Rethinking Social Network Assessment for Students with Intellectual Disabilities (ID) in Postsecondary Education

Laura T. Eisenman
Elizabeth Farley-Ripple
Mary Culnane
Brian Freedman
University of Delaware

Abstract

Social networks of persons with intellectual disabilities (ID) have been characterized as smaller and less diverse than those of typical peers. Advocates have focused on strengthening those social networks by expanding circles of social support, protection, and friendship. As young adults with ID experience increasing levels of community integration and move into new postsecondary education environments, the nature and potential functions of their social networks may shift. We describe the development and use of a social network instrument that is intended to capture an expanded view of social networks as structures influencing career opportunities. Using data from participants in our college program for students with ID, we then describe and illustrate how social network analyses can be used to examine individuals' social networks. Finally, we discuss lessons learned from our development process and implications for social network assessment and analysis with persons who have ID in postsecondary education.

Keywords: Social network analysis, intellectual disability, college, employment

The social networks of persons with intellectual disabilities (ID) have often been characterized as smaller and less diverse than those of typical peers. Due to a history of segregation across school, work, and community life domains, individuals with ID tended to have social networks that included relationships with relatively few people, and these were most likely to be family members, service professionals, and others with disabilities (Devlieger & Trach, 1999; Gotto, Calkins, Jackson, Walker, & Beckmann, 2010; Kennedy, Horner, & Newton, 1990; Rosen & Burchard, 1990). These network patterns sometimes persisted many years after moving from institutional to community settings (Forrester-Jones et al., 2006).

Disability advocates have been interested in the social networks of people with ID because of the influential assets that a network represents. From a social capital perspective (Bordieu, 1986; Putnam, 2000) the relationships within a network are resources that serve important social functions; both creating and constraining opportunity and action at individual and group levels. For persons with disabilities especially, social networks can have an empowering function by creating access to information and opportunities that would not otherwise be available to that person. Networks that create opportunities for inclusion and access to supports have the potential to improve the self-determination and quality of life of persons with ID (Eisenman & Celestin, 2012; Gotto et al.,2010; Trainor, 2008).

New Questions

As young persons with ID are now more often integrated into typical education, work, and social settings and develop higher expectations for their futures, it may be the case that the qualities of their social networks will differ from those observed in the

past. Likewise, the types of interventions and supports needed to facilitate their transitions to adult roles and relationships will change (Eisenman & Celestin, 2012; Trainor, 2008). This may be true especially of young adults with ID who participate in postsecondary education programs authorized by the Higher Education Opportunity Act (2008). The Act initiated five-year model demonstration projects called Transition and Postsecondary Programs for Students with Intellectual Disabilities (TPSIDs). The Act further created access to federal financial aid for students with ID who participate in approved Comprehensive Transition and Postsecondary Programs (CTPs). Programmatic requirements for TPSIDs and CTPs are closely aligned. Both must provide students with campus-based academic, social, and career opportunities that assist them to attain personal goals and lead to gainful employment. At least half of program components must be in integrated settings, and students must be included in typical activities to the extent possible (U.S. Department of Education, n.d., 2013). TPSIDs and CTPs are part of a larger movement to increase the number and variety of inclusive postsecondary education opportunities for students with intellectual disabilities (Grigal & Hart, 2009; Think College, 2013).

In order to qualify for a TPSID or CTP program, students must have been previously declared eligible for special education and exhibit significant cognitive and adaptive functioning deficits at the time of admission. Each TPSID or CTP program then has additional admission requirements based on the individual characteristics of that particular program. For example, the University of Delaware program (which was the subject of this pilot study), requires that students have functional communication skills, be able to manage their time independently for up to two hours in the community, and demonstrate an ability to self-monitor and self-manage behaviors in public settings.

Our University's model demonstration TPSID is a two-year, non-residential program located on the main campus, which is situated in a mid-sized suburban town with a student population of over 17,000 undergraduates and 3,500 graduate students. Students who complete the program earn a Career and Life Studies Certificate (CLSC) through the University's professional and continuing studies division. The program is supported by staff and faculty from the University's College of Education and Human Development. CLSC students have a full-time academic load comprised of core career and life studies modules, undergraduate courses, and internships. They also engage in activities on campus and in the local community. An important feature of the program is individualized coaching and mentoring to support attainment of their postsecondary education goals as identified through a person-centered planning process.

In the CLSC program, students have formal and informal opportunities to develop new relationships through activities with a variety of people. As part of our ongoing program evaluation, we wanted to know more about how participation in our program affected students' social networks. Drawing on earlier work on social-emotional supports within the networks of people with intellectual disabilities as well as studies of employment-related social networks, we developed and piloted an instrument to fit the purpose and goals of the CLSC program.

Early Focus on Social Supports

Efforts in the disability services field to enhance the networks of persons with disabilities focused primarily on expanding their networks through engagement in integrated community activities and strengthening social supports within their networks. Informal and formal interventions to expand circles of support, protection, inclusion, and friendship in the community all can be viewed as representing a concern for increasing the resources available to a person through a social network (Forrester-Jones, Jones, Heason, & Di'Terlizzi, 2004; Gotto et al, 2010; Kennedy et al., 1990; Newton, Horner, Ard, LeBaron, & Sappington, 1994; O'Brien & O'Brien, 2000). Although young adults with ID have unprecedented access to inclusive community activities, research on social networks of people with ID has continued to focus on expanding social supports within those environments and activities. For example, studies have found that peer mentors within postsecondary education programs for students with ID can serve important social support functions by acting as models of accepted social behavior and creating bridges to new social activities (Hafner et al., 2011; Jones & Goble, 2012).

Continuing along previous lines of thinking, we initially reviewed several self-report interview protocols that have been used with people with or without disabilities to assess various dimensions of their social networks in different life domains (Butterworth et al., 1993; Eisenman, 2007; Forrester-Jones & Broadhurst,

2007; Panacek & Dunlap, 2003; Tracy & Whittaker, 1990). These tools lend themselves to qualitative, individually-focused case descriptions, which could be adapted for a variety of purposes to inform individual- and program-level efforts. However, given the requirement that TPSIDs and CTPs should lead to gainful employment we wanted to sharpen the focus to assess specific features of social networks that have been associated with employment opportunities.

Social Networks and Employment of People with Disabilities

The research and practice literature on employment of persons with ID and other developmental disabilities has for some time noted that workplace social relationships are important assets that facilitate obtaining and maintaining employment (e.g., Butterworth, Hagner, Helm & Whelley, 2000; Chadsey & Shelden, 1998; Hagner & DiLeo, 1993; Szymanski & Parker, 1996). Professional providers of disability employment services are often viewed as a primary, formal mechanism for training and supporting persons with ID for employment success. Families and friends also influence employment opportunities and outcomes of persons with ID by shaping their career interests, using connections within their own networks to identify job opportunities, offering emotional and instrumental supports once employment is secured, and negotiating (or renegotiating) employment agency services based on their knowledge of a person's strengths and preferences (Donelly et al., 2010; Doren & Benz, 1998; Knox & Parmenter, 1993; Morningstar, 1997). However, studies of social networks and employment of people with or without disabilities suggest that additional employment opportunities will accrue to those who do not rely solely on formal employment services and strong ties such as family and friends (Carey, Potts, Bryen, & Shankar, 2004; Eisenman, 2007; Granovetter, 1995). Acquaintances (weak ties) are also important because they can serve as bridges to new information that is available only through others' social networks. Also, having connections to higher status networks or network members can create access to opportunities that can be used to improve one's employment situation.

Therefore, we decided to tailor previous social network assessments in ways that would capture students' relationships with a variety of individuals such as acquaintances, peers, and authorities who might ultimately serve as connectors to new employment opportunities. Ultimately, this would allow us to examine whether students were positioned through the college program to expand their networks in ways that have been found to improve employment outcomes. Doing so would extend the literature on social networks of people with intellectual disabilities by shifting the focus from social-emotional *supports* to examining network features most relevant to employment *opportunities*. Additionally, this work would provide basic descriptive information about the social networks of college students with intellectual disabilities, which is currently lacking in the postsecondary education literature.

In this preliminary study, our primary purpose was to pilot an instrument that would help us to establish (1) What students' social networks looked like when they entered the college program, and (2) How their networks changed while in the program. Major dimensions of interest included the distribution of relationships (i.e., with peers, authorities, and acquaintances who might serve as connectors to opportunities) and the integrated nature of their activities (i.e., engagement in inclusive versus separate situations).

Method

Participants

All CLSC students were invited to participate. Students who agreed to participate were interviewed at baseline (T1 program entry) about their experiences within the last year and at the end of their first year in the program (T2 approximately 9 months after baseline just prior to summer break). Although the study was considered exempt from human subjects' protocols required by the University's institutional review board, all students or a legal guardian, signed an informed consent prior to participating.

At the time of this study, network data were available from 12 of 13 students who entered the program at the beginning of our use of the protocol, with eight of those individuals providing data at both T1 and T2. Two students left the program before T2, and two students who did not participate at T1 decided to participate at T2. Table 1 summarizes demographic information for all twelve participants and the eight for whom we had T1 and T2 data.

Instrument & Data Collection

Development. As described above, we located several examples of social network assessments that

Table 1

Demographics at Entry: All Participants Compared to Those Providing Data at T1 and T2

Demographic	All Participants (*n*=12)	Participants with T1+T2 Data (*n*=8)
Age (Average)	20.4 years	20.0 years
Post-High School (Average)	1.6 years	2.5 years
High School Diploma	58 %	63 %
White, Non-Hispanic	83 %	100 %
Male	75 %	88 %
Autism	33 %	50 %

had been used with people who have intellectual or other disabilities. Based on these tools, we first created a semi-structured interview protocol that asked a student to identify people he or she considered to be important at school, work, community, and home. The student was then asked to name and briefly describe activities he or she did with these important individuals and the type of supports experienced. We piloted the assessment with a single student, an interviewer, and a recorder in a fishbowl arrangement with other evaluation team members as observers. We also wrote information on large, segmented poster sheets and sticky notes to provide cognitive anchors for the student as we worked across multiple life domains and people. We periodically stopped the interview to debrief with the staff and the student about clarity of questions and general administration procedures.

Based on that trial run, we revised and administered the interview protocol to other participants. We continued to ask about activities in which our students engaged and the people affiliated with those activities who they considered to be important. However, to streamline and focus the assessment process, we eliminated items that went into detailing the multiple types of supports that a student might perceive with each person in their network. Following the T1 administration, the evaluation team further refined the interview protocol to facilitate student responses and promote more efficient and consistent coding of responses when administered at T2. For example, we asked students to generate a list of activities by location before asking for information about people associated with the activities. This assisted participants to identify context-specific examples of their interactions.

Instrument content. The resulting social network assessment used in this study is in essence a structured qualitative interview that yields data suitable for social network analysis -- in particular, ego network analysis (further described below). Table 2 lists major subsections (dimensions) of the interview with sample guiding questions and related coding categories for *Activities* and *People*. Guiding questions, probes, and examples suggested in the protocol are adapted as needed to support understanding by the respondent. A copy of the full interview protocol is available from the first author.

Activities identified through the interview are coded by name and four unique dimensions: (1) where the activity takes place, (2) the purpose of the activity, (3) how often the student participates in the activity, and (4) degree of integration. Rules to code the integration dimension focus on understanding if the activity is designed especially for individuals with disabilities and if the activity occurs in an environment that is typical for persons who do not have disabilities ("inclusive" versus "specialized"). An activity is coded as hybrid if it is developed for individuals with disabilities but takes

Table 2

Data Collection Elements for Activities and People

Activity Name & ID	Activity Notes: *Provide general description of each activity (What kinds of things do you do during this activity?)*		Location: *Where does the activity take place?* (school/ campus, community, home)	Frequency: *How often do you do this activity?* (weekly, monthly, occasional, annual)	Purpose: *Why do you do this activity?* (social academic, work)	Integration: *Is this activity especially for people with disabilities?* (inclusive, hybrid, specialized)
Person Name & ID	Connected Activity: (Activity Name & ID)	Gender: *Is this person male or female?*	Relation: *How do you describe you relationship with this person?* (family, caregiver, authority, peer, incidental)	Time Known: *How long have you known this person?* Just met (<1yr), few years (<4yrs), long time (5+yrs)	Help: *When you are doing this activity with this person, do you give/get more help from him/ her or is it about equal? What does that help look like?* (student gives, equal, student gets)	Closeness: *How close do you feel to this person?* (very close, sort of or not close)

place in typical environments; for example, job shadowing on campus with a paid coach. A work experience or internship on campus is considered inclusive because it is an experience that is available to typical students.

Students are asked to identify *People* they consider to be important who are associated with each activity. Students are prompted to provide the name of the individual and how they are linked to a previously defined activity. Then they are asked to describe each person on five dimensions: (1) how long they have known the individual, (2) the person's gender, (3) whether the individual is a family member, caregiver (e.g. group home staff, therapists), authority (e.g., teachers, bosses), peers (co-workers, friends, peer mentors), or incidental (e.g. someone known in passing), (4) the reciprocal nature of the relationship, and (5) how close they feel to the individual.

Protocol implementation. Interviewers trained in the social network interview protocol, data collection terms, definitions, and coding procedures worked in pairs to facilitate the pacing of the interview and to increase the likelihood of capturing the interview details. Most interviews were completed in less than 1.5 hours. Two interviews lasting longer than 1.5 hours total were split over two sessions.

Students were asked to identify only activities and people with whom they had been involved in the prior year. Prior to meeting with a student, interviewers reviewed the student's available records or previous interview data. If during the interview, students did not mention activities or people they had previously identified, the interviewer asked if they should be included again. During the interview, visual aids were used with some students to support making choices among response op-

tions. For example, when asked to describe the type of reciprocity with a particular person in a given activity, students were shown three index cards with one response option on each (e.g., You give help; Equal help; You get help). Students also were asked to describe examples of how they interacted with activities and people as a way to check for understanding and facilitate coding.

After the interview, data were checked for missing details and both interviewers filed a reflection on the interview, how the student reacted to the interview, and whether the student had any difficulties identifying or describing activities and people. If coding of a dimension was not clear at the time of the interview it was either determined later from other notes or the audio recording, or the first and third author discussed the item to reach consensus.

Analyses

To generate individual and program information from the data collected, we employed social network analysis (SNA), a set of quantitative methods used to explore social relationships through the lens of network theory. In the context of this project, we are concerned with a subset of SNA which examines ego networks. Ego network analysis is focused on how individuals – referred to as "egos" - are embedded in their own social networks. We were particularly interested in the composition of participants' ego networks at the start and end of their first program year, with specific emphasis on the types of individuals in the network and the nature of the activities in which they engage.

To illustrate the potential for social network analysis to further this field of study, we present exploratory analyses from our first cohort data set, focusing on size, density, and relationships dimensions of students' networks. Because of its importance to our program, we included description of the proportion of integrated activities in which students engaged, however data on this particular dimension must be interpreted cautiously. Information collected during the pilot (T1) was recoded when the protocol was refined, and the degree of integration in some instances could not be discerned if interview questioning did not elicit particular details that permitted distinguishing between "inclusive" and "hybrid". The analyses presented here are not intended to provide definitive results about program effects; rather we offer these analyses as an entry point into a line of inquiry into alternative ways to conceptualize and analyze students' networks in postsecondary education.

Data and software. The instrument developed as part of this project is a form of personal network research design (Halgin & Borgatti, 2012), in which individuals (egos) are surveyed about the people in their lives (referred to as "alters" in SNA). Our instrument specifically yielded data about (a) each ego's alter, (b) the nature of the relationship between each ego and alter, (c) the nature of activities in which the ego and alter are engaged together, and (d) characteristics of the alters. By virtue of collecting data about activities, we can also assess which alters have ties to each other through participation in the same activities with the ego, though we lack information about the nature of those relationships. Finally, we have ego demographic data collected as part of the program application process. These data were organized for analysis using software from Analytic Technologies, including E-Net (Borgatti, 2006), UCINet (Borgatti, Everett, & Freeman, 2002), and NetDraw (Borgatti, 2002).

Characteristics of ego networks. Basic measures of ego networks include size and density, and we include measures of the composition of networks as they are central to our research and program goals. Size is indicated by the total number of alters to which an ego is tied and is interpreted literally – the larger number of alters, the larger the network. Density is calculated as the percentage of all possible ties (between all members of a network) that are actually present in the network. More clearly, density helps us know the extent to which alters are connected. An ego with 0 density has connections to each alter, but no alters are connected. From a behavioral perspective, this means that an ego does one activity with one person, another activity with another person, and so on. A denser network would indicate an ego engages in an activity with a few alters, and then may engage in another activity with some of the same alters as well as new alters.

Composition can be measured as (a) a proportion of all ties made to alters of a particular type, or (b) through indices of heterogeneity. E-Net utilizes Blau's indexand Agresti's IQV to assess heterogeneity for categorical variables – more common for our research questions. Both measures range from 0 to 1, with values closer to one indicating greater degrees of heterogeneity (see Harrison & Klein, 2007 and Agresti & Agresti, 1977 for information on how these figures are calculated). E-Net uses standard deviation for continuous variable (e.g. age), but our data do not include any continuous characteristics of alters.

Results

To answer our first research question, characteristics of the ego networks for participants at T1 are presented in Table 2, with composition illustrated using the "relation" characteristic of alters and "integrated" nature of activities, as described above. At the start of the program, this cohort had an average of 22 members in their network, more than a third of which were authorities, and with families/caregiviers and peers each constituting nearly 30% of the network. On average, nearly half of activities were integrated, in comparison to an average of 20% of activities being specialized. While the cohort averages help us to answer the research question, these data also show a large range for size, density, and composition indicating diversity in participants' networks at entry. Note here that larger networks are not necessarily more diverse or denser than small networks. In fact, size, density, and composition can vary independently. For example, participants G and F have much larger networks than others, but size does not help us to understand the quality of the network. H has the densest network, which indicates he or she engages in some activities with several alters, but the network is dominated by authority figures and is less heterogeneous than peers' networks.

Figure 1 presents two example ego networks (participants D and F) as illustrations of varied characteristics. In these figures the ego is at the center (in black), and alters (in gray) are indicated by node shapes: Squares indicate family/caregiver, triangles indicate authority figures, and circles indicate peers. With the egos at the center, lines – or ties – stretch outward like a star, illustrating the connection to the other actors in the network; where they exist, ties between the other actors create additional lines that make the networks more complex and indicate greater density. The figure offers an alternative view of statistical differences presented in Table 3.

Our second research question focused on change in networks as an outcome of the program. One purpose of TPSIDs is to assist individuals with ID in developing networks likely to result in meaningful employment. Thus, we are interested in creating productive changes in participants' networks. This can be assessed in a number of ways. First we can compare network statistics at T1 to T2, where change can be measured simply by subtracting T1 statistics from T2 statistics to establish the difference (growth or loss). Table 4 presents statistics for the eight participants with data at both T1 and T2. On average, participants' networks shrunk in size by five members but increased in density by eight ties. Further, on average, the role of families/caregivers decreased while peers and authorities became more influential. Lastly, specialized activities decreased as a proportion of all activities, while integrated activities grew substantially.

However, like the results of our first research question, Table 4 illustrates a wide range of change between T1 and T2, with both increases and decreases in network characteristics varying by case. Additionally, no one statistic alone tells the story for these participants. Many students experienced shrinking networks, yet some of the smaller networks are much denser than previously. Most consistently we see a shrinking in the percent of the network considered to be family, and a growth in the proportion that consists of peers. An effect of this type of change is a decrease in the measures of heterogeneity, which if interpreted alone, may be considered a negative outcome. Thus an analysis of multiple variables over time is useful in understanding the complexity of participant's networks.

Figures 2a and 2b illustrate the changes in participants D and F. The figures show the change in composition in F's ego network quantified in Table 4, previously dominated with triangles (authorities) and now dominated with circles (peers). We can also see an increase in the alter-to-alter ties for D, which produces the increase in density in Table 4.

A second type of longitudinal analysis is the concept of tie churn (Halgin & Borgatti, 2012) a specific aspect of network change related to stability. Tie churn measures include the number of ties kept, ties lost, and new ties. An analysis of participants' tie churn is presented in Table 5 and is significantly different information than that captured in Table 4. For instance, participant A seems to have a stable network size – changing only by 4 alters; yet an examination of tie churn shows nearly all the original alters were replaced, suggesting a radical change in the student's ego network.

Discussion

Young adults with ID often have more limited social networks, which consist largely of family and professional support staff. However, increased opportunities for community inclusion, including par-

Table 3

Characteristics of Participants' Ego Networks at T1

	Basic		Relationship						Nature of Activity					
ID	Size	Density	Family/ Caregiver	Authority	Peer	Incidental	Blau	IQV	Integrated	Hybrid	Specialized	N/A	Blau	IQV
A	19	8.19	15.8	10.5	26.3	47.4	0.67	0.89	84.2	0	0	15.8	0.27	0.53
B	10	4.44	63.6	36.4	0	0	0.46	0.93	27.3	0	27.3	45.5	0.65	0.97
C	10	8.89	27.3	18.2	54.5	0	0.60	0.89	36.4	9.1	27.3	27.3	0.70	0.93
D	11	1.82	18.2	18.2	63.6	0	0.53	0.79	18.2	9.1	27.3	45.5	0.68	0.90
E	15	4.76	43.5	13	39.1	4.3	0.64	0.85	26.1	4.3	21.7	47.8	0.68	0.90
F	46	10.34	13	65.2	21.7	0	0.51	0.77	54.3	0	30.4	15.2	0.59	0.88
G	52	7.62	17.9	62.5	19.6	0	0.55	0.74	25	1.8	46.4	26.8	0.65	0.87
H	23	17.79	20.8	54.2	16.7	4.2	0.63	0.79	37.5	0	0	62.5	0.47	0.94
I*	14	9.89	52.6	36.8	10.5	0	0.58	0.86	100	0	0	0	0	0
J*	17	3.68	26.3	42.1	31.6	0	0.65	0.98	47.4	0	15.8	36.8	0.62	0.92
Mean (SD)	*21.7 (14.3)*	*7.74 (4.3)*	*29.9 (16.4)*	*35.71 (19.3)*	*28.36 (18.5)*	*5.59 (14.0)*	*.58 (.06)*	*.85 (.07)*	*45.6 (25.6)*	*2.4 (3.6)*	*19.6 (14.8)*	*32.3 (17.8)*	*.53 (.21)*	*.78 (.29)*

Notes: * Data available for T1 only. N/A = could not be determined

Table 4

Change in the Characteristics of Participants' Ego Networks (T2-T1)

	Basic		Relationship						Nature of Activity					
ID	Size	Density	Family/ Caregiver	Authority	Peer	Incidental	Blau	IQV	Integrated	Hybrid	Specialized	N/A	Blau	IQV
A	-4	10.86	-15.80	2.80	20.40	-7.40	-0.07	0.01	9.10	0.00	0.00	-9.10	-0.14	-0.28
B	-5	15.56	-63.60	63.60	0.00	0.00	-0.46	-0.93	52.70	0.00	-7.30	-45.50	-0.33	-0.33
C	8	10.07	-11.90	-2.80	14.70	0.00	-0.12	-0.18	9.80	-5.30	11.20	-15.80	-0.07	-0.09
D	2	5.87	-10.50	-2.80	5.60	7.70	-0.04	-0.15	20.30	14.00	-27.30	-7.00	-0.03	0.07
E	5	6.29	-26.10	8.70	21.80	-4.30	-0.09	-0.02	8.70	21.80	0.00	-30.40	0.06	0.08
F	-11	8.49	-13.00	-39.60	52.70	0.00	-0.13	0.00	40.60	0.00	-27.80	-12.60	-0.49	-0.74
G	-30	15.37	-17.90	7.10	10.80	0.00	-0.13	0.11	70.70	-1.80	-46.40	-22.50	-0.57	-0.70
H	-4	-5.51	-10.80	20.80	-6.70	0.80	-0.22	-0.24	12.50	0.00	25.00	-37.50	0.16	0.00
Mean	*-5*	*8.02*	*-21.97*	*7.86*	*14.13*	*0.60*	*-0.17*	*-0.20*	*30.76*	*4.10*	*-10.37*	*-24.47*	*-0.18*	*-0.24*
SD	*11.07*	*6.25*	*16.73*	*26.87*	*16.95*	*4.06*	*0.13*	*0.30*	*22.23*	*8.66*	*21.84*	*13.13*	*0.24*	*0.30*

Figure 1a. Ego Network for Participant F at T1, with Nodes Indicating Relationship.

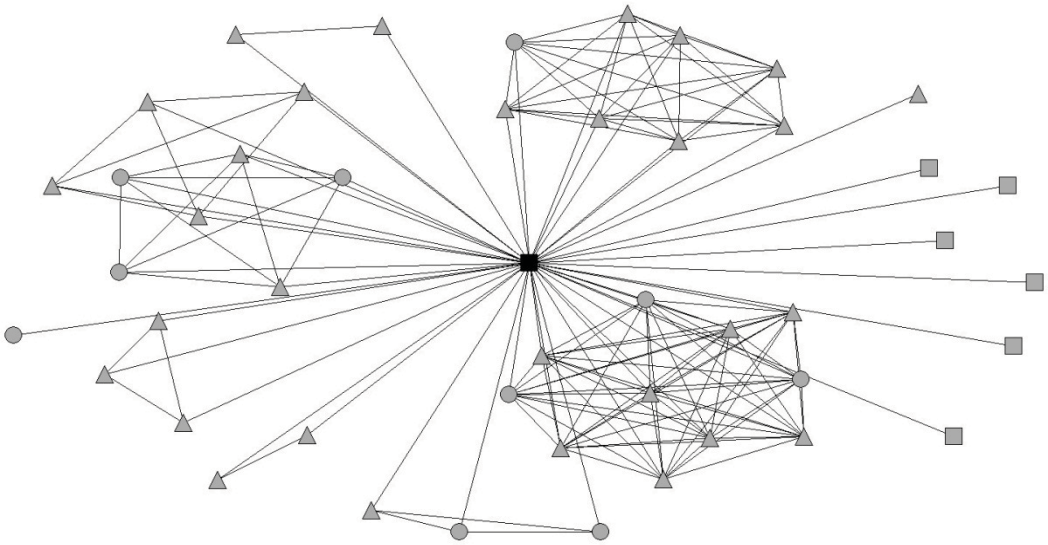

Figure 1b. Ego Network for Participant D at T1, with Nodes Indicating Relationship.

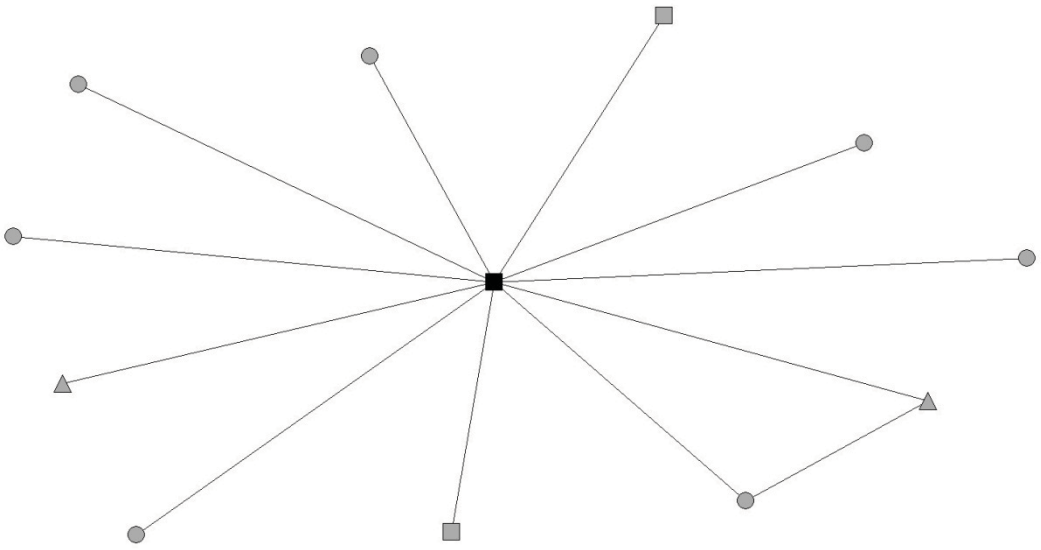

Figure 2a. Ego Network Change for Participant F, with Nodes Indicating Relationship.

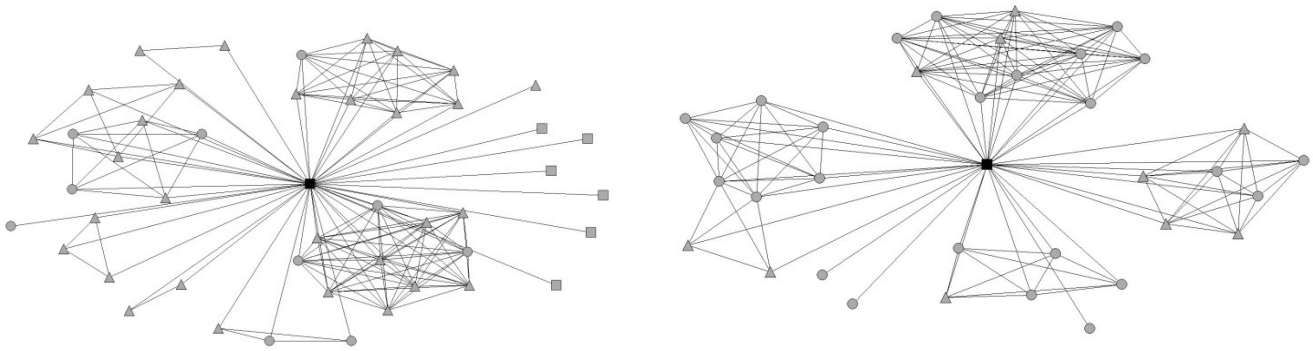

Figure 2b. Ego Network Change for Participant D, with Nodes Indicating Relationship.

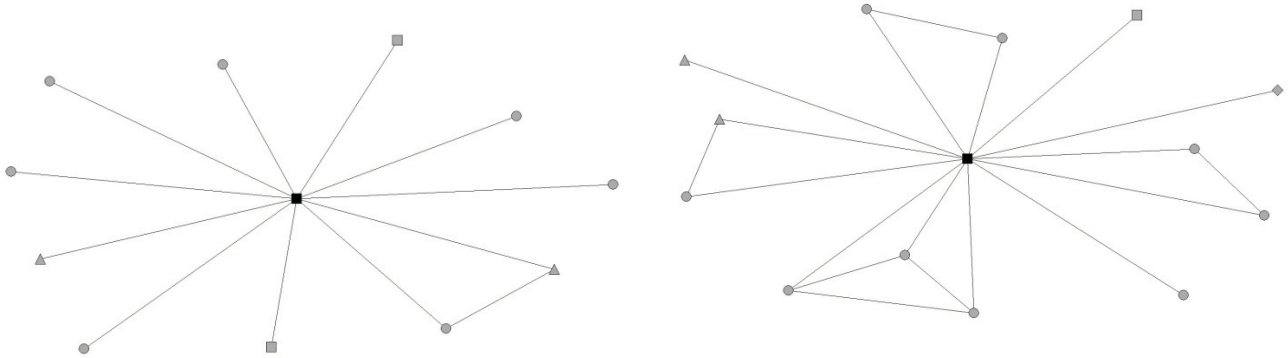

Table 5

Measures of Participants' Tie Churn between T1 and T2

ID	T1Size	T2Size	NewTies	LostTies	KeptTies
A	19	15	15	19	0
B	10	6	4	8	2
C	10	18	14	6	4
D	11	13	12	10	1
E	15	20	15	10	5
F	46	35	25	36	10
G	52	22	18	48	4
H	23	19	14	18	5

ticipation in postsecondary education, may create new opportunities for individuals to expand these networks. While research on social networks for people with ID has historically focused on its relation to general support, social network research for other groups have shown a strong relationship between social networks and employment (Rios-Aguilar & Deil-Amen, 2012). As new initiatives promote increased opportunities for people with ID to pursue higher education, social network assessment may be useful for understanding the capacity for participation in these programs to impact future employment. The purpose of this study was to develop and pilot an assessment for measuring social networks of individuals with ID in a postsecondary education program. An exploratory analysis was conducted in which networks of individual students were examined and network change over time was observed.

Participants exhibited significant variability in the size, density, and quality of their networks. However, most students appeared to rely heavily on families and caregivers overall, particularly upon entering college, which is consistent with previous research (Gotto et al., 2010; Mcvilly, Stancliffe, Parmenter & Burton-Smith, 2006). Those individuals who had larger or more dense networks typically relied heavily on authority figures (e.g., teachers) as well. For students with these types of networks, postsecondary education programs can be especially beneficial, as they place an emphasis on learning and connecting with a variety of individuals through a variety of activities (academic coursework, internship, etc.). Through these connections, students may then be able to successfully work through their connections in order to successfully find employment post-college.

In fact, participants did experience changes in their social network over time during one year of participation in postsecondary education. Interestingly, several social networks shrunk in size and we do not necessarily interpret this as a negative change. Many individuals experienced a decrease in the relative percentage of network members who were family. Meanwhile, there was an overall increase in the relative proportion of network members who were peers. These changes make sense when you consider that a focus of our program is increasing self-determination and independence. So, while this will mean that students are relying less on their family, they may also be involved with fewer activities, since students are only pursuing those activities in which they are truly invested. Other students in the pilot exhibited similar looking networks in terms of size and shape over time; however the people in their networks changed drastically. These changes may represent students who became less connected over time with members of their network that were exclusive to high school but then "replaced" these individuals with new connections in college. This represents a change from many individuals with ID who graduate from high school and have difficulty "replacing" their high school connections with new connections (Eisenman, Tanverdi, Perrington, & Geiman, 2009; McVilly et al., 2006).

Change in networks over time may represent an important variable that postsecondary education programs for people with ID might consider focusing on when describing outcomes. Certainly one standard measure of success for these programs would be students' employment rate post-college. However, extenuating circumstances (e.g., employer bias against hiring individuals with ID) may make finding employment challenging. Postsecondary education programs offer the opportunity to pursue greater academic experiences, explore potential careers, and connect with peers who have similar interests in an inclusive community. Therefore, consideration of social networks as a potential outcome variable would seem to be a good fit for the purpose of these programs.

Social network analysis and representation, such as those presented in Table 3 and Figure 1, are useful for a number of reasons. They help program staff understand the participants in the program as they enter, which can lead to the development of individualized activities for that student. For example, social network assessment can lead to recommendations on how the student could expand their network in meaningful ways (e.g., through a student organization that's associated with a student's career goal). The visual presentations offered also tend to be effective ways of communicating social network data with a broader audience, including program participants. For example, if explicit instruction about network development is incorporated into program activities, visual displays may help participants understand the nature of their own network. Lastly, the characteristics of ego networks at T1 represent baseline information which can be compared to future networks in order to measure change.

Challenges and Next Steps in Protocol Development

The protocol as piloted accomplished the overall purpose of capturing information about activities and important people with whom students had interacted in the prior year and the dimensions of interest. The large majority of students were able to complete the protocol in the amount of time allotted and all students appeared comfortable with the nature of the questions and the method of delivery. Students also appeared to understand the questions and could respond to them with little additional explanation.

A great difficulty for some students occurred when categorizing people on the closeness dimension. Initially, we offered three response options: "very close", "sort of close" and "not close". Some students seemed inclined to identify almost everyone in their network as "very close" because they perceived them as "friends." They also had difficulty establishing a meaningful difference between "sort of close" and "not close". Because we were most interested in determining to what degree students' networks consisted of those not considered "very close", we eventually collapsed the "sort of close" and "not close" categories.

Later coding of the activities and individuals with whom a student was connected was supported by careful questioning in order to discern important details and capture the students' perspectives. For example organizations or groups that serve as umbrella organizations could be listed as a single activity (e.g., Best Buddies) or multiple activities (e.g., Best Buddies group events). Therefore, additional questioning was occasionally needed to tease out the various types of activities and people involved. We also encountered examples of students participating in activities that had no associated "important" people, which we accepted as an indicator of the student being present but having limited engagement with others. Students also sometimes identified a "group" of people as important rather than an individual. We accepted this response and attempted to code dimensions based on students' perceptions of the group. This necessitated adding "mixed" as a code for some categories such as time known and gender. Sometimes students could not remember names of individuals. This was then recorded with a generic title (e.g., "Friend 1"); however, unless additional personal descriptors were noted, it became difficult to discern across activities and time points whether or not the same friend was being discussed.

Another challenge for some students was the length of the interview. Two interviews took more than the allocated time and had to be resumed at a second session. In such cases, it was difficult to know if the length of the interview and the possible fatigue of the student affected the quality of the responses. Some students have long lists of activities and associated important people. Given the extended time it can take to gather descriptions of all activities and people, this prompted us to consider whether it was acceptable to gather details only about aspects of the network of particular interest (e.g., integrated activities; acquaintances, peers, authorities). However, making those distinctions often depended on probing for details during the interview anyway. Ways to streamline the interview

while supporting valid responses and coding need to be further explored. Briefer protocols have been used with typically-developing populations in examining the connection between social networks and employment which may offer suggestions on next steps in transforming our protocol (Erickson, 2003).

Future Directions for Analysis

The analyses presented in this study represent illustrations of the types of information that can be gleaned from social network analysis. In this analysis, we focused largely on the composition of networks in terms of relationships and integrated activities. Yet the analysis can extend far beyond this, particularly with a larger sample.

Analysis of networks and network growth by ego characteristic. There are theoretical and practical reasons to believe that students' networks would vary by certain demographic or disability characteristics, or by other measures of attitudes and behavior. For example, particular disability types (e.g., autism) may be associated with different types of social networks due to the inherent nature of the disability. In addition, students who attend a postsecondary education program directly from high school may begin with different social networks than those who have been out of high school for some time.

Analysis of particular types of networks. Our emphasis here has been on the composition of participants' ego networks as a whole, considering all ties to be ties of interest. However, similar analyses can be conducted of particular types of relations – such as an examination of work networks or social/peer networks. Further comparisons can also be made: are participants more likely to engage in integrated activities with members of their work network, academic network or their social network? In predicting long term outcomes, such as employment success, such analyses may reveal differential impact of varied types of relations.

Longitudinal analyses. Changes over time in network characteristics or tie churn are useful for programmatic and research purposes. Findings can be useful in assessing the effectiveness of the program, either summatively or formatively. Specifically, network analyses can indicate whether the program is successful in engendering the types of changes envisioned during development and implementation. Does participation in integrated activities increase? Do participants leave with connections to authority figures positioned to help them find jobs? Do participants sustain these types of productive networks over time? This information can be used formatively as well, to identify any needed improvements in program planning.

Implications: Use with Individuals

Active discussion of social networks can be valuable in supporting individuals with ID to develop relationships, understand how their contacts are interconnected, and ensure that they are developing a network that is in line with their goals (Carey et al., 2004). Given the growing number of students with ID enrolled in higher education (Grigal & Hart, 2009), disability support professionals in higher education may end up supporting individuals with ID in some capacity. These professionals are in a unique position to have a positive impact on the development of a student's network, particularly as it relates to supporting the student to identify and connect with faculty or other staff and students on their campus who may have similar career interests.

Eisenman & Celestin (2012) offer some exercises that may be useful in supporting students to gain greater awareness of, capitalize on and improve their social network. For example, students can examine which goals their network appears to be supporting them in working toward, as well as which goals are not represented within their network. Attaining this self-awareness is critical, after which students could be supported on strategically expanding their network.

Many students with ID also tend to have difficulty differentiating between different types of relationships in their network. However, the nature of relationships with family, professional staff and colleagues each carry specific boundaries and capacity for reaching goals and expanding the student's network. Social network discussion can be useful for supporting greater understanding of these differences.

Finally, an examination of social networks can facilitate a discussion about membership to groups outside of family and the relationships students have with support professionals. While families and support staff are critical, a network which is solely reliant on these individuals can be very limiting and potentially isolative. Once new groups and potential links to those groups are identified, students should also be encouraged to consider which supports they will need in order to be successful in that setting, as well as how to best seek out this support. Stronger overall connections may

facilitate more natural supports being created within those environments (Garrison-Wade & Lehmann, 2009; Getzel & Thoma, 2008; Storey, 2003).

Implications: Program Evaluation

Social network maps may offer a useful tool for evaluating overall effectiveness and value of programs such as TPSIDs. These maps can be used across students and cohorts in order to evaluate the impact of program engagement. Furthermore, a program might be evaluated with respect to its capacity for developing students' social networks and, in turn, improving employment outcomes. Similarly, social network maps may be used in order to discern those students who may be in a better position to succeed in a college program like a TPSID, perhaps regardless of type and level of severity of disability.

Alternatively, social networks may be an interesting variable to consider using to compare between different TPSID programs, since individual features of a program may have implications for the way in which students' social networks change over time. For example, a residential program in which students live in the dorms would be expected to generate a different social network than a non-residential program. Furthermore, a program that offers internship placements at a variety of sites may result in different social networks than programs which focus students' time in one particular worksite.

Next Steps and Future Research

In order to further an understanding of social network analysis, as well as examine its utility for young adults with ID, additional steps should be considered. First, continued validation of instruments measuring social networks for people with ID, such as the one presented in this paper, should be undertaken. This may require trials in which the assessment is conducted with a support person present or, perhaps in the context of a program activity, have the student present their social network to others who are close to them as a "check" on accuracy. However, any validation process should include careful consideration and discussion with the student about who may participate, in order to avoid the potential for biased responses from the student.

Social network analysis offers a variety of paths for future research, since little is known about the composition of social networks among students with intellectual disabilities attending college. Future research might examine how networks from this population compare to students with intellectual disabilities participating in other types of transition programs. Furthermore, comparisons between the networks of students with ID, other students with disabilities, and typical-developing students attending college may yield important information about the development and utility of social networks as well as programs like TPSIDs.

Most importantly, future investigation may examine how social network analysis can serve as a predictor of employment. Such analyses could include examination of static characteristics of networks (e.g. do participants with a greater proportion of integrated activities find employment sooner than peers with less integrated networks?) and dynamic measures of changes (e.g. do participants' experiencing significant change in their network over time have greater odds of being employed?). If in fact a strong connection is found, it would have important implications for future policy and funding of such programs, as well as in determining best practice models.

References

Agresti, A., & Agresti, B. (1977). Statistical analysis of qualitative variation. In K.F. Schuessler (Ed.), *Sociological methodology 1978* (pp. 204-237). San Francisco: Jossey-Bass.

Borgatti, S. P. (2002). *NetDraw: Graph visualization software.* Harvard: Analytic Technologies.

Borgatti, S. P. (2006). E-NET software for the analysis of ego-network data. Needham, MA: AnalyticTechnologies. https://sites.google.com/site/enetsoftware1/

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *UCINet for windows: software for social network analysis*. Harvard, MA: Analytic Technologies.

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241-258). New York: Greenwood.

Butterworth, J., Hagner, D., Heikkinen, B., Faris, S., DeMello, S., & McDonough, K. (1993). Social network interview guide. In *Whole life planning: A guide for organizers and facilitators.* Boston: University of Massachusetts, Institute for Community Inclusion.

Butterworth, J., Hagner, D., Helm, D. T., & Whelley, T. A. (2000). Workplace culture, social interactions, and supports for transition-age young adults. *Mental Retardation, 38*(4), 342-353.

Carey, A., Potts, B., Bryen, D., & Shankar, J. (2004) Networking towards employment: Experiences of people who use augmentative and alternative communication. *Research and Practice for Persons with Severe Disabilities, 29*(1), 40-52.

Chadsey, J., & Shelden, D. (1998). Moving toward social inclusion in employment and postsecondary school settings. In F. Rusch & J. Chadsey (Eds) *Beyond High School: Transition from School to Work* (pp. 406-437). Belmont CA: Wadsworth.

Devlieger, P., & Trach, J. (1999). Mediation as a transition process: The impact on postschool employment outcomes. *Exceptional Children, 65* (4), 507-523.

Donelly, M., Hillman, A., Stancliffe, R. J., Knox, M., Whitaker, L., & Parmenter, T. R. (2010). The role of informal networks in providing effective work opportunities for people with an intellectual disability. *Work, 36*, 227–237. DOI 10.3233/WOR-2010-1023

Doren, B., & Benz, M. (1998). Employment inequality revisited: Predictors of better employment outcomes for young women with disabilities in transition. *Journal of Special Education, 31*, 425–442.

Eisenman, L. T. (2007). Social networks and careers of young adults with intellectual disabilities. *Intellectual and Developmental Disabilities, 45*(3), 199–208.

Eisenman, L. T., & Celestin, S. (2012). Social Skills, supports, and networks in adolescent transition education. In M. Wehmeyer & K. Webb (Eds.) *Handbook of adolescent transition education for youth with disabilities.* New York: Routledge.

Eisenman, L. T., Tanverdi, A., Perrington, C., & Geiman, A. (2009). Community and social activities of youth with significant intellectual disabilities. *Education and Training in Developmental Disabilities, 44,* 168-176.

Erickson, B. (2003). Social networks: The value of variety. *Contexts, 2*(1), 25-31. Retrieved from http://www.asanet.org/images/members/docs/pdf/featured/erickson.pdf.

Forrester-Jones, R., Jones, S., Heason, S. & Di'Terlizzi, M. (2004). Supported employment: A route to social networks. *Journal of Applied Research in Intellectual Disabilities, 17,* 199–208.

Forrester-Jones, R., Carpenter, J., Coolen-Schrijner, P., Cambridge, P., Tate, A., Beecham, J., &Wooff, D. (2006). The social networks of people with intellectual disability living in the community 12 years after resettlement from long-stay hospitals. *Journal of Applied Research in Intellectual Disabilities, 19*, 285–295.

Forrester-Jones, R., & Broadhurst, S. (2007). Moving on. In *Autism and Loss* (pp. 81-89). London: Jessica Kingsley.

Garrison-Wade, D. F., & Lehmann, J. P. (2009). A conceptual framework for understanding students' with disabilities transition to community college. *Community College Journal of Research and Practice, 33*(5), 417-445.

Getzel, E., & Thoma, C. (2008). Experiences of college students with disabilities and the importance of self-determination in higher education settings. *Career Development for Exceptional Individuals, 31*(2), 77-84.

Gotto, G., Calkins, C., Jackson, L., Walker, H., & Beckmann, C. (2010). *Accessing Social Capital: Implications for Persons with Disabilities.* National Gateway to Self-Determination, Association of University Centers on Disabilities. Available at http://www.aucd.org/ngsd

Granovetter, M. (1995). *Getting a Job: A Study of Contacts and Careers*, (2nd ed.). Chicago: University of Chicago Press.

Grigal, M., & Hart, D. (2009). *Think college! Postsecondary education options for students with intellectual disabilities.* Baltimore: Paul H. Brookes Publishing Company.

Hagner, D., & DiLeo, D. (1993). *Working together: Workplace culture, supported employment, and persons with disabilities.* Cambridge MA: Brookline Books.

Hafner, D., Moffatt, C., & Nutullah, K. (2011). Cutting-Edge: Integrating students with intellectual and developmental disabilities into a 4-year liberal arts college. *Career Development for Exceptional Individuals, 34*(1), 18-30.

Halgin, D.S., & Borgatti, S.P. (2012). An introduction to personal network analysis and tie churn statistics using E-NET. *Connections, 32*(1), 37-48.

Harrison, D., & Klein, K., (2007). What's the difference? Diversity construct as separation, variety, or disparity in organizations. *The Academy of Management Review 32*(4), 1199-1228.

Higher Education Opportunity Act of 2008, Pub. L. No. 110-315 § 122 STAT. 3078 (2008).

Jones, M., & Goble, Z. (2012). Creating effective mentoring partnerships for students with intellectual disabilities on campus. *Journal of Policy and Practice in Intellectual Disabilities, 9*(4), 270–278.

Kennedy, C., Horner, R., & Newton, J. (1990). The social networks and activity patterns of adults with severe disabilities: A correlational analysis. *The Journal of the Association for Persons with Severe Disabilities, 15*(2), 86-90.

Knox, M., & Parmenter, T. (1993). Social networks and support mechanisms for people with mild intellectual disability in competitive employment. *International Journal of Rehabilitation Research, 16*(1), 1-12.

Mcvilly, K. R., Stancliffe, R. J., Parmenter, T. R., & Burton-Smith, R. M. (2006). I get by with a little help from my friends: Adults with intellectual disability discuss loneliness. *Journal of Applied Research in Intellectual Disabilities, 19*, 191-203.

Morningstar, M. (1997). Critical issues in career development and employment preparation for adolescents with disabilities. *Remedial and Special Education, 18*, 307–320.

Newton, J. S., Horner, R., Ard, W., LeBaron, N., & Sappington, G. (1994). A conceptual model for improving the social life of individuals with mental retardation. *Mental Retardation, 32*(6), 393-402.

O'Brien, C., & O'Brien, J. (2000). *The origins of person-centered planning: A community of practice perspective.* Lithonia, GA: Responsive Systems Associates.

Panacek, L. J., & Dunlap, G. (2003). The social lives of children with emotional and behavioral disorders in self-contained classrooms: A descriptive analysis. *Exceptional Children, 69*(3), 333(16).

Putnam, R. (2000). *Bowling alone: The collapse and revival of american community.* New York: Simon & Schuster.

Rios-Aguilar, C., & Deil-Amen, R. (2012). Beyond getting in and fitting in: An examination of social networks and professionally relevant social capital among latina/o university students. *Journal of Hispanic Higher Education, 11*(2), 179-196.

Rosen, J., & Burchard, S. (1990). Community activities and social support networks" A social comparison of adults with and adults without mental retardation. *Education and Training in Mental Retardation, 25* (2), 193-204.

Storey, K. (2003). A review of research on natural support interventions in the workplace for people with disabilities. *International Journal of Rehabilitation Research, 26*, 79-84.

Szymanski, E., & Parker, R. (Eds.) (1996). *Work and disability: Issues and strategies in career development and job placement.* Austin TX: Pro Ed.

Think College. (2013). *College options for people with intellectual disabilities.* Retrieved from http://www.thinkcollege.net/index.php

Tracy, E., & Whittaker, J. (1990). The social network map: Assessing social support in clinical practice. *Families in Society, 71*(8), 461-470.

Trainor, A. (2008). Using cultural and social capital to improve postsecondary outcomes and expand transition models for youth with disabilities. *Journal of Special Education, 42*, 148-162.

U.S. Department of Education. (n.d.). *Transition and postsecondary programs for students with intellectual disabilities.* Retrieved from http://www2.ed.gov/programs/tpsid/index.html

U.S. Department of Education. (2013, March 1). *Students with intellectual disabilities.* Retrieved from http://studentaid.ed.gov/eligibility/intellectual-disabilities

About the Authors

Laura T. Eisenman received her M.A. in rehabilitation counseling from the University of South Florida and Ph.D. in education and human development with a concentration in special education from Vanderbilt University. Her experience includes working in community agencies serving people with disabilities. She is currently an associate professor in the School of Education at the University of Delaware. Her research interests include school to adult life transitions of young adults with disabilities. She can be reached by email at eisenman@udel.edu

Elizabeth N. Farley-Ripple received her B.S.F.S. from Georgetown University, an M.A. from Columbia University, and her Ph.D. in Educational Policy from the University of Pennsylvania. She is currently an assistant professor in the School of Education at the University of Delaware. Her research interests include educational policy and evaluation with a focus on leadership and programs designed to improving student outcomes. She can be reached by email at: enfr@udel.edu

Mary Culnane received her M.S. in Evaluation Methods from University of Delaware and M.S.N. in Adult Primary Care from University of Pennsylvania. She is currently a Ph.D. student in the School of Public Policy and Administration at the University of Delaware. Her research interests include how to evaluate social interventions designed to improve the well-being of children and adults. She can be reached by email at: mculnane@udel.edu

Brian Freedman received his B.A. in psychology from The George Washington University and Ph.D. in clinical psychology from Nova Southeastern University. His experience includes working as a clinical psychologist and clinical director for Kennedy Krieger Institute in Baltimore, MD. He is currently the director of the Transition, Education & Employment Model (TEEM) unit at the University of Delaware Center for Disabilities Studies and is an assistant professor with the UD School of Education. His research interests include postsecondary transition for individuals with developmental disabilities and the impact of raising a child with a disability on families. He can be reached by email at: brianf@udel.edu