picture, audio+picture, or text+audio+picture (see Figure 1 for presentation examples). In the text+picture condition, the text described the steps in the formation of lightning and the pictures depicted the steps in the formation of lightning. Corresponding text and pictures were presented simultaneously. In the audio+picture condition, the slides included pictures with concurrent audio clips that contained the identical words in text. The audio clips were recorded by a female using Windows® Movie Maker 2001. In the text+audio+picture condition, text, audio clips, and pictures were included.

After watching the PowerPoint lesson, the students were asked five comprehension questions following the protocol developed by Moreno and Mayer (2002). Question types included one retention question and four transfer questions. The retention question was “Based on the lesson you just read/listen to, please describe how lightning is formed. Be as specific as possible.” The four transfer questions were (a) what could you do to decrease the intensity of lightning? (b) suppose you see clouds in the sky, but not lightning, why not? (c) what does air temperature have to do with lightning? and (d) what causes lightning? In Mayer’s original task, students read the questions and wrote down their answers; however, in the current study, given the reading difficulties of the students in the DR group, the experimenter read the questions to all students, recorded the answers the students verbally provided, and transcribed them after the experiment was completed.

Apparatus

Eye movements were tracked using an LC Technologies head-free EyeFollower binocular system operating at 120 Hz with a 0.45 degree gaze-point tracking accuracy throughout the operational head range. PowerPoint slides were presented on a 24 inch (61 cm) light-emitting diode (LED) monitor with a resolution of 1920 × 1080 pixels. Fixations were extracted with a temporal threshold of 100 ms and a spatial dispersion threshold of 1.5˚(minimum deviation of 25 screen pixels). Participants sat at a distance of 23.62 inches (60 cm) from the LCD monitor and used a custom-designed keyboard for inputting manual responses. NYAN 2.0 software from Interactive Minds Eyetracking Solutions was used to analyze eye gaze data.
Procedure

Participants individually completed tasks in the following order: (1) general background and meteorology prior knowledge questionnaire, (2) reading and visual sequential memory assessment, and (3) experimental eye tracking task. Each participant was randomly assigned to a presentation group (text+picture, audio+picture, or text+audio+picture). The entire procedure took approximately one hour. Prior to the experimental task, the investigators explained the eye-tracking methodology and participants had time to become familiar with the equipment. This was followed by a nine-point calibration procedure. For the experimental trial, the researchers presented oral instructions, stating that the student would be presented an explanation of how the process of lightning works. When the presentation was finished, the investigators asked the five questions about the content. No time limit was given to answer the questions.

Statistical Analysis

First, to determine if the two reading groups differed in the retention and transfer test scores, univariate analyses of covariance (ANCOVAs) were conducted \( (n = 157) \). Group memberships (DR and TR groups) and presentation type (text+picture, audio+picture, text+audio+picture) were independent variables and WJ-III-COG verbal ability score was the covariate, and the retention score and the transfer score were the dependent variables. The verbal score was included to ensure that the results were not attributable to difference in language ability. The model was intercept + reading group effect + presentation type effect + interaction effect of reading group and presentation time + error. Bonferroni post hoc test was conducted to locate whether the differences occurred between presentation types in the main effects and the interaction effect. As an effect size measure, partial eta squared \( (\eta^2_p) \) was reported. The \( \eta^2_p \), one of the most widely reported measures of effect size (Fritz, Morris, & Richler, 2012), is the proportion of variance that a variable explains that is not explained by other variables (Field, 2009). Effect size is defined small \((0.01-0.06)\), medium \((0.14-0.14)\), and large \((>0.14)\) (Acton, 2012).

Second, to determine if the two groups differed in the eye fixation times for two subregions (i.e., picture and text), a multivariate analysis of covariance (MANCOVA) was conducted \( (n = 107) \). Group membership and presentation types were the independent variables and WJ-III-COG verbal ability score was the covariate, and the total gaze duration was the dependent variable. MANCOVA is the extension of ANOVA in which there are several dependent variables (Tabachnick & Fidell, 2013). Third, to compare eye movements between two subregions (picture and text), a univariate ANCOVA \( (n = 103) \) was conducted with the reading group and the presentation type as independent variables, WJ-III-COG verbal ability as a covariate, and eye movements between the two areas as a dependent variable. Data were analyzed using SPSS version 22.0 for Windows (IBM Corp, 2013).

Results

Group Comparisons of Comprehension Across Presentation Types

The first aim was to compare the two groups’ response to the comprehension questions when information was presented in three different conditions (i.e., text+picture, audio+picture, text+audio+picture). Since the same five comprehension questions are used, the author of the original study, Mayer, provided an initial list of acceptable answers. After the first fifty participants completed the experiment, the first author and Mayer discussed additional possible answers based on their responses. A retention score was computed for each participant by counting the number of major idea units (score range: 0-14) that the participant produced. A transfer score was computed for each participant by counting the number of acceptable answers that the participant produced for four transfer questions (score range: 0-12). Interrater agreement in scoring was .93. For discrepancies, a third rater arbitrated and generated a consensus rating.

Data from 52 participants (18 DR and 34 TR) for the text+picture condition, 50 participants (15 DR and 35 TR) for the audio+picture condition, and 55 participants (21 DR and 34 TR) for the text+audio+picture condition were analyzed to compare response accuracy of students with and without dyslexia corresponding to the types of representations. ANCOVAs were conducted with group membership (DR and TR groups) and presentation types (text+picture, audio+picture, text+audio+picture) as the independent variables, response accuracy as the dependent variable, and WJ-III-COG verbal ability score as the covariate.

For the retention task, the reading group and presentation types significantly interacted after controlling for the verbal ability, \( F(2, 150) = 6.91, p = .001, \eta^2_p = .08 \) (see Table 2 and bar graphs at top of Figure 2). The Bonferroni post hoc tests revealed that the DR group had significantly lower scores in the retention task than the TR group only for the text+picture condition, \( t(150) = -4.15, p < .0001 \). For
the two other conditions, the audio+picture and the text+audio+picture conditions, the groups’ retention score was not significantly different, \( ps > .05 \). Verbal ability, the covariate, was not significantly related to the retention score, \( p > .05 \). Additionally, while TR mean scores across the three presentation conditions did not differ \( (ps > .05) \), the DR mean score in the audio+picture condition was significantly higher than the DR mean score in text+picture condition, \( t(150) = 2.95, p = .01 \). The DR mean score in the text+audio+picture condition was higher than the DR mean score in the text+picture condition, but the difference did not reach the statistical significance \( (p = .07) \). For the transfer task, neither the group membership nor the presentation type significantly related to the transfer score, \( ps > .05 \) (see bar graphs at bottom of Figure 2). Verbal ability was not significantly related to the transfer score, \( p > .05 \).

**Group Comparison of Eye Gaze Patterns across Presentation Types**

The second aim was to compare the two groups’ eye fixation times for specific subregions on the presentation screen (picture and text) and eye movements between the two subregions (picture and text) corresponding to the type of presentation. Only two conditions (text+picture and text+audio+picture) were used for the analysis because the current study focused on the two subareas (picture and text) and the eye movements data were not clearly presented. Thus, data from 50 participants (16 DR and 34 TR) for the text+picture condition and 53 participants (19 DR and 34 TR) for the text+audio+picture condition were used for the data analysis. The eye movement data were analyzed using 2 (reading group: DR, TR) \( \times 2 \) (presentation type: text+picture and text+audio+picture) ANCOVA after controlling for WJ-III-COG verbal ability (see Figure 4). There was no interaction effect between the reading group and the presentation type, \( p > .05 \). However, the reading group was significantly related to the eye movements. The TR group showed more eye movements than the DR group, \( F(1, 15.75) = 11.44, p = .004, \eta^2_p = .42 \).

**Discussion**

The first aim was to investigate the effects of multimedia instruction on learning in college students with and without dyslexia. The main finding was that groups performed similarly across conditions with one exception: when the instructional material was presented in a text+picture format, students with dyslexia scored significantly lower than their peers on the retention task, yet performance was similar across groups on the transfer task. This finding contributes to a broad literature base showing that after controlling for background knowledge, word reading deficits in dyslexia can impair comprehension (Lyon, Shaywitz, & Shaywitz, 2003). It also supports the notion that retention and transfer tasks tap different levels of learning and comprehension (Mayer & Chandler, 2001). However, the direction of performance in the dyslexia group was somewhat unexpected considering that the retention questions, which require only literal understanding, should be easier than the transfer questions which require inferencing and problem solving. It is speculated below as to why there is a significant group difference in the retention task but not in the transfer task.

One explanation is that students with dyslexia have developed good problem solving skills in order to compensate for poor word reading. Compensation skills or coping strategies of young adults with dyslexia have been frequently reported (Fink, 1998; Kirby et al., 2008). For example, Everatt, Steffert,
Implications for Theory

The current data show that students with dyslexia had better learning outcomes when the instructional design included spoken words with picture (audio and visual). This instructional design was more effective than the one that used only printed words and pictures (both visual). These findings are therefore consistent with the theory that learning is enhanced when instructional materials provide students with multiple representations that can be processed through more than one modality (Mayer, 2003). Therefore, the multimodality effect is demonstrated in the reading impaired population. In contrast, combining different types of multimedia instruction did not have a significant effect on learning in students with typical reading skills. Their performance in the audio+picture condition was similar to their performance in the text+picture condition. Mayer (2009) states that the multimodality effect is more apparent when the learning material is complex than when it is simple. It is possible that the learning material in this study may not have been complicated enough to overload typical readers’ working memory capacity. In contrast, for the reading impaired students, even though the text consisted of simple vocabulary and sentence structures, replacing written text with the audio recording may have reduced the extraneous load of reading, which is the primary deficit in dyslexia.

The redundancy effect states that learning is hindered when information is repeated in different modalities (Moreno & Mayer, 2002). This detrimental effect occurs due to the divided attention to the unnecessary information so that cognitive resources become less available to process essential information. Eliminating redundant information has been showed to improve learning (Kalyuga et al., 2004). According to the redundancy effect, students’ performance in the text+audio+picture condition should be lower than their performance in the audio+picture condition. Evidence of the redundancy effect was not found for either group. For the dyslexia group, performance in the text+audio+picture condition was similar to the performance in the audio+picture condition. Taken together, these findings suggest that college students with dyslexia may benefit most from multimodal instructional designs which include an audio component, regardless of whether the audio component is redundant with printed text or is presented alone. The benefit of audio presentation for these students was also supported by the eye gaze data. Specifically, when audio was provided, the students in the dyslexia group spent more time on the picture area than their peers. In addition, instead of frequently moving between the picture and the text areas, the students’ eyes
Implications for Practice

Several educational implications can be drawn from these findings. First, the current data show that the presence of pictures is not enough to ameliorate reading differences between students with and without dyslexia. Students with dyslexia are often believed to have strong visual-spatial skills (Ramus, 2003 for review), so it may be logical to assume that learning is enhanced when text is augmented by pictures. The present study did not find evidence to support this argument. One explanation for this is that students do not automatically know how to process information presented in visual forms (Yeh & McTigue, 2009). Winn (1994; 1987) warned that education’s verbal bias could hinder students from developing their abilities to process non-linguistic visual representations. Recent research has shown that explicit instruction in how to process non-verbal information is necessary. Bergey, Cromley, and Newcombe (2015), for example, trained high school teachers how to interpret individual diagrams and how to connect diagrams with text. The training increased comprehension of diagrams of both high-achieving and low-achieving students, but was more effective for the low-achieving students. A second approach is to teach students specific strategies. Kombartzky, Ploetzner, Schlag, and Metz (2010), for example, taught students several strategies for learning through multimedia animated formats including identifying important pictures, circling important words and regions in pictures, and describing the relationship between pictures and words. Students who learned the strategies outperformed students who were provided the same material but did not learn the strategies.

Second, the audio presentation was most beneficial to students with dyslexia. Previous studies have mainly focused on exploring best ways to improve students’ reading skills; however, mastering content material is as important as mastering reading skills, particularly for secondary and postsecondary students. Milani, Lorusso, and Molteni (2010) provided audiobooks to adolescents with dyslexia. Five months later, students who were provided with the audiobooks improved not only in reading accuracy, but also in emotional-behavioral problems and in motivation and involvement in school activities. Even though more studies are needed to help understand the best ways to use text-to-speech technology and audiobooks (e.g., frequency of use of audio materials), it is clear from the current study, and from other research, that audio material improves dyslexic students’ learning and comprehension of content material. Students benefit from explicit instruction on using and accessing alternative media and technology.

Herein lies the study’s utility for college disability service providers. Audio presentation of academic content, when coupled with images, was shown to benefit students with dyslexia. At the same time, the typical readers’ learning was not hindered by this combination. Designing instruction in this manner appears to afford educational benefit, then, to a wider swath of students. Faculty who design instruction this way from the outset can work more efficiently by not having to replicate instruction using multiple modalities if required by a student’s accommodations. This makes for smarter work. Even though disability service providers are not charged with course design or instruction, they can provide in-service experiences for faculty that could include effective teaching strategies for those who learn differently in addition to traditional information on legal aspects of learning accommodations. While faculty will likely differ in the uptake of such strategies (Park, Roberts, & Delise, 2017), most will conceivably welcome the direction in improving the inclusiveness of their instruction.

Faculty are experts in their field but are rarely trained in pedagogy (Brownell & Tanner, 2012), especially the pedagogy of those who learn differently. Many fields have called upon faculty to become more well-versed in evidence-based strategies in teaching and learning; however, time is one of the most frequently cited barriers to improving teaching practice (Collinson & Cook, 2001). By providing in-service experiences to faculty on more inclusive design, such as the Universal Design Initiative (Association on Higher Education and Disability, 2017) which is purposed to increase the inclusiveness of higher education environments, disability service educators can educate faculty on the front lines on more efficient (i.e., time-saving) teaching strategies that meet the learning needs of those with and without disabilities.

Limitations and Future Directions

Further research is needed to specify ways in which multimedia instructional designs affect learning, especially in terms of how multiple representations of a concept are processed in students with learning difficulties. The present study explored how different combinations of media affected students’ learning, but the unique effects of each representation were not disentangled. In the future, audio-only or text-only can be compared to audio+picture, text+picture or text+audio+picture conditions, which could clarify the unique effects of different representations. Further research should differentiate the function of
the pictures in the presentation. In the current study, the pictures described information presented in text. Thus, the function of the pictures was to aid students’ memory and comprehension of text information. To further explore the role of competing visual attention and the redundancy effect, it would be interesting to design a study in which pictures present information that does not simply support but rather extends the information provided in the written text. Finally, pacing and order of comprehension questions should be investigated further. The current study presented each PowerPoint slide in average eight second intervals and presented comprehension questions after students completed viewing the material. However, presenting comprehension questions first might encourage students to selectively attend to the key information on the slides. A self-pacing experiment would also allow students to advance the slides without predetermined time constraints. This may be especially important for students with dyslexia who commonly present with reading speed deficits. It is suspected that allowing students additional time would improve performance on retention questions, especially in multimedia formats that do not include audio narration.

In the current study, eye tracking is used to monitor eye gaze, with minimum intrusiveness, as students view on-screen information. The use of eye tracking methodology is based on the belief that perceptual processes index underlying conceptual processes (e.g., longer fixation time on a specific area reflects longer processing time of that area; eye-mind hypothesis, Just & Carpenter, 1980). In his review of the literature on dyslexia over twenty years, Rayner (1998) stated that eye-movement difficulty is not a cause of dyslexia, but a symptom reflecting underlying impaired mechanisms. After scrutinizing the evidence for and against sensory theories of dyslexia, Goswami (2015) also concluded that the sensory deficits may result from the effects of reduced reading experience on the brain. However, she also accepted the possibility of sensory dysfunction in dyslexia and suggested that future studies, such as longitudinal studies of sensory processing, beginning in infancy, will contribute to remediation of dyslexia.

**Conclusion**

Multimodal instructional designs can enhance learning outcomes for students with dyslexia. The findings suggest that the addition of pictures is not as beneficial as the addition of an audio recorded reading of the text. Moreover, when audio is paired with pictures, students with dyslexia focus attention on accompanying pictures and can learn content material as easily as their peers with typical reading skills. To support students’ success, educators, disability service providers, and instructional designers should be aware that different combinations of multimedia input can have different effects on learning depending on the specific learning outcomes as well as the students’ reading ability. All students would benefit from specific instruction in how to comprehend individual representations and connect different types of representations.

**References**


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Table 1

Characteristics of Students with Dyslexia and Students with Typical Reading Skills

<table>
<thead>
<tr>
<th></th>
<th>DR Group Mean (SD)</th>
<th>TR Group Mean (SD)</th>
<th>F Statistics (1,155)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>21.83 (6.40)</td>
<td>21.66 (4.64)</td>
<td>0.04</td>
<td>.85</td>
</tr>
<tr>
<td>Education (years post high school)</td>
<td>2.57 (1.85)</td>
<td>3.03 (1.62)</td>
<td>2.62</td>
<td>.11</td>
</tr>
<tr>
<td>TOWRE Total Word Reading Efficiency (SS) (average = 100)</td>
<td>76.89 (7.97)</td>
<td>98.53 (8.44)</td>
<td>241.91</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>WJ-III-COG verbal ability (SS) (average = 100)</td>
<td>89.29 (11.02)</td>
<td>96.03 (10.17)</td>
<td>14.62</td>
<td>.002</td>
</tr>
<tr>
<td>TOMAL-2 Visual Sequential Memory (SS) (average = 10)</td>
<td>9.74 (2.72)</td>
<td>10.04 (2.53)</td>
<td>.49</td>
<td>.48</td>
</tr>
<tr>
<td>Prior knowledge questionnaire (maximum score = 12)</td>
<td>5.29 (2.01)</td>
<td>4.88 (1.75)</td>
<td>1.77</td>
<td>.19</td>
</tr>
</tbody>
</table>

Note. DR = dyslexia (n= 54); TR = typical reading skills (n= 103); TOWRE = Test of Word Reading Efficiency; WJ-III-COG = Woodcock Johnson III Test of Cognitive Abilities; TOMAL-2 = Test of Memory and Learning, second edition), SS = Standard Score.
### Table 2

**Summary of Analysis of Covariance and Bonferroni Post-Hoc Test for Retention Test**

<table>
<thead>
<tr>
<th>Factor</th>
<th>MS</th>
<th>df</th>
<th>F</th>
<th>P-value</th>
<th>(\eta_p^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading group</td>
<td>21.87</td>
<td>1, 2.06</td>
<td>.57</td>
<td>.52</td>
<td>.22</td>
</tr>
<tr>
<td>Presentation type</td>
<td>16.68</td>
<td>2, 2.00</td>
<td>.20</td>
<td>.83</td>
<td>.16</td>
</tr>
<tr>
<td>WJ-III-COG Verbal ability score</td>
<td>14.55</td>
<td>1, 150</td>
<td>2.41</td>
<td>.12</td>
<td>.02</td>
</tr>
<tr>
<td>Reading group * presentation type</td>
<td>41.77</td>
<td>2, 150</td>
<td>6.91</td>
<td>.001</td>
<td>.08</td>
</tr>
</tbody>
</table>

#### Bonferroni Post-Hoc Test

<table>
<thead>
<tr>
<th>Text+picture (DR score &lt; TR score)</th>
<th>df</th>
<th>T</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text+picture (DR score &lt; TR score)</td>
<td>150</td>
<td>-4.15</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Audio+picture</td>
<td>150</td>
<td>0.77</td>
<td>.44</td>
</tr>
<tr>
<td>Text+audio+picture</td>
<td>150</td>
<td>-0.11</td>
<td>.91</td>
</tr>
</tbody>
</table>

*Note.* MS: mean square; df: degree of freedom; DR = students with dyslexia; TR = students with typical reading skills.

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**Figure 1.** Examples of slides from each condition.

*Note.* Speaker icon in the audio+picture and text+audio+picture conditions was not presented in the experiment.
Figure 2. Mean scores for the reading groups on the retention (top) and transfer (down) tasks. Error bars represent standard error of the mean. DR = dyslexia group, TR = typical reading skill group, * \( p < .05 \)

Figure 3. Eye fixation times (milliseconds) for the reading groups on the picture and the text areas. Error bars represent standard error of the mean. DR = dyslexia group, TR = typical reading skill group, * \( p < .05 \)
Figure 4. Eye movements between the text and picture areas for the reading groups. Error bars represent standard error of the mean. DR = dyslexia group, TR = typical reading skill group, * $p < .05$
Social Group Membership and Risk-Taking Behaviors Among College Students with ADHD Symptoms

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Arthur D. Anastopoulos³

Abstract

Young adults with attention-deficit/hyperactivity disorder (ADHD) symptoms are more likely than their peers to engage in risk-taking behaviors, including harmful alcohol use, consumption of illicit drugs, and risky sexual behaviors. These behaviors become more common in the general population of young adults as they enter college, particularly for those who join social groups such as Greek life and athletics. It is unclear whether the presence of significant ADHD symptoms is related to engagement in risky behaviors particularly among students who participate in various social activities. We examined: (a) the degree to which inattentive and hyperactive-impulsive symptoms predict risk-taking behavior for a sample of 395 college students, and (b) whether the relationship between ADHD symptoms and risk-taking behavior is moderated by participation in social activities. Results indicated that more significant ADHD symptoms are associated with increased risk-taking behaviors, including harmful alcohol consumption, illicit drug use, and risky sexual behavior. Additionally, social group membership was predictive of increased risk-taking in some cases, particularly for students affiliated with Greek organizations. Findings demonstrate the need for universities to implement preventive programs for students with ADHD symptoms and those in social groups, especially Greek life, to minimize the likelihood of negative outcomes associated with risk-taking.

Keywords: Attention-deficit/hyperactivity disorder, college students, risk-taking behavior, social organizations

Attention-deficit/hyperactivity disorder (ADHD), estimated to affect 5% of the population, is a condition characterized by developmentally atypical levels of inattention, hyperactivity, and/or impulsivity (American Psychiatric Association, 2013; Willcutt, 2012). Behaviors associated with the disorder become apparent in early childhood, and symptoms tend to persist across adolescence and adulthood (Barkley, 2002; Biederman et al., 2006; Bussing, Mason, Bell, Porter, & Garvan, 2010). Individuals with clinically significant ADHD symptoms experience difficulties across several domains of functioning, including social and emotional impairments. For example, they may struggle to maintain prolonged reciprocal interactions, which is perceived as being unaware of their peers’ feelings and needs and leads to difficulties in developing friendships (Cordier, Bundy, Hocking, & Einfeld, 2010a, 2010b). Children with ADHD often have difficulty with sharing, cooperation, turn taking, and other play behaviors, which is viewed by peers as intrusive, overbearing, or disinterested (Barkley, 2002). These social challenges in childhood often translate to more problematic social behaviors in young adulthood.

ADHD and Risk-Taking Behavior among Young Adults

Some of the common features of ADHD, such as failing to consider consequences before taking action or having difficulty following rules, are associated with risk-taking behaviors among young adults with ADHD. One such behavior is illegal and dangerous...
Elevated Risk-Taking Among College Students

College is a unique developmental period when young adults are expected to take on increased responsibility with decreased support from parents and educators. In contrast to the highly structured routine of high school, the college setting allows individuals to make more choices about their academic, social, and personal activities. This can be particularly difficult for students with ADHD, whose symptoms influence how they cope with more intensive academic and social demands, less parental support, and higher expectations for self-management (Weyandt et al. 2013; Wolf, Simkowitz, & Carlson, 2009). In addition to the new academic world all college students face as they begin their undergraduate career, they enter a new social world as well. One choice all college students must make is the types of social commitments in which they would like to become involved, including Greek life, athletics, or other social groups.

Research has found an association between involvement in particular college social groups and increased likelihood of risk-taking behavior. Students in Greek organizations engage in underage alcohol use more frequently, drink more heavily, and are more likely to use illicit drugs than students who are not in Greek organizations (Bartholow, Sher, & Krull, 2003; Caudill et al., 2006; Dussault & Weyandt, 2013; Larimer, Anderson, Baer, & Marlatt, 2000; Scott-Sheldon, Carey, & Carey, 2008; Wechsler, Kuh, & Davenport, 2009). Similarly, college athletes participate in underage binge drinking more often than non-athletes (Ford, 2007; Green, Nelson, & Hartmann, 2014; Lisha & Sussman, 2010; Martens, Dams-O’Connor, & Beck, 2006). Research regarding illicit drug use among college athletes is mixed, with some studies finding them to be more likely than non-athletes to use drugs and others showing they are less likely than their peers to do so (Lisha & Sussman, 2010). In contrast to findings on Greek life and athletics, there is some evidence that being in a committed relationship can act as a protective factor against risk-taking for college students. Those in committed relationships in college tend to binge drink less often, have fewer sexual partners, and report fewer mental health problems than students who are not in relationships (Braithwaite, Delevi, & Fincham, 2010). The current study will assess whether it could benefit professionals working with college students with ADHD symptoms to identify social groups that may serve as “red flags” (e.g., Greek life) versus those that are hypothesized to be protective factors (e.g., relationship status), based on current research.

There may be differences in risk-taking behavior between males and females in college social groups.
Studies have found that males in fraternities tend to drink more than females in sororities (Capone, Wood, Borsari, & Laird, 2007; Iwamoto, Cheng, Lee, Takamatsu, & Gordon, 2011; Larimer et al., 2000) and male athletes consume more alcohol and binge drink more frequently than female athletes (Yusko, Buckman, White, & Pandina, 2008). Gender effects must be explored further in research involving college students, including the degree to which social group membership influences the relationship between gender and risk-taking.

The Current Study

It is clear that participation in risky activities is a normative part of the college experience, especially for students in certain social groups (e.g., Greek life, athletics). Past research has demonstrated that adolescents and young adults with ADHD symptoms are prone to engaging in risk-taking behaviors, but it remains unclear what factors, other than their core symptoms, influence them to do so. As such, the current study aimed to address these gaps through two research questions:

1. How well does ADHD symptom frequency predict risk-taking behaviors (i.e., sexual risk-taking, alcohol use, and illicit drug use) among college students? Based on prior literature (e.g., Brown et al., 2010; Upadhyaya & Carpenter, 2008), it was hypothesized that that higher symptom frequency would predict increased risk-taking.

2. In what ways does participation in social activities (i.e., Greek life, sports teams, and committed relationships) moderate the relationship between ADHD symptom frequency and risk-taking behaviors in college students? Based on existing research support (e.g., Barthlow et al., 2003; Ford, 2007), it was hypothesized that higher symptom frequency would interact with engagement in Greek life or sports teams to predict increased risk-taking across all three risky behaviors of interest. Conversely, it was hypothesized that the interaction between being in a committed relationship and symptom frequency would predict lower risk-taking across all three risky behaviors based on prior research by Braithwaite and colleagues (2010).

Method

Participants

Participants for this study were recruited through the Trajectories Related to ADHD in College (TRAC) project, a longitudinal study examining the experiences of college students with and without ADHD. First-year student participants were assessed annually over four years of college. Two waves of participants were recruited across two years, resulting in the total sample. Data from Year 2 for each cohort were used for the current study because that is the year in which students typically have established their membership in certain social groups, such as Greek life. The original TRAC project sample included 456 college students from nine colleges and universities, with 228 students each in the original ADHD and comparison groups (see Anastopoulos et al., 2016 for details regarding sample characteristics). There were 395 students who returned to the study in Year 2; those students served as the sample for the current study, for which the sample consisted of 207 females (52.4%) and was primarily Caucasian (71.9%). Participants ranged in age from 18 to 23 years old (M = 19.23; SD = 0.55).

Procedures

College students were recruited through fliers, Facebook posts, freshman orientation sessions, office of disability service referrals, and visits to speak with freshman classes. Recruitment efforts elicited self-referrals from students who believed they may meet criteria for the study. A formal diagnosis was not required. During Year 1 for each cohort, students who expressed interest in the study participated in a screening assessment with a research assistant to determine eligibility for the ADHD or comparison group. Following screening assessments, a panel of four experts reviewed participant responses to determine group designation. The panel included the three primary investigators and another expert in the field with extensive knowledge of adult ADHD. Eligible students then met with a research assistant one to two more times to complete questionnaires, interviews, and tasks.

Screening Measures

ADHD rating scales. Three different versions of the same questionnaire were administered to obtain the participant’s ratings of his or her ADHD symptoms in childhood and over the past 6 months, as well as the participant’s parent’s ratings of the participant’s ADHD symptoms as a child and over the past 6 months. Parent data were gathered via rating scales sent to participants’ parents’ homes in the mail.
The ADHD Rating Scale-IV (DuPaul, Power, Anastopoulos, & Reid, 1998) was originally developed to collect parent and teacher ratings of a child or adolescent’s ADHD symptoms. The scale was adapted for the purposes of the current study to serve a new purpose as a self-report measure, in addition to one of its original purposes as a parent report measure. Possible eligibility for the ADHD group was indicated by endorsement of four or more symptoms of inattention, hyperactivity-impulsivity, or both. Both categories of symptoms had to be present in childhood (prior to age 12) and currently (in the past 6 months at the time of data collection). Students were eligible for the control group if they reported three or fewer symptoms in both categories in childhood and in the past 6 months. Cronbach’s alpha coefficients for the current sample ranged from 0.75 to 0.96 for the two symptom categories across versions of the scale.

Semi-Structured ADHD interview. A semi-structured interview was created to evaluate the presence of ADHD symptoms and their impact on the student’s life. This measure consisted of two sets of nine questions, one assessing inattention symptoms and one assessing hyperactivity-impulsivity symptoms, and for each symptom the potential impact on daily functioning was assessed. Initial criteria for the ADHD group were six or more symptoms in either or both symptom categories, and the presence of symptoms prior to age 12. The criteria changed for the second cohort of participants when the DSM-5 was released; at that point, participants met criteria for the ADHD group if they reported five or more symptoms and the presence of symptoms prior to age 12. Because DSM-5 criteria are less stringent than DSM-IV-TR criteria, all participants in the ADHD group met DSM-5 criteria for ADHD. The criterion for the control group was no more than 3 symptoms indicated on both sets of questions.

Structured Clinical Interview for DSM Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1996). The SCID-I was used to examine the presence of clinical disorders other than ADHD. Interview findings and supplemental notes from graduate student assistants were reviewed by the same panel of four experts who reviewed the initial screening measures. A potential participant would be excluded from the study if it was believed that their ADHD symptoms could be better explained by another disorder (e.g., generalized anxiety disorder, major depression).

Predictor and Outcome Variables

Demographic form. Participants reported demographic information, including age, gender, race, and ethnicity during their initial assessments each year. Gender was included as a covariate in the current study.

Conners’ Adult ADHD Rating Scale – Self Report: Long Version (CAARS). The CAARS (Conners, Erhardt, & Sparrow, 1999) is a rating scale designed to assess ADHD symptom frequency in adults. The measure contains 66 items rated by participants on a 4-point Likert scale, ranging from 0 (not at all/never) to 3 (very much/very frequently) intended to capture how often the rater demonstrates certain ADHD symptoms. According to the CAARS manual, the scale has adequate factorial, discriminant, and construct validity. The CAARS contains eight subscales; the DSM-IV Inattentive (IN) and DSM-IV Hyperactive-Impulsive (HI) Symptoms subscales were used as independent variables for the current study. Participant responses resulted in the following internal consistency reliability coefficients: (1) DSM-IV Inattentive Symptoms: 0.81 for males, 0.84 for females, (2) DSM-IV Hyperactive-Impulsive Symptoms: 0.64 for males, 0.75 for females.

Social history interview. A social history interview developed by the researchers was used to learn about participants’ involvement in social activities, including Greek life participation, sports team involvement, and relationship status. Participants’ answers to “current” items (three separate responses of “yes” or “no”, indicating presence or absence of participation in each activity over the past year; e.g., “Are you currently in a fraternity or sorority?”) were included in this study as moderator variables.

Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). The ASSIST (W.H.O. Group, 2002) is a structured interview designed to gather information regarding lifetime and current use of 10 types of substances. All substances on the scale except tobacco were examined in the study as dependent variables. Two separate dependent variables were created using the ASSIST, (1) the total score for all items related to alcohol and (2) the sum of the seven total scores for illicit drugs measured on the ASSIST (cannabis, cocaine, amphetamine type stimulants, inhalants, sedatives, hallucinogens, and opioids). It should be noted that the ASSIST variables in the current study reflect not only the quantity and frequency substance use, but also the degree of problematic use of alcohol and illicit drugs.

Sexual Risk Survey (SRS). The SRS (Turchik & Garske, 2009; Turchik, Walsh, & Marcus, 2015) is a 23-item questionnaire used to evaluate sexual risk-taking behaviors among college students. Respondents completing the scale report the number of times they have engaged in certain sexual risk behaviors over the past 6 months. Frequencies are coded into five ordinal categories of 0 to 4 using the coding procedures recommended by Turchik et al. (2015) to avoid positively skewed data. A total risk score was
calculated by totaling responses to all the items, with a higher score indicating more engagement in risky sexual behaviors. The internal consistency for the scale is adequate, with a Cronbach’s alpha of 0.90.

**Data Analytic Procedure**

First, descriptive statistics for all measures were calculated. Assumptions were checked before analyses, including normality using skewness and kurtosis, linearity using tolerance and VIF measures, and outliers using Cook’s D and studentized residuals. A post-hoc power analysis using G-Power3 software (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that the sample size allowed sufficient power (.80) to detect a medium effect size.

**Research question 1.** Simultaneous multiple linear regression was used to answer the first research question regarding the degree to which inattentive and hyperactive/impulsive symptoms predict risk-taking behaviors. Independent variables for this analysis were the CAARS DSM-IV Inattentive Symptoms and DSM-IV Hyperactive-Impulsive Symptoms subscale T-scores. Dependent variables were the total ASSIST alcohol score, the sum of the seven ASSIST illicit drug total scores, and the total score from the SRS. Gender was included as a covariate.

**Research question 2.** Hierarchical regression analyses were used to answer the second research question regarding the extent to which participation in social activities moderates the relationship between ADHD symptom frequency and risk-taking behaviors. Six different analyses were conducted to evaluate the interactions between the two symptom categories with the three social activity moderators. The independent and dependent variables were the same as those used for the first research question. Gender was also included as a covariate. Variables were entered in the following order: ADHD symptoms (CAARS inattentive or hyperactive/impulsive symptoms) and gender at Step 1, the moderating variable (Greek life, sports team, or committed relationship) at Step 2 to evaluate main effects, and the interaction term of each moderator (e.g., Greek life x inattentive symptoms) at Step 3. Six interaction terms were created to reflect interactions between each of the two ADHD symptom categories and each of the three social activities. Independent variables were centered to ensure invariance of slope coefficients and reduce multicollinearity of predictor variables.

**Results**

First, the distributional properties of all continuous independent and dependent variables were explored to evaluate the normality of the data. Skewness and kurtosis were in the recommended range of -2.00 to +2.00 (Lomax, 2001) for the CAARS IN T-score, CAARS HI T-score, and SRS total score. Skewness was outside of the recommended range for the ASSIST illicit drug score (2.88), and kurtosis was outside of the recommended range for both the ASSIST alcohol (3.71) and the ASSIST illicit drug (9.59) scores. Thus, a log+1 transformation, based on recommendations by Winer (1971), was used for both the ASSIST alcohol and ASSIST illicit drug scores. Skewness and kurtosis were in the acceptable range for both transformed variables, and the latter were used for all analyses.

Frequency data for each moderator variable found that 29.7% of participants endorsed involvement in Greek life, 25.6% endorsed sports team membership, and 33.5% reported being in a committed relationship at the time of data collection. It should be noted that there were only 20 students, 5.3% of the sample, who reported current participation in varsity sports. Thus, a new variable was created including students who reported any current sports team involvement, including varsity, club, and intramural teams (n = 97). The latter variable was used in analyses.

Linearity was examined for all predictor variables using tolerance and VIF measures, with all found to be in the acceptable range. Data for the outcome variables (ASSIST alcohol total, ASSIST illicit drug total, and SRS total) were tested for outliers, with Cook’s D larger than 1.00 and studentized residuals outside of the -2.00 to +2.00 range considered indicative of outliers (Cook, 1977). All Cook’s D statistics were in the acceptable range. There were studentized residuals outside of the recommended range for all three outcome variables, including six alcohol score data points, 11 illicit drug score data points, and 18 SRS total data points. Cases with outlier values remained in the data set because there were so few relative to the larger sample, and because students with the most extreme scores were of particular interest.

**ADHD Symptoms and Risky Behavior**

Simultaneous multiple linear regression was used to answer the first research question to assess the degree to which each predictor variable within a set of predictors contributed to a single outcome variable, with all predictors considered to be of similar importance in answering the research question. See Table 1 for more detailed results of initial model regression analyses.
Risky alcohol consumption. The regression model including gender, IN, and HI as independent variables was found to predict 6.8% of the variance in risky alcohol use, which is a significant amount of the variance explained \((p < .001)\). Gender was the only significant predictor \((p = .009)\) when the other independent variables were held constant. Males reported riskier alcohol consumption than females (transformed ASSIST alcohol total means: males = 0.72, females = 0.59; original ASSIST alcohol total means: males = 6.99, females = 4.67).

Illicit drug use. The regression model predicted 13.6% of the variance in risky illicit drug use, also a significant amount of variance explained \((p < .001)\). IN symptom frequency significantly predicted drug use \((p = .012)\) when HI and gender were held constant \((\beta = 0.176; B = 0.006)\). This regression weight indicates that drug use increased as IN symptom frequency increased. HI did not predict drug use when IN and gender were held constant. Gender was also a significant predictor of drug use \((p < .001)\) when IN and HI were held constant. Males reported riskier illicit drug use than females (transformed ASSIST illicit drug total means: males = 0.56, females = 0.30; original ASSIST illicit drug total means: males = 7.19, females = 2.77).

Sexual risk-taking. The regression model predicted 15.4% of the variance in sexual risk-taking, which is a significant amount of variance explained \((p < .001)\). IN symptom frequency did not significantly predict sexual risk-taking, but HI symptom frequency did \((p < .001; \beta = 0.319; B = 0.277)\), which is significant at the \(p = .01\) level indicating that sexual risk-taking behavior increased as HI symptoms were more frequent. Gender also predicted sexual risk-taking \((p < .001)\) when IN and HI symptom scores were held constant. Males \((M = 17.11)\) reported a higher sexual risk-taking on the SRS than females \((M = 10.77)\).

Social Moderators of ADHD and Risky Behavior

Next, moderators were added to the model and evaluated using hierarchical regression. Results in this section are broken down by risk-taking behaviors within each social group.

Greek life. First, all three risk-taking behaviors were analyzed based on Greek life status along with the independent variables and covariate assessed in the first research question (IN, HI, and gender). No significant interactions effects were found for any Greek life moderator analyses. Other results are reported below. See Table 2 for more detailed results.

Risky alcohol consumption. Without the interaction effect, the model including IN, gender, and Greek life participation significantly predicted risky alcohol consumption \((p < .001)\), accounting for 13.7% of the variance. Each independent variable also significantly predicted risky alcohol consumption when the other predictors were held constant.

The model including only HI, gender, and Greek life significantly predicted alcohol scores \((p < .001)\), accounting for 13.0% of the variance. Each independent variable in the HI model also significantly predicted risky alcohol consumption when the other independent variables were held constant.

Illicit drug use. The model excluding interaction effects found that, together, IN, gender, and Greek life participation significantly predicted drug use \((p < .001)\), accounting for 14.9% of the variance. All predictors were also significant when the other predictors were held constant.

The model including only HI symptoms, gender, and Greek life significantly predicted 13.1% of the variance in drug use \((p < .001)\). Within the model, each variable was also a unique predictor of drug use.

Sexual risk-taking. After removing the interaction effect, the model including IN, gender, and Greek life predicted 16.7% of the variance in sexual risk-taking, which is a significant amount of variance predicted \((p < .001)\). All three independent variables were significant for predicting sexual risk-taking when the other two independent variables were held constant.

Excluding the interaction effect, the model with HI symptoms, gender, and Greek life significantly predicted sexual risk-taking \((p < .001)\). This model predicted 20.0% of the variance. Again, all three independent variables were significant predictors when the others were held constant.

Sports teams. Each risk-taking behavior was then evaluated in regard to ADHD symptom dimension (IN and HI), gender, and sports team participation. No significant interaction effects were found with sports team participation as a moderator. Other results of sports team analyses are outlined below. See Table 3 for more detailed results.

Risky alcohol consumption. The model with only IN symptoms, gender, and sports team status significantly predicted risky alcohol consumption \((p < .001)\), accounting for 9.0% of the variance. IN symptoms and sports team participation were both unique predictors at the \(p < .001\) level when other variables in the model were held constant.

The model including HI symptoms, gender, and sports team participation accounted for 8.4% of the variance in risky alcohol use, which is a significantly amount of variance explained \((p < .001)\). HI symptoms and sports involvement both significantly predicted alcohol use when the other predictors were held constant.
**Illicit drug use.** There was no significant main effect of sports team participation on drug use. The model excluding the interaction term and sports involvement, including only IN symptoms and gender, significantly predicted illicit drug use ($p < .001$), accounting for 12.7% of the variance. In the model with only the two significant predictors, IN symptoms and gender both significantly predicted illicit drug use when controlling for the other predictor.

Sports participation alone was also not a significant predictor of illicit drug use. Without the interaction term or sports team status, the model including only HI symptoms and gender accounted for 10.6% of the variance in drug use, which is a significant amount of variance explained ($p < .001$). HI symptoms and gender were both found to uniquely predict illicit drug use.

**Sexual risk-taking.** Findings for athletics and sexual-risk taking were similar to findings for athletics and illicit drug use. Sports participation alone was not a significant predictor of risky sexual behavior. The model with only IN symptoms and gender significantly predicted sexual risk-taking ($p < .001$), accounting for 10.5% of the variance explained. IN symptoms and gender were both significant predictors of risky sexual activity when controlling for the other predictor in the model.

Sports involvement alone did not significantly predict risky sexual behavior. The model including only HI symptoms and gender significantly predicted sexual risk-taking ($p < .001$), accounting for 14.5% of the variance. HI symptoms and gender both significantly predicted sexual risk-taking when the other predictor was held constant.

**Committed relationships.** The final social activity that was evaluated as a moderator of ADHD symptoms and risk-taking behavior was involvement in committed relationships. Results in this area are provided for all interaction effects tested, as there was one significant interaction effect found. See Table 4 for more detailed results of committed relationship analyses.

**Risky alcohol consumption.** The interaction term for IN symptoms and relationship status did not significantly predict alcohol use. The model with only IN symptoms, gender, and relationship status significantly predicted alcohol consumption ($p < .001$), accounting for 7.7% of the variance. IN, gender, and relationship status were all significant predictors of alcohol use when controlling for the other variables.

The interaction between HI symptoms and relationship involvement was also not a significant predictor of risky alcohol use. The model excluding the interaction term, with only HI symptom frequency, gender, and relationship status predicted 7.6% of the variance in alcohol use, a significant proportion of variance explained ($p < .001$). Within that model, each variable was also a unique significant predictor of risky alcohol consumption.

**Illicit drug use.** The interaction between IN symptoms and relationship status was not found to significantly predict drug use. Relationship status alone was also not a significant predictor. Without the interaction effect or relationship status, the model including only IN symptoms and gender significantly predicted illicit drug use ($p < .001$), accounting for 12.8% of the variance. IN symptom frequency and gender were both uniquely significant predictors of drug use when controlling for the other variable.

The interaction term for HI symptom frequency and relationship involvement, and relationship involvement alone both did not significantly predict illicit drug use. The model with only HI symptoms and gender accounted for 11.0% of the variance in drug use, a significant proportion of variance explained ($p < .001$). HI symptoms and gender both individually predicted drug use when the other predictor was held constant.

**Sexual risk-taking.** The interaction between IN symptoms and relationship status was not a significant predictor of risky sexual behavior. There also was no significant main effect of relationship involvement alone. Without the interaction effect or relationship status, the model including only IN symptom frequency and gender significantly predicted sexual risk-taking ($p < .001$), accounting for 11.2% of the variance. IN symptoms and gender were both unique significant predictors when controlling for the other predictor.

Finally, there was a significant interaction between HI symptoms and relationship status for predicting sexual risk-taking ($p = .015$). A means comparison found that single students with low HI symptoms reported engaging in less sexual risk-taking than students in relationships with low HI symptoms. However, single students with high HI symptoms reported more frequent risky sexual behavior than students in relationships with high HI symptoms. Relationship status alone did not significantly predict sexual risk-taking when controlling for the HI X Relationship interaction, IN symptoms, and gender. HI symptoms and gender both independently predicted risky sexual behavior at the $p < .001$ level when the other predictor variables were held constant.
Discussion

Findings Regarding ADHD and Risky Behavior

The model with the two ADHD symptom dimensions and gender predicted a significant amount of the variance in both alcohol consumption and illicit drug use. Males reported more extreme use of alcohol, and males as well as those with higher IN symptoms reported more dangerous use of illicit substances. These findings expand upon the large body of research suggesting that adolescents with more severe ADHD symptoms engage in more risk-taking related to alcohol and drug use than their peers with lower ADHD symptoms (Bidwell et al., 2014; Dunne et al., 2014; Lee, Humphreys, Flory, Liu, & Glass, 2011), indicating that this risk-taking pattern persists into young adults’ college years.

Alternatively, these findings only partially support findings by Upadhyaya and Carpenter (2008) suggesting that more severe ADHD symptoms are associated with increased alcohol and drug use. For the college student sample in the current study, gender was a more significant predictor of risky alcohol consumption than ADHD symptoms, and only IN (not HI) symptoms were uniquely predictive of illicit drug use. This finding contradicts the expectation that students with high impulsivity would engage in more drug use because they would presumably act without considering the consequences of substance use. Perhaps the reason students with higher IN symptoms are more likely to use drugs is related to the theory offered by Diamond (2005), proposing that individuals with higher levels of inattention often feel understimulated by their environment and seek ways to feel more stimulated, in this case through illicit drug use.

The model also accounted for a significant amount of the variance in sexual risk-taking, with gender and HI symptoms being two unique significant predictors. Being male and having more frequent HI symptoms were predictive of increased reported risky sexual behavior. This supports past findings by Flory et al. (2006) and Monawar Hosain et al. (2012) suggesting that higher ADHD symptoms are associated with increased sexual risk-taking. Additionally, this study found that HI symptoms in particular are most highly predictive of risky sexual behavior.

Findings Regarding Social Moderators of ADHD and Risky Behavior

For risky alcohol consumption as an outcome, the percentage of variance accounted for increased by adding all three social moderators (Greek life participation, sports team involvement, and relationship status) to the original regression model. Students who reported higher alcohol use were those in Greek life, those playing on sports teams, and those who were single. When illicit drug use was added to each model, the percentage of variance accounted for slightly increased for Greek life, and decreased for sports team involvement and relationship status. Individuals in Greek life reported more illicit drug use than those not in Greek life.

The findings on Greek life confirm the large existing body of research on risky alcohol and illicit drug use in students with Greek life affiliations (e.g., Bartholow, Sher, & Krull, 2003; Scott-Sheldon, Carey, & Carey, 2008; Wechsler, Kuh, & Davenport, 2009). The largest change in variance explained for moderators of alcohol use was for students in Greek life organizations, suggesting that although it is important to consider several factors as predictors of dangerous alcohol use, Greek life may play the largest role in predicting risky alcohol-related behaviors in college students. Regression weights for illicit drug use were smaller for Greek life than for ADHD symptoms or gender, indicating that Greek life is a less important factor when predicting the likelihood of college students engaging in illicit drug use. Taking these results into consideration along with prior findings that students in Greek life use illicit substances more than their peers (Dussalt & Weyandt, 2013; Janusis & Weyandt, 2010; Scott-Sheldon et al., 2008), it seems that college students affiliated with Greek life are more still more likely than their peers to use illicit drugs, but that ADHD symptoms and gender are stronger predictors in this case.

Relative to the original models, Greek life affiliation increased the variance explained and sports team participation decreased the variance explained in sexual risk-taking. Students in Greek life reported more frequent risky sexual behavior than students not in Greek life. Sexual risk-taking analyses showed that Greek life, IN symptoms, HI symptoms, and gender were all relatively equivalent predictors of risky sexual behavior. This is a new finding in the literature, as most existing studies have conceptualized sexual risk-taking as a negative outcome of alcohol and drug consumption, rather than as an outcome of other factors, such as ADHD symptoms, gender, or social group membership. It seems that there are factors other than alcohol and drug use that university leaders should consider in initiatives targeting risk-taking in college students.

Also, sexual-risk taking analyses demonstrated an interaction effect for HI symptoms and relationship status. Single participants with low HI reported engaging in less frequent risky sexual behavior than participants in committed relationships with low HI
symptoms. Alternatively, single participants with high HI symptoms reported engaging in more sexual risk-taking than participants in relationships with high HI symptoms. This aligns with the hypothesis that being in a committed relationship would serve as a protective factor against risky sexual behavior for students with significant ADHD symptoms. This demonstrates that Braithwaite and colleagues’ (2010) research applies particularly well to students presenting with higher levels of hyperactive-impulsive symptoms. Professionals working with college students with ADHD symptoms can use these findings to recognize potential protective factors and possible “red flags” in assessing the likelihood of those students engaging in sexual risk-taking. Future research should seek to better understand risky sexual behaviors in college students with ADHD symptoms to determine the needs of these students and to encourage safe sex practices.

In sum, results of the current study suggest that increased symptom frequency is predictive of increased risk-taking behavior in college students, with varying predictive strength across predictor-outcome pairs assessed. Alcohol consumption is the major outcome most strongly impacted by social group participation, particularly for students in Greek life and single students. It appears that the association between Greek life affiliation and alcohol use is exceptionally strong, which could be a result of the assumption college students may have that heavy alcohol use is the norm for students in Greek life. Both types of ADHD symptoms and gender were important predictors of some types of risk as well. Alternatively, illicit drug use was found to be more strongly predicted by ADHD symptoms (both IN and HI) and gender than by social group participation. Sexual risk-taking appears to be equally impacted by Greek life membership, ADHD symptoms, and gender.

A unique contribution of this study is the consideration of the independent impact of IN and HI symptoms to behavior in the first research question, versus the analysis of the two symptom types in tandem for the second research question. Both IN and HI presented as unique predictors of all types of risk assessed when analyzed separately in moderator analyses, as opposed to the first research question, which found that IN and HI symptoms were not significant predictors of risk. Results suggest that ADHD as a unitary concept is more strongly predictive of alcohol use than the two symptom dimensions separately, whereas the opposite is the case for illicit drug use and sexual risk-taking. This is an important distinction that represents the necessity of evaluating IN and HI symptoms separately in research to allow for a more complete understanding of the unique impact of both symptom types on behavior.

Implications for Practice

College students with more frequent ADHD symptoms are more likely than their peers to engage in all risky behaviors evaluated in the current study. Thus, students who are identified as having significant symptoms may benefit from risk prevention efforts or programs that teach safe practices for college students, similar to secondary level risk prevention practices universities currently use to target students affiliated with Greek life. This may include targeted efforts such as incorporating interventions into one-on-one coaching or counseling, or universal efforts such as university-wide programs for incoming students. Also, findings of this study demonstrate the importance of universities offering services to help students effectively manage their ADHD symptoms, which should in turn reduce dangerous or risk behaviors.

Notably, students affiliated with Greek life organizations are at greatest risk, even when controlling for ADHD symptom severity and gender. Although this is not a new finding, as it has been demonstrated in numerous prior studies, the current study demonstrates the ongoing need for universities to develop and test programs for preventing dangerous behaviors in Greek life communities at colleges and universities. Further, it should be noted that ADHD symptoms and gender were also significant predictors of risk when controlling for Greek life status; thus, efforts could focus on these risk factors as well. For example, college-based service providers may give special consideration to preventing risky behaviors in students with ADHD, and university initiatives may focus more on male students than female students within Greek life communities.

Limitations and Future Directions

Findings of the current study should be interpreted in light of the study’s limitations. First, the transformation of alcohol and illicit drug variables limits the degree to which some results can be interpreted, though it can be noted that the non-transformed means were included in the comparison of means for each follow-up analysis for significant results and always aligned with the patterns found with the transformed data (e.g., transformed and non-transformed alcohol variable means were both higher for males than for females). Next, the TRAC Project, the larger study from which data for the current study were taken, dichotomized participants into ADHD and control groups. Students who were found to have only some ADHD symptoms, but not enough to be
considered clinically significant, were ineligible for the TRAC Project such that the sample excludes an important group of students those with subclinical ADHD symptoms. Also, participants were recruited in a way that created a relatively equal distribution of males and females in the ADHD and control groups (e.g., when the number of male participants recruited equaled approximately 50% of the goal number of ADHD participants, only female participants were accepted into the ADHD group). As such, the sample is not representative of population estimates of males and females with ADHD; population estimates vary across studies, but generally show a significantly higher likelihood of diagnosis in males versus females (Fayyad et al., 2007).

All data were self-report, which may impact the reliability and validity data based on the participants’ understanding of interview questions and questionnaire items, and the degree to which participants accurately remembered their past behaviors. Additionally, the data only included students in their second year of college. The results can only be assumed to represent that group of students, not those who are new to college or those in their later years of college. Perhaps students who are new to social groups (often in their second year of college) behave differently than those who have been active in social groups for a year or two. Further, researchers should continue to explore other potential predictors of risk-taking, including pre-college functioning (e.g., binge drinking in high school), college life variables (e.g., living in a fraternity/sorority house versus other campus housing), and other individual factors (e.g., presence of comorbid disorders). The research base can continue to expand to include the effect of treatment on outcomes assessed in the current study. Perhaps certain forms of treatment can reduce the likelihood of risk-taking, even with the impact of important predictors, such as ADHD symptomatology or Greek life membership.

Conclusions

Prior research has found that young adults with significant ADHD symptoms are more likely than their peers to engage in risk-taking, including high alcohol consumption, illicit drug use, and risky sexual behavior. This is the first study to focus specifically on IN and HI symptoms separately as predictors of risk-taking in college students, with additional consideration of the effects of social activities on risky behavior. Findings showed that gender is a significant predictor of risky alcohol use, gender and IN symptoms predict illicit substance use, and gender and HI symptoms predict sexual risk-taking. Greek life presented as the social group with the most significant impact on risk-taking, particularly for alcohol use. A notable interaction was found in which being in a committed relationship was a protective factor against risky sexual behavior for students in relationships with high HI symptoms, which was not the case for those with low HI symptoms. Findings of the current study can be applied to efforts by universities to minimize risk-taking and associated negative outcomes for students. Initiatives can be focused on groups found to be at the greatest risk, including those with high IN and HI symptoms, males, and students in Greek life. Future research can replicate and expand upon findings of this study and examine the best methods for preventing risky behaviors among college students, particularly those with significant ADHD symptomatology.

References


### Table 1

**Analyses of ADHD Symptoms and Gender as Predictors of Risk-Taking Behavior**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Multiple $R^2$</th>
<th>$F$ (df)</th>
<th>$p$-value</th>
<th>Predictors</th>
<th>Unstd. Reg. Weight</th>
<th>Std. Reg. Weight</th>
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### About the Authors

Brittany Pollack received her B.A. degree in Psychology and B.S. degree in Family Science from the University of Maryland, College Park. She received her Ph.D. in School Psychology from Lehigh University in August 2017. Her early career experience includes working as a school psychologist in the Philadelphia area. Her research interests include ADHD and associated academic, social, and emotional functioning. She can be reached by email at brittanypollack12@gmail.com.

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Arthur D. Anastopoulos received his B.A. in Child Study from Tufts University, his M.A. in General/Experimental Psychology from Wake Forest University, and his Ph.D. in Clinical Psychology from Purdue University. He has extensive experience providing clinical services and consultation to children, adolescents, and adults with ADHD. He is currently a professor in the Department of Human Development and Family Studies at the University of North Carolina at Greensboro. His research interests include the assessment and treatment of ADHD and its associated features across the life span, with a current focus on emerging adults with ADHD attending college. He can be reached by email at ada@uncg.edu.
Table 2

Analyses of ADHD Symptoms and Gender as Predictors of Risk-Taking Behavior

<table>
<thead>
<tr>
<th>Outcome</th>
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<th>$p$-value</th>
<th>Predictors</th>
<th>Unstd. Reg. Weight</th>
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Note. The only data from Model 3 (which includes the interaction effect) of each analysis provided are the regression weights and $p$-value for the interaction effects. All other data are from Model 2 (which includes Greek life, IN/HI, and gender).
Table 3

Analyses of Sports Team Involvement as a Moderator Between ADHD Symptoms and Risk-Taking Behaviors

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<th>Predictors</th>
<th>Unstd. Reg. Weight</th>
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<th>p-value</th>
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Note. The only data from Model 3 (which includes the interaction effect) of each analysis provided are the regression weights and p-value for the interaction effects. All other data are from Model 2 (which includes Greek life, IN/HI, and gender).
Table 4

**Analyses of Relationship Status as a Moderator Between ADHD Symptoms and Risk-Taking Behaviors**

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<th>Predictors</th>
<th>Unstd. Reg. Weight</th>
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*Note.* The only data from Model 3 (which includes the interaction effect) of each analysis provided are the regression weights and $p$-value for the interaction effects. All other data are from Model 2 (which includes Greek life, IN/HI, and gender).
Disability in Postsecondary STEM Learning Environments: What Faculty Focus Groups Reveal About Definitions and Obstacles to Effective Support

Genia M. Bettencourt¹
Ezekiel Kimball¹
Ryan S. Wells¹

Abstract

Students with disabilities lag behind their peers without disabilities in success outcomes related to access to, persistence within, and completion of postsecondary degree programs (National Center for Education Statistics [NCES], 2017). Faculty play a key role in shaping student success. To date, however, most of the work exploring faculty attitudes and behaviors has drawn from a broad sample (e.g., Buchanan, Charles, Rigler, & Hart, 2010; Kraska, 2003; Jensen, McCray, Krampe, & Cooper, 2004; Rao & Gartin, 2003), with only limited exploration of the attitudes and behaviors of science, technology, engineering, and mathematics [STEM] faculty (e.g., Milligan, 2010; Moon, Utschig, Todd, & Bozzorg, 2011). This study seeks to understand how STEM faculty think about and respond to students with disabilities in order to shape effective interventions. Data were collected through a series of four focus groups with 27 participants across 17 STEM majors including lecturers, pre- and post-tenure, and academic administrators. Key findings from the focus groups illuminated the impact of a formal accommodations process, individual approaches to providing support, and perceptions of the STEM climate towards students with disabilities. Recommendations for research and practice include strengthening support and training for faculty in STEM disciplines while continuing to explore these themes across institutional types.

Keywords: Students with disabilities, STEM, faculty, universal design for learning

Students with disabilities lag behind their peers without disabilities in success outcomes related to access to, persistence within, and completion of postsecondary degree programs (National Center for Education Statistics [NCES], 2017). These trends hold true across both disability diagnoses and institutional types (Manly, Wells, & Kimball, 2015). Empirical studies have consistently highlighted limitations in support and the prevalence of disability stigma on postsecondary campuses as among the most likely factors contributing to these gaps (Evans, Broido, Brown, & Wilke, 2017; Kimball, Wells, Ostiguy, Manly, & Lauterbach, 2016). Studies have also consistently suggested that faculty attitudes and behaviors contribute to the perceptions of both inadequate support and stigma (e.g., Baker, Boland, & Nowik, 2012; Schelly, Davies & Spooner, 2011). A growing evidence base has shown that intentionally-constructed interventions can modify faculty attitudes and behaviors in positive ways (e.g., Bongey, Cizadlo, & Kalnbach, 2010; Junco & Salter, 2004; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007).

To date, however, most of the work exploring faculty attitudes and behaviors has drawn from a broad sample (e.g., Buchanan, Charles, Rigler, & Hart, 2010; Jensen, McCray, Krampe, & Cooper, 2004; Kraska, 2003; Rao & Gartin, 2003), with only limited exploration of the attitudes and behaviors of science, technology, engineering, and mathematics [STEM] faculty (e.g., Milligan, 2010; Moon, Utschig, Todd, & Bozzorg, 2011). Nonetheless, work of this sort is vitally necessary given that students with disabilities face additional challenges in STEM fields (Dunn, Rabren, Taylor, & Dotson, 2012; Lee, 2011). For example, analyses of enrollment patterns show that students with disabilities face even more restricted success pathways in STEM degree programs than in other fields (Lee, 2011; National Science Foundation

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Postsecondary Learning Environment for Students with Disabilities

Students with disabilities entering postsecondary learning environments face an often unwelcoming, sometimes hostile climate (e.g., Beilke & Yssel, 1999; Hedrick, Dizen, Collins, Evans, & Grayson, 2010; Stodden, Brown, & Roberts, 2011; Vogel, Holt, Sligar, & Leake, 2008). Negative postsecondary experiences for students with disabilities often occur during the transition process and continue to compound over time. For example, Adams and Proctor (2010) documented significant differences between the transition experiences of students with and without disabilities—noting suppressed adaptation, social adjustment, and academic outcomes for students with disabilities. While students with disabilities frequently possess strong compensatory skills that allow them to utilize their own self-determination and self-advocacy skills to navigate the transition process (e.g., Chiba & Low, 2007; Garrison-Wade, 2012), limited and/or inconsistent institutional supports can suppress positive transition outcomes (Dowrick, Anderson, Heyer, & Acosta, 2005; Garrison-Wade, 2012).

Issues related to accommodations have consistently been cited as amongst the most problematic aspects of the transition process (e.g., Collins & Mowbray, 2008; Denhart, 2008; Lightner, Kipps-Vaughn, Schulte, & Trice, 2012; Marshak, Van Wieren, Ferrell, Swiss, & Dugan, 2010). For example, Lightner and colleagues (2012) found that most students who received postsecondary disability accommodations sought them only after encountering an academic crisis. Furthermore, their research indicated that the proactive pursuit of accommodations was related to student knowledge and perceptions of the process. These findings are echoed by additional studies that have shown that the decision to seek services is powerfully influenced by factors such as understanding of the accommodation process, perceived social stigma, and the nature of prior interactions with faculty members (e.g., Baker et al., 2012; Kranke, Jackson, Taylor, Anderson-Fye, & Floersch, 2013; Marshak et al, 2010).

This literature base has also demonstrated that students with disabilities and faculty members perceive postsecondary institutions differently—with the latter believing campuses to be more welcoming (Baker et al., 2012). As a result, students with disabilities express reluctance to disclose their disability status and often do so only under conditions of extreme need (e.g., Collins & Mowbray, 2008; Denhart, 2008; Kranke et al., 2013; Lightner et al., 2012). Notably, students with disabilities have reported that they would feel more welcome to disclose their disability status if they perceived faculty and staff to be
more supportive (e.g., Barnard-Brak, Paton, & Sulak, 2012; Burgstahler & Moore, 2009; Farone, Hall, & Costello, 1998).

**Faculty Attitudes and Behaviors toward Students with Disabilities**

Findings related to faculty attitudes demonstrate both the widespread presence of problematic beliefs and limited knowledge as well as the effectiveness of trainings in moderating these issues (e.g., Izzo, Murray, & Novak, 2008; Kraska, 2003; Lombardi, Murray, & Gerdes, 2011). For example, Brockleman (2011) revealed wide variability among faculty in their perceptions of effective accommodations. Some of that variability was explained by the differences between STEM and non-STEM faculty attitudes (Brockleman, 2011; Kraska, 2003; Lombardi et al., 2011). Studies have also shown that faculty members struggle to devise support strategies based on variations in learning environments (Gladhart, 2010; Rule, Stefanich, & Boody, 2011) and disability type (e.g., Bush et al., 2011; Cawthon & Cole, 2010; Chanock, Stevens, & Freeman, 2010; Jensen et al., 2004; Prevatt, Johnson, Allison, & Proctor, 2005). This inflexibility may pose particular challenges in STEM disciplines due to the wide variability in instructional practices—such as the combination of lectures, labs, and team-based project work—and varied ways that specific disabilities would need to be accommodated therein.

While the documented faculty attitudes described above are likely to prove problematic for some students with disabilities, they are also malleable (e.g., Izzo et al., 2008; Murray, Lombardi, Wren, & Keys, 2009; Rohland et al., 2003). Changing faculty attitudes can result in behavioral modifications, leading to more supportive learning environments for students with disabilities (e.g., Izzo et al., 2008; Murray et al., 2009). Particularly effective trainings have included the development of faculty learning communities (Cook et al., 2006; Murray et al., 2009; Rohland et al., 2003) and online components (Izzo et al., 2008; Junco & Salter, 2004). In contrast, disability simulations were shown to be ineffective mechanisms for challenging attitudes and behaviors (e.g., Nario-Redmond, Gospodinov, & Cobb, 2017; Silverman, Gwinn, & Van Boven, 2015). Instead, effective interventions for faculty provide both empirical information about students with disabilities and effective strategies for addressing support needs.

**STEM Experiences of Students with Disabilities**

While students with disabilities face unique challenges in STEM disciplines (e.g., Dunn et al., 2012; Lee, 2011; Moriarty, 2007), the empirical literature on modifying faculty attitudes and behaviors reviewed above suggests possible paths forward. Limited evidence from STEM-specific interventions indicates that they would prove effective in modifying faculty attitudes and behaviors (Rule et al., 2011). These interventions need to address both unique nature of STEM learning environments and the ways in which various disabilities manifest themselves in STEM disciplines. For example, students with disabilities generally have high STEM aspirations (Bittinger, Wells & Kimball, 2015). However, studies of their perceptions, as well as those of their parents and teachers, have shown that STEM fields are perceived as unwelcoming and unsuited for students with disabilities (Alston & Hampton, 2000; Bellman, Burgstahler, & Hinke, 2015). Additionally, the negative relationship between other minoritized identities and STEM participation is amplified by disability status (Cardoso et al., 2013; Lee, 2014)—that is, women and people of color with disabilities enroll in STEM fields at even lower rates than their peers without disabilities. Recent empirical findings suggest that these outcomes may also vary by disability status with positive associations between some types—most notably, autism—and STEM participation (Wei, Yu, Shattuck, McCracken, & Blackorby, 2013).

**Data and Methods**

This qualitative research project utilized focus groups to explore the way that participating STEM faculty members conceptualized disability and understood the support needs of students with disabilities. We utilized focus groups because they allow researchers to gain information on group opinions, perspectives, reactions, and responses (Guest, Namey, & Mitchell, 2013). By asking individual participants to respond within the context of a group conversation, focus groups help to illustrate: how shared understandings develop through interpersonal interaction; the consensus perception within and across groups; and the presence or absence of diverging opinions (Marshall & Rossman, 2006).

**Sample Site and Participants**

Our study took place between 2016 and 2017 with a total of 27 faculty participants ranging across 17 STEM majors. Participants held a variety of faculty positions at the university including lecturers, pre- and post-tenured faculty, and academic administrators. All participants were drawn from the same large public research institution located in the northeastern United States. At the time of the study, the
institution offered over 30 STEM majors for undergraduate students across three different colleges. While programmatic initiatives existed on campus to increase student representation within STEM disciplines, their missions operationalized diversity via efforts to promote the inclusion of women and underrepresented minority students. Support for students with disabilities was funneled through the disability services office on campus, a mid-sized office that offered resources for accommodation registration, exam proctoring, and individual consultation.

To recruit participants, we utilized maximum variation sampling to ensure a wide breadth of opinions, faculty roles, and disciplines (Morgan, 1996). We utilized three strategies to develop our sample. First, the disability services office on campus provided an initial list of faculty who represented a range of perspectives on working with students with disabilities and accommodations to serve as potential participants. Second, we sought referrals from experts in STEM fields and STEM education—again asking them to recommend faculty members representing diverse opinions about and awareness of disability support. Finally, we supplemented our other recruitment strategies by inviting small groups of STEM faculty from different disciplines until saturation was reached (between four to eight participants per group).

Data Collection
This study shares the results of four focus group semi-structured interviews, each lasting approximately one hour in length. The first two authors of the research team each led two focus groups. We utilized a loosely structured facilitation protocol (Morgan, 1996) consisting of seven questions, which were asked in slightly different sequence and phrasing based on the context of each individual focus group. Our protocol included questions such as (a) how welcoming do you feel that STEM fields are to students from diverse backgrounds? (b) how would you describe the support or guidance that you receive on working with students with disabilities? and (c) are there any specific strategies that you have found helpful in supporting students with disabilities in your classes? Focus groups were audio-recorded and transcribed.

Data Analysis
We utilized NVIVO software to assist in data management and analysis. After each focus group, memo writing was used to engage with preliminary findings (Saldana, 2013). These memos were used to explore potential codes that would form categories and themes. The study used constant comparison analysis to look for similarities and differences within each group (Corbin & Strauss, 2008). In this analysis, conceptually similar incidents are organized within high-level descriptors. Subsequent comparisons illuminated the properties and dimensions of each category and theme as well as their differences. Here, comparisons were made across participants and focus groups. Negative cases were used to illuminate the boundaries of these descriptors (Patton, 2015).

The lead author conducted the preliminary data analysis, which was subsequently reviewed by the other coauthors. The entire research team then negotiated discrepancies in interpretation. Following this analysis, we engaged in member checking by sending preliminary analysis to participants to check the resultant findings and interpretations (Merriam, 2009). Conducting four groups allowed us to reach a point of saturation in which similar themes emerged across participants (Lincoln & Guba, 1985). In this case, we sought to provide sufficient description within our findings to help readers decide what concepts might have transferability to their specific contexts.

Positionality
The research team included people with varied personal and professional experiences related to disability. Genia Bettencourt grew up with a parent with a chronic health condition. She currently studies issues of access and persistence for marginalized student groups within postsecondary education, including conducting both research and teaching related to students with disabilities. Ezekiel Kimball is a person with a disability (obsessive-compulsive disorder). He has written extensively about disability in the higher education environment and worked previously at a postsecondary education program for young adults with developmental disabilities, served as the disability services coordinator for a small college, and as the director of institutional research at a college well-known for its work with students with learning disabilities. Ryan Wells focuses his research on equitable postsecondary access and success for students who are underserved and under-researched. The study of students with disabilities in college is, therefore, a natural extension of over a decade’s worth of research. As the parent of a student with disabilities who is about to start transition planning and considering options beyond K-12 schooling, issues of disability and success in higher education are meaningful in personal ways as well. This mixture of experiences allowed us to approach our data collection and analysis with varied perspectives and to challenge one another to deepen our understanding of how STEM faculty perceived support for students with disabilities.
Limitations

Like all focus groups, the primary strength of our study is its ability to capture both group consensus and potential dissent from that consensus. However, focus groups can potentially be biased by the presence of strong opinions that suppress dissenting voices. As facilitators, we controlled for this potential through triangulation of findings across multiple focus groups and proactive facilitation techniques, but the risk cannot be mitigated entirely. Additionally, focus groups can be subject to strong outlier biases in sampling. In other words, the faculty who agreed to participate in our focus groups may be those who are already more aware of and purposeful in supporting students with disabilities. The range of opinions and espoused practices in our data suggests that our sampling frame adequately captured both positive and negative perceptions, but it is possible that the “average” STEM instructor is not full represented. Finally, in our focus on exploring instructor attitudes and behaviors in STEM fields, we acknowledge that we have compressed widely divergent disciplinary cultures and faculty social identities. Future work should look at variations in faculty attitudes and behaviors across fields. It should also explore how faculty members holding various minoritized social identities—including various types of disability—think about and respond to the learning needs of students with disabilities.

Findings

Key findings from the focus groups are divided into three sections below: (a) the impact of a formal accommodations process, (b) individual approaches to providing support, and (c) perceptions of the STEM climate towards students with disabilities.

Impact of a Formal Process

While multiple faculty members perceived disability accommodations to be a formalized process, this was particularly evident for senior members who reflected on their experiences over time. As opposed to working directly with faculty to address concerns, many recent students went through the institutional disability services office for accommodations. The functions provided by the office included formal documentation, overviews of accommodations, notetakers, and standardized testing facilities to provide fewer distractions and additional time. In many ways, faculty perceived benefits associated with having a formal process. A centralized office created clear procedures to follow and provided resources that did not require additional faculty time or energy. A sentiment echoed by many participants, one individual elaborated on the benefit of the accommodations system:

Even though the letter that you get [describing the accommodations for a student with a disability] isn’t helpful in terms of exactly what the issue is that they’re having, it is decently prescriptive as to what you should do. It’s not vague, like “the student has a disability. You should talk with them to see what they might want.” It’s very much, “they need twice as much time to take a test in a distraction-free setting.” That’s explicit. I can do that.

However, participants also suggested numerous limitations of the formal system of accommodations. In some cases, accommodation letters arrived weeks into the term, and created situations in which faculty and students had to work retroactively to address a situation. Some types of accommodations available to students were irrelevant or difficult to implement, particularly for courses reliant on specific software programs, learning environments, or pedagogical designs (e.g., team-based learning). Additionally, several participants shared a concern that students might try to misuse the system of accommodations for personal gain. Having an intermediary, here the disabilities services office, as the defining agency on campus took the burden of responsibility from faculty in ways that could be both helpful and challenging. In one example, a faculty member shared a case in which it was unclear if a student with disabilities truly needed an accommodation, eventually deciding that the student’s “been diagnosed through a process and I have no way of refuting that... I just have to go by what’s on the accommodation letter.” Overall, deferring to the disability services office provided a form of standardization across individuals but also limited instructor agency in structuring supports.

As a result, the formal process was sometimes viewed as a barrier for faculty seeking to directly connect with students, instead creating a one-directional process of receiving information with minimal follow-up. The disabilities services office was primarily seen as having an administrative function rather than serving as a space to dialogue about how to best serve students or to navigate challenges of providing certain accommodations. In one example, a participant noted, “I want to help but, for example, with [the disability services office], they don’t give you more information. It’s just … send the exam here. That’s all I can do without interacting with them.” There were cases where the disability services office responded to faculty concerns and provided feedback on specific plans for accommodations, but these were often
seen as the exception. The uneven nature of responses made it difficult to anticipate what types of support were available. A positive past interaction was no guarantee of future support, a challenge exacerbated by a universal perception of the disability services office as understaffed on campus.

The lack of a relationship with the disability services office connected to a broader faculty experience of supporting students with disabilities with few resources. Participants voiced that they did not receive any formal preparation to support students with disabilities at any point during their academic training. The lone exceptions were those faculty coming from elementary and secondary teaching backgrounds, in which facilitating individualized education plans (IEPs) provided exposure to several key ideas. In higher education, supporting students with disabilities did not come up until one was a lead instructor, often late in a graduate program if at all. Without this background, faculty relied on trial and error and on-the-job learning. Another complication was participants’ sense of an increasing numbers of students with disabilities within higher education. As one participant shared, “the sheer numbers of students now that are getting accommodations is exploding. When I started here, I had three to four kids in my class with accommodations. I now have 25 to 30.” These numbers create new demands on the educational system and on faculty without prior preparation.

**Individual Approaches**

Although participants had little guidance around how to support students, they found effective ways to do so. Strategies of support fell into four categories: (1) referrals to campus resources, (2) use of empathy and personal attention, (3) development of relationships, and (4) adaptations to course structures. Participants largely saw their ability to use these approaches as dependent on their other instructional commitments, including time and class size. As such, it was important for students to self-advocate and proactively communicate.

Participants viewed referrals to campus services as a particularly effective way of supporting students with disabilities. Most frequently, participants connected students with the disabilities services office to obtain formal accommodations. Beyond this resource, other entities included the health center and the counseling center. One participant described an example of using the latter:

I certainly walk two or three people to the counseling services every semester…I think many just assume that it will be easy, that this is what they’re good at, and it should be easy. I counsel a lot of people that, no, the right major should be challenging without being overwhelming, and that it’s okay to be frustrated.

More broadly, participants also described learning resources as a form of referral as well. For example, undergraduate teaching assistants offered support within academic disciplines. Others made referrals to campus tutoring services.

While not all participants were able to do so, faculty members that provided individual support to students with disabilities often drew upon their own past experiences. One participant shared, “I had a student that I was sure was dyslexic and for me it was easy to point out or to see because I’m dyslexic myself.” Multiple individuals framed their understanding of disability through family members and their use of accommodations. For others, individual investment was based on a personal commitment and empathy. One participant shared an example of supporting an individual student to seek out accommodation:

I have one student, it took me two years to get him to disability services. When I finally got that, his mother basically said, “There is nothing wrong with his brain.” That was her attitude. She still has that attitude. The dad is more willing to work with it. It turns out his processing speed is very slow. He understands, he solves problems correctly, he just does it very slowly.

Large class sizes made this sort of personal attention more difficult. However, when possible, the result was usually a more rewarding relationship with students.

Multiple participants valued students coming to them with specific needs, building relationships that helped to provide better accommodations within the classroom. Examples of these collaborations included a student with a visual impairment explaining to a faculty member how to describe images in detail, one with anxiety sharing that she needed to have a panic attack prior to being able to complete exams, and one with colorblindness asking for alternate colors instead of red and green content on PowerPoint slides. Although faculty were receptive to these modifications, students with disabilities needed to proactively express their needs. This was particularly crucial with the rapid pace of the academic term, in which students that fell behind were often unable to catch up. One participant noted that, “If [students] talk to me, I can do something. If they show up at the end of the semester and say, ‘Oh, by the way,’ at that point, it’s too late.” In this regard, the highly sequenced
The challenges are amplified when students arrive on campus with varying degrees of secondary preparation and mismatched expectations of academic programs, creating tension between the perceptions of STEM fields and their realities.

The difficulty of STEM climates was amplified by the fact that the sample site was a large public research institution. A class size of 100 was considered small for many classes, and routinely went up to as large as 500. One participant expressed the barriers of the institution, confiding that “if I could be honest [with students with disabilities], I’d say, ‘Go to a smaller college where there are smaller classrooms.’ I don’t think I could say that, but that’s what I’d be thinking.” Even minor accommodations created time restraints, such as trying to reschedule or create new tests when someone missed an exam date. One participant shared an example, stating:

Those are really problematic when we run a lab with 380 students because you have a student who says, “Due to my disability, I wasn’t able to come to class today.” You’re not supposed to say anything and then, all of a sudden, it’s five, six weeks in and they’ve missed four labs. How do you help that student?

One participant described the struggle to navigate across these limitations, sharing that “I sometimes think, if I wind up taking a lot of time for whatever reason for one student, then I have less time for all the others.” The tenure system also prioritized other aspects of faculty performance for many participants, rewarding research productivity over teaching. As one participant noted, “I would love to be a better teacher. I would love to have time to read pedagogy, but that’s not happening.” Growth in the technical craft of teaching required individual investment beyond the daily structures and demands of academic life.

At times, participants voiced ways in which they struggled with the degree of accommodations to make and how those might impact overall rigor within a course or students’ ability to succeed post-graduation. One manifestation of this concern was the idea that accommodations within higher education may prevent students from learning the skills necessary to be successful in their careers. A participant voiced this as part of their personal approach, in which “I’m kind of cut and dry and I don’t know how to pull your boots up, you’re just going to have to work hard. You may have to work harder than somebody else.” This was directly tied to success in the future, where “if you can’t get up, you’re not going to have a job.” In these views, accommodations did not provide the right type of support to the students because they might...
not prepare them for the career ahead. One participant noted that “our job is to produce people that will practice in the profession...This includes not only knowing some equations and thermodynamics and so forth, but it’s showing up on time, getting your work in and things of this sort.” The desire to appropriately prepare students for the environments they would encounter post-graduation was amplified by the nature of STEM fields themselves, in which individual limitations could result in widespread impacts to the general health and wellbeing of society. Here again, the unique nature of STEM fields likely plays a role: since STEM fields are almost universally high paradigm consensus, there is often a core knowledge that students must acquire to be successful not just in a particular course but in those that follow. In contrast, in low paradigm consensus fields, it may be possible to avoid some content entirely—for example, specializing in one area of history while not pursuing others.

**Discussion**

Our findings highlight the requisite complexity of supporting students with disabilities in postsecondary STEM learning environments. Faculty members must work to balance a formal accommodations process that at times seems ill-suited both to student needs and to the structure of learning experiences in their particular field. They do so while balancing the need to provide individual support to students with disabilities and very real obligations including large class sizes, research agendas, and service commitments. Participants also recognized that disability may have unique resonance within postsecondary STEM learning environments where disciplinary norms structure classroom and laboratory experiences in very specific ways. Each of these findings contributes to and extends existing dialogue within the growing literature base on the postsecondary experiences of students with disabilities.

The empirical literature on the campus climate for students with disabilities has previously suggested that students with disabilities frequently feel unwelcome in postsecondary learning environments (e.g., Stodden et al., 2011; Vogel et al., 2008). The work supporting this claim has focused primarily on students’ reports of postsecondary learning environments, and our work highlights congruity between student and faculty perceptions. Given the importance of faculty members to the experience of postsecondary students with minoritized identities (Hurtado, Álvarez-Guillermo-Wann, Cuellar & Arellano, 2012), this commonality may be a beneficial place from which to work toward a more supportive campus climate for students with disabilities. Further, while our findings confirm the largely good intentions of STEM faculty members, they also suggest a widespread lack of training and experience regarding how best to support students with disabilities. Prior research has indicated that helping students to develop positive self-concept (e.g., Chiba & Low, 2007; Garrison-Wade, 2012) and to secure accommodations would be effective ways of addressing the support needs of students with disabilities in postsecondary STEM learning environments (e.g., Baker et al., 2012; Kranke et al., 2013; Marshak et al., 2010). Our findings reveal that more effective support for STEM faculty in working with students with disabilities would help to realize these positive outcomes; doing so would likely contribute to student perceptions of faculty support, a key measure in studies of several desirable outcomes (e.g., Barnard-Brak et al., 2012; Burgstahler & Moore, 2009).

While our findings did generally confirm the good intentions of STEM faculty, participants also had a wide range of views and opinions in describing their interactions with students with disabilities. Many of them genuinely seem to have the students’ best interests at heart, and yet their understanding and awareness of disability often influenced the way this concern manifested itself. That finding challenges prior findings that indicate that STEM faculty held disproportionately negative perceptions of students with disabilities when compared to faculty as a whole (e.g., Brockleman, 2011; Lombardi et al., 2011). For example, some of our participants described walking students to counseling services due to their understanding of what was needed. This sort of individualized helping behavior is a key mechanism for support. Furthermore, other participants were concerned that helping students too much could in some way hamper their learning of the behaviors needed for future job success. That inconsistency echoes prior findings that document wide variability in faculty knowledge regarding the needs of students with disabilities and how best to support them (e.g., Bush et al., 2011; Cawthon & Cole, 2010; Prevatt et al., 2005).

While participants differed markedly in their opinions about how best to support students, they all suggested major systemic issues that could be addressed more centrally within the institution where we collected data. Many participants found the accommodations process to be problematic, illustrating that the STEM field matches the more general literature on student transitions (e.g., Collins & Mowbray, 2008; Denhart, 2008; Lightner et al., 2012; Marshak et al., 2010). There was widespread agreement that faculty are not trained or prepared well for understanding disability or how to provide appropriate ac-
Commodations. Although not entirely surprising, this finding does mean that evidence-based interventions designed to help faculty members learn how to support students with disabilities have not fully made their way into practice (e.g., Cook et al., 2006; Junco & Salter, 2004; Rohland et al., 2003).

Perhaps even more tellingly, participants described navigating not only their own confusion over supporting students with disabilities, but also the unease of those same students. According to participants, they frequently encountered students with disabilities who feared that others would perceive them as receiving special treatment, were unable to access timely and effective accommodations, and struggled to conceptualize their present support needs in the context of perceived expectations in rigorous STEM careers. These findings echo prior literature on student experience (Lyman et al., 2016; Marshak et al., 2010). The similar concerns may be a place from which to advance the conversation between faculty and students on these topics, and yet they can also serve as sources of tension and apprehension. That work is particularly needed given the complex relationship between disability and STEM education previously documented (e.g., Bittinger et al., 2015; Cardoso et al., 2013; Lee, 2014; Wei et al., 2013).

Conclusions and Implications

Our findings confirm, extend, or complicate prior work on the experiences of students with disabilities generally and in STEM fields specifically. Faculty participants in a series of focus groups described the often-problematic influence of formal accommodation structures on the experiences of students with disabilities. They also espoused a wide range of opinions regarding how best to support students with disabilities in STEM as well as the likelihood of their success in postsecondary STEM learning environments. Our findings connect with prior literature that suggests that these attitudes contribute to faculty behaviors, which are malleable through evidence-based interventions (e.g., Cook et al., 2006; Junco & Salter, 2004; Rohland et al, 2003). Finally, our findings suggest that STEM faculty members, like students with disabilities, understand that postsecondary learning environments can be unwelcoming and invite support in addressing the factors creating this problem.

Implications for Practice

The views and opinions shared by STEM faculty lead to several considerations for faculty development. Two implications for practice emerged from the participants themselves. The first focused on strengthening relationships with disabilities services administrators to provide ongoing support and resources. Rather than receiving a letter about accommodations without follow up, faculty expressed a desire to consult with disability services staff around decision making. Moreover, as STEM learning environments differ appreciably from other postsecondary learning environments, having in-depth knowledge of STEM fields is particularly important in navigating unique challenges related to content, classroom structures, and technology. Faculty suggested developing specialized STEM liaisons to consult regarding disability accommodations within their disciplines. However, these partnerships would require a greater commitment to support students with disabilities at the institutional level, as disability services offices are often understaffed and under-resourced. Our sample site provided an example of limited resources, as an office with fewer than 20 individuals was responsible for overseeing accommodations and support for a student population of almost 30,000.

The second recommendation focused on the need for more training for STEM faculty regarding how to support students with disabilities within their disciplines. Since no participants reported receiving this training as part of their graduate programs, STEM faculty often were forced to learn about these accommodations during their career in informal or unstructured ways. These types of learning are more likely to result in inappropriate approaches or simply a lack of awareness of the options available (Kimball, Vaccaro, & Vargas, 2016). While trainings were offered, they often required faculty to invest time and energy outside of their daily responsibilities and were not rewarded within institutional measures of productivity. Instead, a more effective support structure would integrate trainings into existing requirements of faculty life, such as having guest speakers at faculty meetings. Additionally, as graduate education provides an important role in socializing students to the norms of academia (Weidman & Stein, 2003), working to incorporate such education into early teaching experiences may provide a foundation for future pedagogy. For example, graduate teaching assistants could be required to attend workshops on supporting students with disabilities, adapting course content, and providing accommodations. Creating multiple opportunities for trainings across levels would create an internal infrastructure in which academic units could better develop internal capacity to support students with disabilities beyond a sole reliance on disability services providers.

An extension of this recommendation for better training generally is to provide training in UDL
principles and design specifically. While some faculty were already adapting courses in ways that were likely to benefit a wide range of students (though not using the UDL label), other faculty were fairly convinced that their discipline’s courses were unlikely to be able to be modified in appropriate ways. Both groups could benefit from formal training in UDL principles and design. Those who are already de facto doing some form of this would benefit from finding support for their individual efforts and learning how to improve more formally. Those who do not understand how courses can be made more universally accessible would benefit from a basic understanding of the ways this can be achieved and the benefits that accrue from use. This is a way to potentially overcome resistance to such changes, or at least to move away from potentially problematic tacit pedagogical assumptions (e.g., Bongey et al., 2010; Junco & Saltzer, 2004; Spooner et al., 2007).

Moreover, specific support measures can be used to help support students. Many disciplinary STEM initiatives have successfully sought to change the climate and culture in specific fields for students of color and/or women. For example, the BRAID (Building Recruiting and Inclusion for Diversity) initiative focuses on the inclusion of women and underrepresented minority students in computer science. There could be similar effort across STEM disciplines to provide support for students with disabilities. As NSF explicitly includes this group as a focus in its grant funding, there may be viable funding mechanisms to support such efforts. These organizations could also include advisory positions for students to provide input into their STEM learning environments. These types of opportunities would not only be beneficial to providing faculty with resources for how to provide accommodations, but would provide students with disabilities with an opportunity for self-advocacy beneficial to their larger sense of belonging on campus (Vaccaro, Daly-Cano, & Newman, 2015).

Across these implications, there is clear evidence that education at the individual level needs to be supported at the institutional level. The academic climate, particularly for research intensive institutions, prioritizes peer-reviewed publications as the benchmark of success for job rewards, including tenure (Slaughter & Rhoads, 2004; Weber, 2011). This system provides little incentive for faculty to focus on their teaching, a challenge amplified students with disabilities represent a heterogeneous group where needs may vary (Kimball et al., 2015). The development of clear training, communications, and rewards structures may enhance the ways that STEM faculty develop to provide support to students with disabilities. These strategies would also support the development of modifications within specific STEM learning environments in ways that provided support for both students and faculty, aligning with key goals to increase diversity across STEM fields (NSF, 2017).

Implications for Further Research

While changes in practice are likely to be most directly beneficial to students, additional research is also needed given the relatively small body of literature related to STEM faculty and disability. Exploring similar questions at different types of institutions would be useful, as one may assume that these issues play out differently at smaller colleges than at large research institutions. One faculty member even referred to this, assuming that students with disabilities should “Go to a smaller college where there are smaller classrooms.” As yet, however, we lack even the empirical literature to determine whether this assumption is valid. Students with disabilities disproportionately attend community colleges (NCES, 2017), which tend to be smaller than research universities but are also notoriously under-resourced. In that regard, they mirror the comparative resource poverty of many smaller, less selective institutions. Small, non-selective institutions other than community colleges present even more questions that are currently not address in the literature regarding STEM education. As such, a useful study might ask about the intersection between disability, institutional type, and STEM outcomes.

In order for researchers to approach the role of faculty in the experiences of students with disabilities in STEM, common models or frameworks would be useful. Existing models such as the Multi-Contextual Model for Diverse Learning Environments (DLE; Hurtado et al., 2012) acknowledge the role of faculty in the student experience broadly. However, there are unique aspects to students with disabilities as participants in a diverse learning community and to STEM fields that go unacknowledged in the DLE (Kimball et al., 2015). The important connection between faculty and the disability services offices is also integral to this learning, as participants in this study made clear. A model that includes these specific pieces, likely bridging curricular and co-curricular aspects of a campus, could help the field to systematically develop knowledge that would be useful to improving the system on behalf of students with disabilities.
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Promoting Inclusive Teaching Among College Faculty: A Framework for Disability Service Providers (Practice Brief)

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Abstract

As increasing numbers of students with disabilities enter higher education, the need for college faculty to adopt inclusive teaching practices intensifies. Professional development (PD) opportunities involving inclusive teaching strategies are a useful way to help instructors develop these skills; unfortunately, many colleges and universities do not offer such trainings due to lack of resources or limited faculty time. This practice brief presents a framework for disability service providers (DSPs) to utilize and guide instructors to create accessible class materials and assessments. Following a “plan, deliver, assess” structure, the framework includes multiple tools, including self-assessments, check lists, and work sheets, that instructors can use following PD activities to continue to make their teaching more accessible.

Keywords: Inclusive teaching, college faculty, professional development, universal design for instruction, accessibility

Students with diverse abilities and learning styles including those with disabilities comprise a growing population on college and university campuses. Encompassing approximately 11% of postsecondary education enrollment, these students may experience a range of impairments, including cognitive, emotional/psychological, physical, or developmental. While their enrollment rate continues to increase, as a group, their retention and graduation rates lag behind their peers without disabilities (Lombardi & Lalor, 2016). For example, 41% of college students with disabilities complete their degrees as compared to 59% of students without disabilities (Newman et al., 2011; U.S. Department of Education, 2017). This disparity highlights problems for institutions of higher education seeking to improve retention and graduation rates (Dukes, Madaus, Faggella-Luby, Lombardi, & Gelbar, 2017). Further, failure to obtain a college degree is associated with higher unemployment rates and lower hourly wages as well as less flexible work hours (Park, Roberts, & Delise, 2017).

Students with disabilities have identified multiple barriers to achievement, which include negative faculty attitudes and/or a lack of understanding of disabilities, accommodation needs, and stigma (Dowrick, Anderson, Heyer, & Acosta, 2005). Not only are these factors associated with decreased graduation rates and lower self-esteem, but also with a reduced likelihood of using accommodations and academic resources (Lombardi & Lalor, 2016).

Faculty members can serve as key players in ensuring accessible education for students with disabilities by building supportive courses that foster student engagement (Dowrick, et al., 2005). However, many college instructors feel uninformed and underprepared to provide appropriate supports such as assistive technology and course materials in varied formats (Raue & Lewis, 2011). Further, instructors may not even be aware of the growing number of students with disabilities in their classes.

Targeted efforts to increase faculty knowledge of disability and methods to ensure their classes are accessible may better equip instructors to serve this population. Disability-related knowledge, including disability law and characteristics of different types of disabilities, can help faculty to understand students’ experiences, as well as faculty responsibilities for accommodation. While sharing disability-re-

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lated information with faculty may benefit students with disabilities, these trainings unfortunately happen infrequently on college campuses (Lombardi & Lalor, 2017). Most universities do not mandate or offer faculty professional development opportunities about ways to work with students with disabilities. For example, in a survey of 1600 institutions of higher education conducted by the National Center for Education Statistics, only 46% provided faculty training involving accessibility and inclusive teaching practices (Park et al., 2017). Instructors are often challenged to independently navigate their legal obligations, as well as explore the most effective teaching practices for students with disabilities. Alternatively, faculty members who attend disability-related trainings indicate feeling more familiar with the needs of these students and better able to provide appropriate accommodations (Lombardi & Lalor, 2016). Despite these benefits, institutions cite lack of resources and limited instructor time as reasons these trainings are infrequent (Raue & Lewis, 2011). As such, there is a need for effective professional development tools that can introduce college faculty to principles that make courses accessible to all learners.

Universal Design and Inclusive Instruction

The principle of universal design which originated in architecture involves constructing environments that can be accessed, experienced, and understood by the greatest number of individuals (Connell et al., 1997). When adapted to fit instruction, universal design incorporates adaptability, flexibility, and preemptive planning to ensure all aspects of a class, including planning and instructional delivery, as well as assignments and assessments, are inclusive and responsive to students’ needs (Park et al., 2017). Universal design for instruction (UDI; Scott, McGuire, & Shaw, 2001a) and universal design for learning (UDL; Rose, Harbour, Johnston, Daley, & Abarbanell, 2006) are frameworks to guide faculty to consider inclusivity as they plan and deliver lectures, as well as evaluate students’ learning. Operationalizing these broad theories with concrete, actionable steps to implement principles can provide a scaffold for more accessible and inclusive teaching. This practice brief describes an approach to professional development that disability service providers (DSPs) can use to guide instructors at their institutions to achieve these goals.

A Challenge for Training Faculty to Teach Inclusively

Today’s undergraduate enrollment is more heavily nontraditional, including older and part-time students, racially and ethnically diverse learners, and students with disabilities (National Center for Education Statistics, 2017). Diversity among learners includes diversity of experiences, ways of learning, and challenges to the traditional “sage on the stage” instructional model (King, 1993). It is significant to note a shift over the past several decades to the importance of pedagogy and the scholarship of teaching in postsecondary settings (Boyer, 1990). In fact, many faculty now examine their teaching practices with interest in learning technologies, different teaching modalities, and ways that the learning environment may be enhanced to meet the needs of diverse students (Mellow, Woolis, Klages-Bombich, & Restler, 2015). DSPs, serving as a bridge between students with disabilities and professors, are often in a position to work collaboratively with faculty on inclusive strategies, but limited resources and time may create a challenge for DSPs given their multiple responsibilities. Materials that can be adapted to individual campuses and tailored to faculty needs comprise a valuable tool for use in a variety of training milieus.

Description of Practice

Based upon extensive college teaching experiences as well as federally funded grants, numerous training opportunities via professional institutes, conference presentations, and institutional consulting, the authors have developed and refined several resources that can be adapted to various training settings (e.g., short workshops, extended day professional development seminars). Feedback from conferences and trainings over several years has affirmed the relevance, adaptability, and effectiveness of materials for faculty who have implemented inclusive strategies across a number of disciplinary areas and courses. Specifically, the UDI framework was used as the foundation for actionable steps that faculty can directly employ in their teaching. In the following sections, strategies that are grounded in UDI and facilitate inclusive teaching are described and illustrated. We encourage DSPs to consider these strategies in any institution-wide faculty training effort.

Important Campus Partnerships

Because of time considerations both for faculty and DSPs, campus based disability trainings require long term planning with multiple constituencies to be most effective. DSPs should foster cross-campus collaborations outside of disability services. Partnering with administrators or supportive faculty members can increase visibility of PD opportunities, as well as uncover possible resources for trainings. For instance, administrators or faculty partners may sug-
gest that instructors attend disability-related PD by sending emails or memos about the trainings. Campus partners may be able to create time or space within already existing faculty development events such as department meetings. Another important ally includes staff within a campus-wide Center for Teaching and Learning which might offer ongoing PD opportunities for faculty. A partnership with such a center can infuse disability-related trainings into an already existing faculty support network (Behling & Linder, 2016). In addition, DSPs can also explore other possible campus partners, such as advising or support staff, who can serve as liaisons with faculty. When planning a disability-related training, the following core questions are essential: (a) With regard to administrator or faculty support, who are your allies? (b) How might you collaborate with a Center on Teaching and Learning? (c) Who else could you partner with on your campus (e.g., multicultural centers, tutoring services)?

Inclusive UDI-based Teaching Strategies

DSPs can promote inclusive teaching practices by discussing the basic tenants of universal design for instruction (UDI), “an approach to pedagogy that is responsive to a broad range of diverse learning needs” (Scott, McGuire, & Shaw, 2001b, p. 11). This concept applies to all stages of instruction, including the development of and planning for class lectures and assignments, the delivery of these course components, and ways student learning is assessed. The nine tenets of UDI in Table 1 include examples of their application in practice. In the following sections, we describe several strategies that can be easily adapted by faculty committed to inclusive teaching.

Syllabus design. Faculty can incorporate aspects of UDI when designing the course syllabus which is often a student’s introduction to a course. Clearly stated course objectives and expectations can guide students to necessary additional resources and alert them to effective time management. To maximize inclusivity, all course information such as course title and number, unit value, meeting times and prerequisites, instructor’s name and contact information, office hours, and information about the relevant course management system should be easily located. To augment equitable access, the course description, expected learning outcomes, and course requirements, course and relevant college policies, schedule, and additional learning resources should all be explicit. Exemplifying UDI elements 1, 3, and 4, these components should be presented in a clear and intuitive manner perceivable by a wide variety of learners. Course policies can include a “Community of Learners” statement (see Figure 1) to establish a positive class climate that welcomes all learners and diversity of opinion.

Appendix A includes a syllabus checklist with specific examples of each syllabus section and maps each element onto the UDI principle it addresses. DSPs can discuss and share this checklist with faculty to help them relate this information to their courses.

Course mapping. Listing all course requirements and expectations and connecting them to course objectives can give direction and purpose to students’ learning. Course mapping provides a framework to implement this practice with a template for delineating overall course objectives and individual lesson objectives, linking these to activities, instructional materials, and assessments, and outlining what students can expect to gain from each activity. Beginning with the overall learning objectives of the course, learning objectives of each lesson should be stated along with associated course materials (e.g., readings, websites, videos) and assessments used to track learning including assignments, discussion board posts, or exams. Finally, faculty should link lesson objectives, course materials, and assessments with the overall course learning objectives. This course mapping practice is facilitated by using a four-column chart, listing lesson/module learning objectives, activities, instructional materials, course technologies and notes, assessments and measurement tools, and overall course objectives (see Appendices B and C for a completed course mapping worksheet for an undergraduate course in education, as well as a blank template).

Inclusive lecture strategies. Classroom lectures provide another opportunity for inclusive teaching. For example, DSPs can remind faculty when presenting lectures to begin each class with a review of material covered in the previous class as well as the agenda for the current class, repeat any question posed by a student, and summarize and connect key points to broader course objectives. In addition, course content can be presented in a variety of formats, including lecture, text, graphics, and hands-on activities. Course material should also be available in diverse formats, such as readings as mp3 files, podcasts, and captioned videos. Opportunities for students to participate can also be varied by creating times to answer verbally in class, complete written assignments, or by using an online discussion post format. Instructors can affect a positive and accessible class climate by previewing the physical classroom in advance to anticipate physical barriers, and by inviting students with disabilities to discuss their needs through both a spoken and written statement in the syllabus. Tips, such as these, that
DSPs can share with faculty can be found in the Teaching Inclusivity Tip Sheet in Appendix D.

**Inclusive assessments.** Assessment is an integral element of the learning process by which students demonstrate or provide evidence of their learning. Guaranteeing equal access for all learners is relevant not only when teaching new information, but also when assessing what students have learned. One way to increase inclusivity is to provide multiple means of assessment. For example, a student’s learning may be evaluated through an in-class exam, out-of-class written essay, a multi-person project, or through an oral discussion with a professor. Providing multiple options allows students to capitalize on their cognitive strengths and minimize areas of impairment. Importantly, regardless of the type of assessment, each student should demonstrate mastery of all course content and material.

If a faculty member determines that an in-class exam is the sole method to assess a student’s learning, accommodations can be critical and necessary to maximize accessibility. Five acceptable ways to accommodate in-class exams include altering the setting, timing, scheduling, presentation, or allowed responses (IRIS Center, 2016). Changing the exam setting by allowing a student to take the test in a small group or individually can alleviate concentration or anxiety issues. Allowing extended test time or frequent breaks can assist students who experience processing issues, take longer to read or communicate, or experience any chronic health issue that requires bathroom or other breaks. Scheduling changes can encompass allowing testing over several days or moving the day or time of the exam. These adjustments can accommodate students whose disability requires tasks to be divided into smaller sections or who experience exacerbated symptoms during certain times of day. Faculty members can alter the presentation or response format of an exam through the use of assistive devices, such as a screen reader, or computer to read or type responses, an accommodation that benefits students who regularly use assistive technology. Other reasonable accommodations include a scribe or recorder to respond to test items.

Questions about maintaining academic expectations and standards can be clarified by distinguishing academic accommodations from modifications. Faculty should be reassured that accommodations do not alter academic rigor, but instead, provide access to the learning outcomes set for all students. Examples of differences between accommodations and modifications are presented in Table 2.

**Self-assessment.** At the conclusion of UDI PD, instructional scenarios are effective in guiding faculty to internalize information. Mini-cases based upon a classroom of diverse learners in Appendix E are a tool that faculty can discuss to determine which UDI principle(s) is illustrated in each situation. After completing this activity independently, instructors can share their ideas regarding inclusive instructional practices and which were utilized. In many settings, this exercise elicits additional examples already practiced by faculty that reinforce the fact that, in reality, many are already teaching with inclusive strategies, an outcome of training that is reinforcing. Lombardi, Vukovic, and Sala-Bars (2015) describe another resource, the Inclusive Teaching Strategies Inventory (ITSI), a survey intended for faculty. Use of the ITSI as a self-assessment tool may help faculty review inclusive teaching concepts, and identify areas on which they need improvement.

**Implications and Portability**

These examples from UDI based professional development training incorporate inclusivity into all stages of instruction, including planning, delivering inclusive lectures and class activities, and designing accessible assessments. DSPs are encouraged to use materials presented in this manuscript with the likelihood that numerous examples will emerge during trainings from creative faculty who are already teaching in an inclusive manner. Faculty also can be encouraged to follow a planning, delivery, assessment instructional cycle to continuously assess and reflect upon their implementation of inclusive teaching methods.

**References**


About the Authors

Allison Lombardi received her B.A. degree in English Literature and her M.A. degree in Education from the University of California, Berkeley, and Ph.D. from the University of Oregon. She is currently an Associate Professor in the Department of Educational Psychology at the University of Connecticut. Her research interests include college and career readiness for students with disabilities and promoting inclusive instruction among university faculty. She can be reached by email at: allison.lombardi@uconn.edu.

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and Disability. She is Professor Emerita, Department of Educational Psychology, and Senior Research Scholar at the University of Connecticut’s Center on Postsecondary Education and Disability. Her professional interests include universal design for instruction (UDI); faculty training in inclusive teaching strategies; and postsecondary disability program development, administration, and outcomes. She can be reached at joan.mcguire@uconn.edu.

Emily Tarconish received her B.A. degree in English and Women’s Studies and her M.S. in Rehabilitation Counseling from the Pennsylvania State University. She is beginning her 3rd year in the Educational Psychology Ph.D. program at the University of Connecticut. Her experience includes working as a vocational rehabilitation counselor for the Pennsylvania Office of Vocational Rehabilitation, and director of Student Accessibility Services at Clark University. Her research interests include accommodations for college students with traumatic brain injuries and in postsecondary education and employment, peer supports, and universal design and accessibility. She can be reached by email at emily.tarconish@uconn.edu.
Table 1

**The Nine Principles of Universal Design of Instruction**

<table>
<thead>
<tr>
<th>Principle</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Equitable use</td>
<td>Instruction is designed to be equally accessible to all learners, providing identical or equivalent means to all students.</td>
<td>A multiple-choice exam, as well as a take-home essay exam, assesses the same information.</td>
</tr>
<tr>
<td>2. Flexibility in use</td>
<td>Instruction in designed to include options and flexibility to accommodate learners with diverse abilities.</td>
<td>Text book reading assignments are also provided in digital versions.</td>
</tr>
<tr>
<td>3. Simple and intuitive</td>
<td>Instruction is clear and predictable and eliminates unnecessary complexity.</td>
<td>Large assignments are broken into smaller steps and deadlines.</td>
</tr>
<tr>
<td>4. Perceptible information</td>
<td>Instruction effectively communicates necessary information to students, accommodating for environmental conditions or sensory abilities.</td>
<td>Videos shown in class contain closed-captions.</td>
</tr>
<tr>
<td>5. Tolerance for error</td>
<td>Instruction allows for a variety in students’ learning pace and skill acquisition.</td>
<td>Instructors give students multiple opportunities to complete assignments (assign 6 response papers, only require 5 to be handed in).</td>
</tr>
<tr>
<td>6. Low physical effort</td>
<td>Instruction minimizes physical effort that is nonessential to learning outcomes.</td>
<td>Vary instruction between lecture, group and individual activities to minimize learner fatigue.</td>
</tr>
<tr>
<td>7. Size and space for approach and use</td>
<td>Instruction and learning activities can accommodate students of various sizes and with different mobility and communication needs.</td>
<td>Consider the classroom: can wheelchairs fit comfortably within desks? Is the lighting appropriate?</td>
</tr>
<tr>
<td>8. A community of learners</td>
<td>The learning environment fosters communication among students and students and faculty and is perceptive of different levels of prior knowledge.</td>
<td>Faculty offer a range of ways to communicate with students, including via email, live-chat hours, or office hours to discuss student needs.</td>
</tr>
<tr>
<td>9. Instructional climate</td>
<td>Instruction welcomes and is accessible to all types of learners and maintains rigorous academic standards for all.</td>
<td>Instructor presents in syllabus and in class statement inviting students to share their learning needs.</td>
</tr>
</tbody>
</table>

*Note. From Principles of Universal Design for Instruction* (Scott, McGuire, & Shaw, 2001). Adapted with permission.
Table 2

Examples of Accommodations versus Modifications in a Higher Education Classroom

<table>
<thead>
<tr>
<th>Accommodations</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do not</strong> change the expectations for learning.</td>
<td>All students must earn class participation points, although can do so through in-class participation or written response.</td>
</tr>
<tr>
<td><strong>Do not</strong> reduce the requirements of the task.</td>
<td>All students must complete 5 writing assignments, although they will have 6 opportunities to accommodate differences in pace.</td>
</tr>
<tr>
<td><strong>Do not</strong> change the content standard or rigor.</td>
<td>All students must demonstrate knowledge of key concepts, despite using different assessments.</td>
</tr>
<tr>
<td>Change the access by removing barriers.</td>
<td>Student who struggles with reading textbook will have access to audiobook.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do</strong> change the expectations for learning.</td>
</tr>
<tr>
<td><strong>Do</strong> reduce the requirements of the task</td>
</tr>
</tbody>
</table>

*Note.* IRIS Center (2016).

---

**A COMMUNITY OF LEARNERS**

A goal for this course is that we shall all contribute to a climate that promotes a Community of Learners. This includes participating in an instructional environment that promotes respect, interaction, and communication. Respectful language and behavior are expected of all students during classes and class discussions.

Please Note: In a community of learners, diversity of opinion is respected. Class discussions, group exercises, etc., should reflect respect for others’ opinions. If you anticipate an emergency during the class meeting that will require the activation of your cell phone and/or device please speak with the instructor before class. Otherwise, please respect the instructional environment that is interrupted if cell phones or devices are activated.

*Figure 1.* Community of Learners statement to include in a class syllabus. Adapted from EPSY 336, “Individual Pupil Assessment,” (McGuire, 2007).
Appendix A

Inclusive Instruction…by Design!
Incorporating UDI in a Syllabus
(McGuire & Lombardi, 2016)

This worksheet can serve as a guide for creating and revising a syllabus. You are not limited to the ideas expressed here and are encouraged to use them to expand your thinking about inclusive instruction. This tool can serve as an action plan to document your efforts to develop a universally designed syllabus.

<table>
<thead>
<tr>
<th>Syllabus Component</th>
<th>UDI Principle(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course and Instructor Information</strong></td>
<td>3</td>
</tr>
<tr>
<td>- semester; year; course title; number; unit value;</td>
<td></td>
</tr>
<tr>
<td>meeting times and location; prerequisites;</td>
<td></td>
</tr>
<tr>
<td>instructor’s name and contact information; office</td>
<td></td>
</tr>
<tr>
<td>hours; course management system information (e.g.,</td>
<td></td>
</tr>
<tr>
<td>URL, online “chat” times, etc.)</td>
<td></td>
</tr>
<tr>
<td><strong>Course Description and Outcomes</strong></td>
<td>1</td>
</tr>
<tr>
<td>- Official catalog description and your description</td>
<td></td>
</tr>
<tr>
<td>- Course/learning objectives; relevant college and/or</td>
<td></td>
</tr>
<tr>
<td>professional certification standards</td>
<td></td>
</tr>
<tr>
<td>- Learning outcomes</td>
<td></td>
</tr>
<tr>
<td><strong>Course Policies</strong></td>
<td>1,3,4</td>
</tr>
<tr>
<td>- Community of Learners</td>
<td></td>
</tr>
<tr>
<td>- Late and missing assignments</td>
<td></td>
</tr>
<tr>
<td>- Exams and quizzes; make-ups</td>
<td></td>
</tr>
<tr>
<td>- Extra credit</td>
<td></td>
</tr>
<tr>
<td>- Time extensions for assignments</td>
<td></td>
</tr>
<tr>
<td><strong>Course Requirements</strong></td>
<td>1,3</td>
</tr>
<tr>
<td>- Format and preparation</td>
<td></td>
</tr>
<tr>
<td>- Attendance; absences; class participation</td>
<td></td>
</tr>
<tr>
<td>- Readings; assignments; presentations</td>
<td></td>
</tr>
<tr>
<td>- Acceptable sources; stylistic requirements in</td>
<td></td>
</tr>
<tr>
<td>written work (e.g., MLA, APA)</td>
<td></td>
</tr>
<tr>
<td>- Course materials including required text(s) and</td>
<td></td>
</tr>
<tr>
<td>additional readings</td>
<td></td>
</tr>
<tr>
<td><strong>Course Schedule</strong></td>
<td>1,3</td>
</tr>
<tr>
<td>- Readings/assignments with page numbers</td>
<td></td>
</tr>
<tr>
<td>- Quizzes, exams, projects</td>
<td></td>
</tr>
<tr>
<td>- Due dates for all</td>
<td></td>
</tr>
<tr>
<td><strong>Course Grading</strong></td>
<td>1,3,4,9</td>
</tr>
<tr>
<td>- Number of points/% of total points according to type</td>
<td></td>
</tr>
<tr>
<td>of assessment (e.g., attendance, class participation</td>
<td></td>
</tr>
<tr>
<td>homework, quizzes, exams, projects, papers, etc.)</td>
<td></td>
</tr>
<tr>
<td>- Grading rubric(s); rubrics for class presentations</td>
<td></td>
</tr>
<tr>
<td>- Link to examples of student work for course</td>
<td></td>
</tr>
<tr>
<td>assignments</td>
<td></td>
</tr>
<tr>
<td><strong>College Policies</strong></td>
<td>8,9</td>
</tr>
<tr>
<td>- Academic integrity/Honor Code</td>
<td></td>
</tr>
<tr>
<td>- Accommodations for students with disabilities</td>
<td></td>
</tr>
<tr>
<td>- Inclusivity/Full Participation</td>
<td></td>
</tr>
<tr>
<td>- Religious holidays; inclement weather</td>
<td></td>
</tr>
<tr>
<td>- Grading (e.g., incompletes)</td>
<td></td>
</tr>
<tr>
<td><strong>Additional Resources</strong></td>
<td>4</td>
</tr>
<tr>
<td>- Campus resources</td>
<td></td>
</tr>
<tr>
<td>- Links to online course related materials</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Completed Course Mapping Worksheet

Course Mapping Example
Example of mapping one module onto one or more course objectives

Course objectives:
1. Define the key components of IDEA, Section 504, ADAAA (as related to school settings), and ESEA.
2. Identify and examine the unintended consequences that might arise regarding implementation of these laws.
3. Evaluate challenging scenarios and apply professional and ethical judgments.
4. Apply a legal reasoning framework to select case studies involving students with disabilities to problem solve and develop solutions.

Module 1 - Overview of IDEA and ESEA

<table>
<thead>
<tr>
<th>Module Learning Objectives</th>
<th>Activities, Instructional Materials, Course Technologies, and Notes</th>
<th>Assessment and Measurement</th>
<th>Course Objectives</th>
</tr>
</thead>
</table>
| 1. Define two overarching laws that shape our educational practices in the classroom today: IDEA and ESEA | Yell, Chapter 1: Introduction to the American Legal System  
Yell, Chapter 3: The History of the Law and Children with Disabilities  
Yell, Chapter 4: The Individuals with Disabilities Education Act  
Yell, Chapter 7: The Elementary and Secondary Act | Discussion Board topics:  
1. What would you change about IDEA and why?  
2. What would you change about ESEA and why? | 1,2 |
| 2. Identify & describe seminal court cases that influenced the legal language of IDEA and ESEA | Yell, Chapter 3: The History of the Law and Children with Disabilities | Discussion Board topic:  
1. What are the 2 seminal court cases that occurred prior to the passage of IDEA?  
2. How are the outcomes of these cases still prevalent in the law today? | 1,2 |
| 3. Identify the strengths and weaknesses of a component of ESEA, large-scale assessment, particularly for students with disabilities. | Yell, Chapter 7: The Elementary and Secondary Act  
OSEP Alternate Assessment Toolbox  
IRIS Module “Accountability and High-Stakes Testing” | IRIS Journal:  
1. What are three “take aways” from the IRIS module on accountability?  
Accountability in Practice paper:  
1. Apply the OSEP decision-making framework to a student case study | 1,3 |
4. Define the Issue, Rule, Analysis/Application, Conclusion legal framework (IRAC)

5. Analyze an accountability case study, applying the IRAC framework.

Intro to IRAC framework (ppt slides) *Weishaar, Chapter 3: Paul*

Complete IRAC activity on Paul

Note. (Lombardi, McGuire, & Garrett, 2016, June).

**Appendix C**

Completed Course Mapping Worksheet

List Course Objectives:

Map one module for your course.

**Module 1**

<table>
<thead>
<tr>
<th>Module Learning Objectives</th>
<th>Activities, Instructional Materials, Course Technologies, and Notes</th>
<th>Assessment and Measurement</th>
<th>Course Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note. (Lombardi, McGuire, & Garrett, 2016, June).
Appendix D

Teaching Inclusively Tip Sheet: Planning and Delivering Instruction and Assessing Learning Outcomes

Allison Lombardi & Joan M. McGuire (2016, February)

1. Planning

A. Syllabus Components

My course syllabus includes:

- **Course and instructor information**
  - Semester and year
  - Course title; number; credits
  - Meeting times and location
  - Prerequisites
  - Instructor’s name, contact information, office hours
  - Course management system information

- **Course description and outcomes**
  - Official catalog description and your description
  - Course/learning objectives; relevant college and/or professional certification standards
  - Learning outcomes

- **Course policies**
  - Community of Learners
  - Late and missing assignments
  - Exams and quizzes; make-ups
  - Extra credit
  - Time extensions for assignments

- **Course requirements**
  - Format and preparation
  - Attendance; absences; class participation
  - Readings; assignments; presentations
  - Acceptable sources; stylistic requirements in written work (e.g., MLA, APA)
  - Course materials including required text(s) and additional readings

- **Course schedule**
  - Readings/assignments with dates and page numbers
  - Quizzes, exams, projects
  - Due dates for all

- **Course grading**
  - Number of points/% of total points according to type of assessment (e.g., attendance, class participation, homework, quizzes, exams, projects, papers, etc.)
  - Grading rubric(s); rubrics for class presentations, papers, etc.
  - Link to examples of student work for course assignments

- **College policies**
  - Academic integrity/Honor Code
  - Accommodations for students with disabilities
  - Inclusivity/Full Participation
  - Religious holidays; inclement weather
  - Grading (e.g., incompletes)

- **Additional Resources**
  - Campus resources
  - Links to online course related materials
  - Supplementary materials
B. **Course Mapping**: Process of delineating course learning outcomes; activities, instructional materials, course technologies, and notes employed; and assessments for measuring student learning

- **Topic/Module/Unit Learning Objectives**: In planning this course, I have determined that
  - Objectives for each topic/module/unit relate to overarching course goals;
  - Activities and materials connect with topic objectives and types of assessment; and
  - Formative and summative assessment methods are used to confirm student knowledge/skills

2. **Course Delivery**

- **Inclusive Lecture Strategies**
  - For any question asked during class, repeat it before answering.
  - Begin each class with a review of previous class content and an outline/agenda of topics to be covered.
  - Summarize key points throughout each class session.
  - Connect key points with broader course objectives during class sessions.

- **Inclusive Classroom**
  - Present course content in multiple formats (e.g., lecture, text, graphics, hands-on activities).
  - Use technology so that course material can be available in a variety of formats (e.g., podcasts, course readings as mp3 files).
  - Create multiple opportunities for engagement (e.g., student response).
  - Use interactive technology to facilitate class communication and participation (e.g., Discussion Board).
  - Survey the classroom space in advance to anticipate any physical barriers.
  - Include a syllabus statement that invites students with disabilities to discuss their needs with me.
  - Make a verbal statement in class inviting students with disabilities to discuss their needs with me.
  - Use a variety of instructional formats, such as small groups and hands-on activities, in addition to lecture.
  - Supplement class sessions and reading assignments with visual aids (e.g., captioned videos, diagrams, interactive simulations).
  - Discuss and model examples of classroom interactions that promote our class as a Learning Community.
  - Identify learning resources that include low-cost/no-cost technology.

3. **Assessment**

- **Inclusive Assessment Strategies**
  - Include both formative and summative assessment activities in class.
  - Provide timely feedback for assignments and other types of assessment to the class as well as each student.
  - Provide grading rubrics for class projects, papers, presentations, etc.
  - Share examples of graded student assignments for student review.
  - Include options for students to complete assignments or exams through ways other than typical verbal or written responses.
  - Incorporate both self- and peer-based assessment as appropriate.

- **Accommodations**
  - Be familiar with different types of assessment accommodations for students with disabilities (e.g., change of test taking location, extended time, change of test administration schedule, change of format, change of response mode).
  - Assure access to information by using presentation accommodations other than standard visual and auditory means. Presentation accommodations change the way that instruction, directions, and information are presented to students (e.g., by using assistive devices such as allowing a
reader, computer assistance, screen-reader).
- Use response accommodations that allow students to complete assignments or exams through ways other than typical verbal or written responses (e.g., type response on computer, use different booklet, circle instead of fill-in).
- Allow setting accommodations such as a change in the environment or in how the environment is structured (e.g., separate testing room, different time of day).
- Permit timing and scheduling accommodations to allow students extra time to complete an activity or test.
- Allow accommodations that do not change the expectations for learning.
- Allow accommodations that do not reduce the requirements for a task (e.g., reduce reading load, number of test items, and/or alter assignments).
- Allow accommodations that do not change the content standard or level of rigor.
- Allow accommodations that remove access barriers.
Appendix E

Faculty Scenarios
(Lombardi & McGuire, 2016)

Scenarios Activity
DIRECTIONS: Below are several scenarios involving diverse student learners in college classrooms. Each scenario illustrates one or more inclusive instructional practices based on Universal Design for Instruction. For each scenario, please indicate whether or not the listed inclusive instructional practices were utilized. Campus resources include student services and virtual resources (e.g., Libraries, Moodle, etc.).

Scenario 1:
In her large lecture class, Professor Finn presents audio versions of speeches that are captioned, as well as visual representations of concepts, to supplement her lecture presentation format. She also has found it effective to post copies of both auditory and visual materials on Blackboard for students to review at their own pace.

Which of the following UDI principles are reflected in the scenario?
Click YES if the scenario depicts the element of inclusive instruction
Click NO if the scenario does not depict the element of inclusive instruction

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Scenario 2:
Professor Smith posts outline notes of his lecture before class for all students to review. He was surprised to see that many students reviewed this information and some printed it out to follow during lecture. For some students, this additional information provided a structure that supported increased engagement and attention to the material.

Which of the following UDI principles are reflected in the scenario?
Click YES if the scenario depicts the element of inclusive instruction
Click NO if the scenario does not depict the element of inclusive instruction

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Scenario 3:
Professor Johnson affirms on the first day of class the importance of respecting diversity of students and perspectives. He demonstrates an understanding that there is a range of student abilities and a diversity of learning styles. He encourages any student who anticipates barriers to learning due to course design or evaluation processes to meet with him. A syllabus statement encourages students with identified disabilities to register with the Disability Services office. In addition, he reminds students about the Office of Multicultural Academic Success and the Teaching and Learning Center.

Which of the following UDI principles are reflected in the scenario?

Click YES if the scenario depicts the element of inclusive instruction
Click NO if the scenario does not depict the element of inclusive instruction

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Scenario 4:
In Professor Rose’s class, students regularly give individual and group presentations either in front of the class or recorded ahead of time. Students may choose a final paper or final exam. Any student concerned about time for completion of the final exam is welcome to sign up for an alternate location with extra time, proctored by a teaching assistant. Professor Rose has found that this significantly reduces his need to work out individual exam arrangements for students with disabilities.

Which of the following UDI principles are reflected in the scenario?

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Scenario 5:
In addition to posting course materials on Blackboard, Professor Moore allows students to submit assignments electronically using the Digital Dropbox feature or via email attachment. Her course includes pop quizzes, a term paper, a multiple choice midterm exam, and a final portfolio project. She holds virtual office hours by using Skype, iChat, and FaceTime to communicate with students.

Which of the following UDI principles are reflected in the scenario?

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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 current edition of The Publication Manual, American Psychological Association. For responses to frequently asked questions about APA style, consult the APA web site at http://apastyle.org/faqs.html

- All components of the manuscript (i.e., cover page, abstract, body, and appendices) should be submitted as ONE complete Word document (.doc or.docx).
- Provide a separate cover letter asking that the manuscript be reviewed for publication consideration and stating that it has not been published or is being reviewed for publication elsewhere.
- Manuscripts should be double-spaced and range in length between 25 and 35 pages including all figures, tables, and references. Exceptions may be made depending upon topic and content but, generally, a manuscript’s total length should not exceed 35 pages.
- Write sentences using active voice.
- Authors should use terminology that emphasizes the individual first and the disability second (see pages 71 - 76 of 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. Please include this in the ONE Word document (manuscript) that is submitted.
- Include an abstract that does not exceed 250 words. Abstracts must be double-spaced and located on page 2 (following the title page). Include three to five keywords below the abstract.
- 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. If Tables and/or Figures are submitted in image format (JPEG, PDF, etc.), an editable format must also be submitted along with a text description of the information depicted in the Table/Figure. This will be provided as alt format in the electronic version of JPED, making Tables/Figures accessible for screen readers.

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- Body of Email: Include a statement that you are submitting a manuscript for consideration for the JPED. Include the title of the manuscript and your full contact information.
- Attach to the email:
  - Your complete manuscript, prepared as directed above.
  - Cover letter as outlined above.

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- 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.
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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. Practice Briefs are not research articles. Manuscripts that involve data analysis beyond the reporting of basic demographic data or evaluative feedback should be submitted as research articles. 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.

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- **Title Page:** Title not to exceed 12 words. Identify each author and his/her campus or agency affiliation. State in your email cover note that the work has not been published elsewhere and that it is not currently under review by another publication.
- **Abstract:** The abstract needs to answer this question: “What is this paper about and why is it important?” The abstract should not exceed 150 words.
- **Summary of Relevant Literature:** Provide a succinct summary of the most relevant literature that provides a clear context for what is already known about your practice/program. If possible, describe similar practices on other campuses. Priority should be given to current literature published within the past 10 years unless an older, seminal source is still the best treatment of a particular topic/finding.
- **Depiction of the Problem:** In addition to a clear statement of the problem being addressed, consider the following questions when stating the purpose of the article: What outcome, trend, or problem might improve if your practice/program works? What gaps or problems or issues might persist or arise if this practice/program did not exist?
- **Participant Demographics and Institutional Partners/Resources:** Maintain the anonymity of the students, colleagues, and campus(es) discussed in the article but provide a clear demographic description of participants (e.g., number of students, disability type, gender, race and/or ethnicity whenever possible, age range if relevant) and the types of offices or agencies that were collaborative partners (if relevant).
- **Description of Practice:** Briefly and clearly describe your innovative practice/program and how it has been implemented to date. Tables and figures are encouraged to provide specific details you are comfortable sharing. They condense information and enhance replication of your practice/program on other campuses.
- **Evaluation of observed outcomes:** Whenever possible, summarize formative or summative data you have collected to evaluate the efficacy of your practice/program. This can be anecdotal, qualitative, and/or quantitative data. Support any claims or conclusions you state (e.g., “Our program greatly enhanced students’ ability to self-advocate during their transition to college”) with objective facts and/or behavioral observations to support these claims.
- **Implications and Portability:** Discuss what you have learned thus far and how you could further develop this practice/program in the future. Be honest about any challenges you may have encountered. This transparency enhances the rigor of your reporting. What would you do differently next time to achieve stronger outcomes? Provide a clear description of how and why disability service providers on other campuses should consider adapting your practice/program. Finally, how could your practice be studied by researchers? Identify possible research questions, hypotheses, or potential outcomes that could be studied if you and/or colleagues could expand the practice/program into a research investigation.
- **References:** Use the current APA guidelines to format and proofread your paper prior to submitting it. This includes the proper use of spelling, punctuation and grammar, appropriate use of headers, correct formatting in listing references, and formatting any tables or figures appropriately.

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Content and Format

In general, the book review should present:

• An overview of the book, providing the book’s stated purpose, the author’s viewpoint, and a general summary of the content.
• An evaluation of the book, elaborating on the author’s objectives and how well those objectives were achieved, the strengths and weaknesses of the book along with the criteria you used for making that assessment, and the organization and presentation of the book. Recommendations should specify to whom you would recommend the book, why, and how you would suggest the book be used, and address its potential contribution to our field.
• Citations within the book review should follow the current edition of the American Psychological Association (APA) style manual.

At the end of the review, please list your name and institutional affiliation.

Submission

The length of a book review can range from 800-1200 words. Please send in an email attachment in MS Word, double-spaced to jped@ahead.org per instructions above in “How to Submit Manuscripts.” After the review is submitted, the Executive Editor or designee will edit the manuscript and follow up with you about the publication process.

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