



HHS Public Access

Author manuscript

Can J Occup Ther. Author manuscript; available in PMC 2017 February 01.

Published in final edited form as:

Can J Occup Ther. 2016 February ; 83(1): 14–26. doi:10.1177/0008417415583107.

Social Networks and Participation with Others for Youth with Learning, Attention and Autism Spectrum Disorders

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Abstract

Background—Social participation involves activities and roles providing interactions with others, including those within their social networks.

Purpose—Characterize social networks and participation with others for 36 adolescents, ages 11-16 years, with ($n = 19$) and without ($n = 17$) learning disability, attention disorder or high-functioning autism.

Methods—Social networks were measured using methods of personal network analysis. The Children's Assessment of Participation and Enjoyment *With Whom* dimension scores was used to measure participation with others. Youth from the clinical group were interviewed regarding their experiences within their social networks.

Findings—Group differences were observed for six social network variables and in the proportion of overall, physical, recreational, social and informal activities engaged with family and/or friends. Qualitative findings explicated strategies used in building, shaping and maintaining their social networks.

Implications—Social network factors should be considered when seeking to understand social participation.

Keywords

adolescent development; adolescence; social network analysis; social environment; social participation

Social participation refers to a person's involvement in activities and roles that provide interaction with others, as well as engagement in family and community activities (Levasseur, Richard, Gauvin, & Raymond, 2010; American Occupational Therapy Association [AOTA], 2014). As such, social participation is an essential daily life activity important for leading a healthful and satisfying life. For children and youth, social participation provides opportunities within the social environment for developing friendships, competencies and self-concept (Barletta & Loy, 2006; Specht, King, Brown, & Foris, 2002). For occupational therapy clients of all ages, social participation remains both a rehabilitation process and an important outcome (AOTA, 2014).

Assessing and affecting occupational therapy clients' social participation patterns involve discerning the client's engagement in daily life activities across the range of the client's social roles and social environments. Current models for assessing social participation patterns reflect the multidimensional nature of social participation and a range of associated individual and/or environmental factors. For children and youth, assessment of occupational therapy clients' social participation can include measurement of the youth's (a) social cooperative behaviours, such as on the Social Profile (Donohue, 2013); (b) accomplishment and satisfaction with engagement in activities typically occurring in social contexts or as part of social roles, such as with the children's version of the Assessment of Life Habits (Noreau et al., 2007); (c) the range of individuals with whom a youth engages in activities (e.g. family versus someone from the community), such as on the Children's Assessment of Participation and Enjoyment (CAPE) (King et al., 2004); (d) the frequency, involvement, enjoyment, and/or preference for activity engagement in home, school and community settings, such as on the Child and Adolescent Scale of Participation (Bedell, 2009) and the CAPE; and (e) environmental factors related to functioning and involvement at home, in school and within the community, such as measured with the Participation and Environment Measure for Children and Youth (Coster et al., 2011, 2012) and the School Function Assessment (Coster, Deeney, Haltiwanger, & Haley, 1998). Assessing the multidimensional nature of social participation involves understanding and measuring environmental features believed to support or hinder social participation; it involves understanding and measuring the social environment.

Background on the CAPE as a Measure of Social Participation

The World Health Organization's International Classification of Functioning, Disability and Health (ICF) (2001) provides a common language and framework for describing health and health-related states, yet it does not provide a specific definition of social participation (Piškur et al., 2014). Rather, the broader construct of participation is defined as involvement in life's situations (WHO, 2001). Within the research literature, multiple and distinctly different definitions of social participation persist. Social participation has been researched and conceptualized in a variety of ways, and include conceptualizations relative to social integration (e.g. community and societal engagement), social involvement (e.g. involvement with others), and as a synonym for social activity (Piškur et al., 2014).

The CAPE has been used in paediatric rehabilitation research to measure social participation through measurement of whom children and youth engaged with during activities (e.g. Palisano et al., 2009; Kang et al., 2010; Kang et al., 2011), which is consistent with conceptualizations of social participation as relative to social inclusion. Alternatively, Gorzkowski and colleagues (2010) used the CAPE to measure social participation by assessing the diversity, intensity, with whom and where youth with spinal cord injury engaged in social types of activities. However, the vast majority of research studies using the CAPE did not distinguish social participation from participation. Several studies using the CAPE reported on the participation diversity and intensity in activities (e.g. Imms, Reilly, Carlin, & Dodd, 2009; Anaby, Law, Hanna, & Dematteo, 2012; Bjornson, Zhou, Stevenson, & Christakis, 2013; Shikako-Thomas et al., 2013). Other studies reported on most or all dimensions of participation measured by the CAPE (e.g. Engel-Yeger, Jarus, Law, 2007; Lindwall et al., 2012; Bendixen, Lott, Senesac, Mathur, & Vandenborne, 2014).

Background on Social Networks and Social Network Analysis

Important aspects of the social environment include the youth's social network. For children and youth, social networks are primary contexts for engaging in activities and social interactions that have the potential to bolster competence and self-identity, as well as negatively impact health, attitudes and educational trajectories (Smith & Christakis, 2008; Holland, Reynolds, & Weller, 2007). Social networks can act to enhance development and health through mechanisms such as the provision of emotional connection, resources and support, and social organization (Berkman, Glass, Brisette, & Seeman, 2000; Cohen & Lemay, 2007; Heaney & Israel, 2008; Godde et al., 1994). A youth's social network (SN) is primarily comprised of family and others in the youth's immediate social environment, such as teachers, coaches and friends. However, as children and youth mature toward late adolescence and young adulthood, they experience a shift in social engagement away from family toward peers and the community (Jarus, Anaby, Bart, Engel-Yeger, & Law, 2010). For youth with disabilities, this shift toward more community and peer-based social interactions can be difficult to achieve (Bedell et al., 2013). Social networks of youth with disabilities are often smaller (Kef, 1987; Harty, Joseph, Wilder, & Rajaram, 2007) and contain fewer reciprocated friendships (Chamberlain, Kasari, & Rotheram-Fuller, 2007).

The fundamental premise underlying social network theory is that the social structure (i.e. the organized patterns of social relationships) matters; and that the structures, and people occupying specific network positions, have important effects on social dynamics and individual social behaviour (Scott, 2000). The term “social network” refers to a social structure that is made up of its members and their interconnections. From a network perspective, both the network members, and the patterns of relationships among members impact behaviours and attitudes of those within the network.

Social network analysis (SNA) entails the systematic quantification and mapping of the relationships between network members. Such relationships, or interconnections, between network members are referred to as relational ties; examples include friendships, kinships, and ties bound by shared experiences such as beliefs, knowledge, prestige, or common goals. Network attributes concerning the members' locations within the network are referred to as *structural* attributes. A common structural metric used in SNA is network *centrality*, which refers to available social power, influence, or deference based on one's position within the social structure of the network (Hanneman & Riddle, 2005). At the most fundamental level, centrality (specifically, the metric referred to as *degree centrality*) is calculated by counting the number of direct ties a person in the network has to other people in the network (Freeman, 1979). In SNA, centrality is often calculated for each person in the network and has been measured in paediatric disability research. For example, Chamberlin and colleagues (2007) used centrality measurement to assess inclusion of children with autism within mainstream classrooms. Structural metrics are different from *compositional* network variables, which refer to characteristics or attributes of network members, such as gender, beliefs or provider of social support.

Social networks can be bound by predefined parameters, such as a classroom, in which the analysis is referred to as a *whole* (or sociometric) network analysis. Alternatively, SNA can be focused on relationships directly connected to one individual, referred to as a *personal* (or egocentric) network analysis. In whole or personal network studies, the characteristics of network members, as well as their relative locations within the network, can be evaluated and then used as metrics of the network. This research measured both compositional and structural network factors using methods of personal network analysis.

Study Purpose

Social participation of youth with disabilities can be better understood through explication of the social environmental contexts of participation. The purpose of this study was to characterize the social networks and engagement in activities with others for youth with learning, attention and autism disorders, and to explore how social networks are developed for these youth. Our intent was to inform understanding of the *with whom* aspect of social participation. This exploratory study used a cross-sectional mixed-method design with statistical testing for differences in the clinical and comparison groups. Qualitative interviews from youth in the clinical group were then used to explore development of social networks and enhance understanding of quantitative findings (Creswell & Plano Clark, 2007). Specifically, for youth we (a) tested for differences in the proportion of activities engaged with alone and with others, (b) applied methods of SN analysis and tested for SN

differences, and (c) conducted cognitive interviews to explore social network experiences related to developing and shaping the social networks of youth in the clinical group.

Methods

Participants and Recruitment

The study sample consisted of two groups. The clinical group was comprised of 19 youth with learning disability (LD), attention disorder (AD) or high-functioning autism (ASD), of which 5 had a combination of diagnoses to include LD plus AD, AD plus ASD, or ASD plus LD (mean age 13.9 ± 1.3 ; 84.2% male). The typically developing comparison group consisted of 17 youth who were matched for sex and exact age (± 6 months) distribution (mean age 13.9 ± 1.2 ; 82.4% male).

Participants were recruited from the community using word of mouth and study flyers distributed at local therapy clinics and schools. Primary participants consisted of 36 adolescents, ages 11-16 years who were functioning at academic grade level or one grade above or below expected level. One parent per youth was also enrolled as a secondary participant to provide diagnostic, educational and demographic information. Additionally, parents assisted youth in reporting on the youth's engagement in activities and SN.

Following approval from the University of Florida Institutional Review Board, written informed consent was obtained from each parent and verbal and written assent was obtained from each youth. Study risks and benefits, privacy and data protection procedures, and the voluntary nature of study participation were explained prior to written consent/assent. Each youth participant was given a \$10.00 gift card and all participants were treated in accordance with the university's ethical standards. Quantitative and qualitative data were collected simultaneously but analyzed separately. Data were collected in a location preferred by the youth's parent; either in the youth's home or at a home-like research lab located within a community neighbourhood. The parent was on premises during data collection and available to assist as needed. When preferred or needed by the youth, the parent remained in the room during data collection; all but three parents of youth in the clinical group stayed in the room during data collection.

Quantitative Data

CAPE Metrics—The CAPE was administered using paper and pencil format with interviewer assistance provided as needed. The CAPE is a valid and reliable self-report or interview-assisted instrument designed to assess the manner in which youth, with and without disability, ages 6 through 21, participate in everyday activities beyond those required by school (King et al., 2004). The CAPE inquires as to the youth's engagement in 55 activities, which are categorized by type and domain. Activity types include recreational, physical, social, skill based and self-improvement activities. Activity domains include formal and informal; formal activities refer to structured activities such as karate lessons, and informal activities refer to less structured and/or more spontaneous activities such as playing cards or dancing. The CAPE measures five dimensions of the youth's participation in activities, which include (a) *Diversity* – number of activities engaged in, (b) *Intensity* -

frequency of activities engaged in, (c) *With Whom* – range of individuals activities are engaged with, (d) *Where* – range of locations activities are engaged in, and (e) *Enjoyment* – extent of enjoyment with activities engaged in.

CAPE *With Whom* dimension scores from all activity type and domain categories were used in this analysis; activity type and domain categories included (a) recreational, such as playing cards; (b) physical, such as bicycling; (c) social, such as hanging out; (d) skill-based, such playing a musical instrument; (e) self-improvement, such as reading; (g) informal, such as playing games; and (h) formal, such as engaging in team sports. For each CAPE item (i.e. activity inquired about), respondents used a five point scale to report with whom the activity was engaged with most often (1 = alone; 2 = with family; 3 = with other relatives; 4 = with friends; 5 = with others). CAPE *With Whom* responses were calculated for the proportion of activities engaged in alone, with family, with relatives, with friends, and with others for each activity type and domain. For instance, if a youth reported engaging in six of 12 potential recreational activities (i.e. recreational diversity score), of which two activities were most frequently engaged with family, then the overall proportion of recreational activities done with family was 33%, which was calculated as follows: (Number of “with family” responses for recreational activities ÷ recreational diversity score) × 100.

Social Network Metrics—Using conventions of personal network analysis established in the social sciences (McCarty, 2002; Borgotti, Everett, & Johnson, 2013), each youth was surveyed as to who comprised their SN, network members’ characteristics (i.e. gender, age, kinship, social role, social support provided, and strength of relationship) and the presence of existing relationships between network members (i.e. structural network data). Network composition questions were collected using interviewer-facilitated paper and pencil format (i.e. the interviewer verbally asked the survey questions and clarified as needed). Data regarding relationships between network members were collected using Egonet (McCarty, 2012; version 2012-05-18), an open-source java-based SN data collection and analysis software program. EgoNet was also used to calculate each youth's structural network measures and to generate a graphic of each youth's network map (Figure 1). A total of 20 SN variables were measured for each study youth, of which 13 were compositional and seven were structural variables (Table 1).

Quantitative Data Analysis

All CAPE and network variables were analyzed using SPSS version 21. Independent samples *t*-tests were calculated to assess group differences when appropriate, otherwise Mann-Whitney U tests were used and asymptotic significance (2-sided assumed) reported. As many CAPE scores had skewed distributions, these data were summarised as median scores and interquartile ranges. Shapiro-Wilk tests were used to assess distribution normalcy. Effect sizes were calculated using Cohen's *d* when the assumption of homogeneity of variance was met using Levene's test for equality of variances for normally distributed variables. For variables lacking normal distribution, the correlation coefficient, *r*, was used to calculate effect size, and calculated by dividing the absolute value of the standardized test statistic, *z*, by the square root of the number of observations (Corder & Foreman, 2009). Cohen's (1988) conventions of effect size were used, whereby the

standardized mean differences (Cohen d) of 0.2, 0.5, and 0.8, and correlations (r) of .1, .3, and .5 correspond respectively to small, medium and large effect sizes.

Qualitative Data

Network members with notably high and low connections to others in the network were identified from the youth's structural network analysis and used to guide the interview. Researchers asked youth about their experiences with these key individuals as well as with groups of people. The youth's network map was used in combination with prepared interview prompts (e.g. What sorts of things do you do with [named person/people]? How do you know [named person]?), which provided initial questions and probes for semi-structured cognitive interviews. However, the interviewer was free to pursue discussion points that were salient to the youth or brought up by prior interviewees.

Qualitative Data Analysis

A thematic analysis was used for the discovery and detailing of nuanced experiences regarding the creation and shaping of social networks discussed during qualitative interview of the clinical group (Sandelowski & Barroso, 2003). An iterative process of data collection and analysis was used to facilitate refinement of emerging ideas. Frequent analysis of interview data enabled continuous honing of interview questions and the checking of emerging ideas with subsequent participants. All interviews were audio-recorded, transcribed verbatim, checked for accuracy, and read separately by multiple researchers. Strategies of repeatedly reading and discussing transcripts and resultant conceptualizations, constant comparison of data to identified codes, and consensus with observations of patterns within the data served to strengthen trustworthiness of qualitative findings.

Results

Quantitative Results

Youth from the clinical group engaged in proportionally more overall, physical, social and informal activities with family as compared to youth from the comparison group. They also engaged in proportionally fewer overall, recreational, physical, social and informal activities with friends (Table 2 & Table 3). Additionally, significant differences were observed in five compositional network variables and one structural network variable. Youth in the clinical group reported more adults (mean difference [MD], 3.00; 95% CI , 0.29 to 5.71), fewer peers (MD , 3.20; 95% CI , 0.60 to 5.80), fewer same gender peers (MD , 13.37; 95% CI , 3.45 to 23.39), fewer weak tie peers overall (MD , 3.90; 95% CI , 1.29 to 6.51), and fewer same gender weak tie peers (MD , 20.34; 95% CI , 5.86 to 34.83), as well as lower connectedness to others in the network for strong tie peers (MD , 2.78; 95% CI , 0.25 to 5.31). No differences were found relative to social support provided by network members. Table 4 details observed differences and similarities in network variables.

Qualitative Results

Building Networks—Several youth described strategies for increasing their social connectedness and participation. Some strategies were based on well-scripted social

exchanges more commonly used by children younger than the study sample. From one 12-year-old with LD:

I would go to them and like just, if they were like alone I would hang out with them. If we were ... nice to each other and we liked each other then I would ask if they would be my friend. [Youth 8]

While this youth described actively pursuing new social connections, the social and linguistic immaturity with which it was pursued was evident. Other strategies described by youth included actively working to get to know the “new kid” in school even when the new schoolmate was not in the youth's grade or class. One youth [Youth 10] conveyed multiple stories conveying the youth's concerted and persistent effort in seeking-out and attempting to befriend children who new to the school, yet not necessarily a classmate. Another youth [Youth 11] described moving from classmate to classmate and social group to social group in search of someone to engage with during the school day; this youth described it as if it were a typical occurrence in his day. Several youth in our clinical group described working hard to socially engage their peers; for a few, this was despite having been enrolled in a small school for several with only marginal acceptance from classmates. Other youth described more passive mechanisms for building their social networks. A few youth described peer network members who had reached out to them in an effort to engage them socially. From a ninth-grader with ASD, regarding a group of 12th-graders named in the network, “They just came up to me and started talking to me, especially Joey, he just came to me.” [Youth 2]

Some youth described slow acceptance by classmates who were known for several years. In discussing experiences of attempting to socialize after school with classmates known since early elementary, one 13 year old with AD shared,

Occasionally, I kind of like say, ‘How about we all get together and hang out together outside of school’...It is like one thing I throw out there, [but] they like pull excuses out of their heads, like ‘I'm busy this week,...[but] they're mostly busy like every week. [Youth 10]

Not surprisingly, when asked about network members with whom these youth had only weak ties, multiple youth spoke of peers they knew from memorable past experiences (e.g. summer camp) rather than peers whom they know with potential for ongoing relationships such as a classmate or teammate.

Understanding one's social-self played a part in the youths' ability to build a social network. When asked if he wanted to meet new people, one 13 year old with ASD responded, “I would have to come out of my shell.” [Youth 16] A few youth with insight into their social difficulties understood that parents, teachers and society expected them to be socially engaged, and that they were falling short of these expectations. From a 15 year old with AD:

Usually around my family it's usually in big social settings and I don't tend to like to go out in them...til recently when I figured, well, I need to at least have the basics [regarding social skills] or else I might not function real well. [Youth 5]

This youth understood that the family offered connectedness and opportunities for practicing important social skills within larger social arenas that the youth judged to be safer for such practice. Some youth approached understanding of their social difficulties with an appreciable level of self-acceptance. “I usually like, you know, stay in my own little world. I don't mind actually not knowing too many people.” [Youth 5]

Other youth recognized that siblings played a role in building their social networks. Some assigned value to their sibling's connections. “Yeah, [my sister] introduced me to like a bunch of my friends and I think it's helpful.” [Youth 14] Others described learning to advocate for themselves in order to take advantage of their sibling's social connections. In describing an interaction between a youth with AD, his sibling and the sibling's friend, “[My brother] never wants us to do something and I'll sort of go ‘I need to be a part of this too’ because I am sort of, uh, limited in my resources.” [Youth 5] This youth viewed his brother as an avenue for increasing his social engagement.

Parents of youth from the clinical group also described ways in which they had a hand in bolstering the social networks of their youth. After hearing how her youth described easy and successful interactions within his social network, the mother of an almost 14 year old with AD [Youth 17] reported that the network described by her son was a network that she had facilitated for him as a young child. She pointed out that the peers named in her son's network did not attend his school and that no classmates were actually named in his social network. Another mother, in observing the network of her high-school aged youth with ASD [Youth 20], identified same aged network members whom she planned to contact so as to facilitate more peer interactions for her son.

Shaping networks—Several youth described favourite friends in terms of similarities to themselves. Some described similarities in shared outlooks; from a youth with AD, “He looked at reality more like me.” [Youth 14] Others found similarities based on sociocultural experiences of disability. From a 13 year old, “We both have some kind of mental disorder or like, issues...Johnny has Asperger's and I have ADD, and it's like that...Like we both..., we can understand each other.” [Youth 11] Parents also furthered ascription to cultural norms associated with the youth's diagnosis. From one parent of a youth with ASD [Youth 2], “Jason is the other one with Asperger's. They have a connection going on there. It is very interesting. They are tight.”

Some youth conveyed stories that shed light onto their interpretation of social rules and norms. Not surprisingly, some youth had difficulty in applying social rules. Cognitive difficulties associated with LD, AD, and ASD can include difficulties and impairments in attention, executive functioning, abstraction, perception and/or reasoning; any of which can impact ability to interpret and apply social rules. Some youth described rigid or concrete application of social rules. When this was observed, there was little to no indication that the youth had attended to nuances of the social situation, or that they had modified social rules to fit the situation. Some youth described strict adherence to social rules. When being asked about the people on the edges of the network that the youth did not know as well, one youth with AD responded, “I don't really know what they're doing. Uh, I mean, like, I don't really get involved in other people's social lives outside of me because I don't like barging in on

what they're doing. It's kind of rude.” [Youth 5] This misapplication of social rules pertaining to social intrusion served to constrain development of the youth's social network.

A few youth verbalized understanding of social norms, but chose to overlook the norms when a good friend did not meet socially assigned standards. From one respondent with AD, “He dressed strangely. He was a bit disgusting. But I ignored that because he was a good friend. He was a good friend and I miss him.” [Youth 14] From a different youth with ASD, acceptance of his friend's social difficulties was based on comprehension of his own social shortcomings. “Sometimes Freddie can bring all of these off topic subjects, [but] so can I, kind of. And he has some anger issues. So I can see why they really wouldn't want to be friends with him.” [Youth 17] These youth successfully weighed social rules rather than applying them in a concrete manner. They were able to make judgments regarding social rules that enabled them to expand their social networks and socially participate in ways that were reciprocal, meaningful and supportive.

Discussion

This research used social network metrics, CAPE With Whom scores and qualitative data to gain understanding of social participation. We found that youth from the clinical group reported fewer peers in their social networks as compared to youth from the comparison group. Youth from the clinical group also reported engaging with friends in proportionally fewer recreational, physical and social activities, and engaging with family in proportionally more physical and social activities. Because youth in the clinical group had fewer peers in their network, it was not surprising that they engaged in proportionally fewer activities with friends and more activities with family. Importantly, no differences were observed in the proportion of activities engaged in alone; youth in the clinical group were as socially engaged in activities as youth in the comparison group – they just differed in with whom they engaged (friends versus family). This finding is notable because of the implicit assumption often made for youth that socializing with family is not as desirable as socializing with peers. This assumption can imply that a youth's progression toward more independent social participation is more desirable than the youth engaging in activities with supportive and meaningful people who may also be family. While the relative importance of distal (i.e. away from family) versus high quality supportive social participation may be debatable, both remain developmentally essential.

We also observed differences in gender distribution within the peer networks, with youth in the clinical group having proportionally fewer same gender peers. Having friends who are the same gender is important for adolescents. As children age into adolescence, their needs for companionship and acceptance increase, with shifts in how these needs are met – they shift from being met by parents to being met by same gender friends (Erdley, Nangle, Newman, & Carpenter, 2001). Differences in peer gender distribution suggest a potential need to focus on developing and fostering socially-supportive same-gender social interactions for youth growing up with disabilities. In informing on attributes of network members, study participants reported on each network member's provision of social supports, such as being helpful to the youth and sticking up for the youth. Despite

differences in peer network size and composition, both study groups reported comparable amounts of social support received from their peer networks.

Notably, both study groups reported high variability in the amount of social support provided by their peer acquaintances (i.e. weak ties). This observation suggests a limited ability of weak ties to provide socially supportive resources for the youth. Within the adult social science literature, weak ties have been identified as important bridges to additional people (i.e. social opportunities) and prospects (e.g. potential job opportunities) (Granovetter, 1973) rather than important sources of social support. It is conceivable that weak ties may present different or expanded participatory opportunities for youth – opportunities for engagement in different activities or different people. Additional research is needed to determine if such an effect exists. Explicating any strengths in having weak ties for youth with disabilities may also be useful to occupational therapists and families when working to facilitate their child's social interactions outside of the youth's social comfort zone (e.g. circle of close friends).

Importantly, both study groups reported similar numbers of close friends within their networks. However, the close friends of youth in the clinical group averaged significantly fewer connections to others within the network. This finding suggests that both the youth with the disability and his or her close friends may be situated toward the periphery of the larger peer social groups (e.g. classroom). This is consistent with findings from published studies reporting high functioning youth with autism to occupy less central or peripheral positions within their whole classroom networks (e.g. Chamberlain et al., 2007; Ochs, Kremer-Sadlik, & Sirota, 2001). More importantly, however, both groups reported receiving similar amounts of social support from their close friends despite differences in network connectedness. Social support received from friends is indicative of the quality of the friendship relationship; both groups had similarly supportive close friendships. Having good friendships with quality relationships are important for the adolescents' adjustment (Waldrup, Malcom, & Jensen-Campbell, 2008; Nangle, Erdley, Newman, Mason, & Carpenter, 2003). However, having social connections sets the stage for the fostering of developmentally important social competence (Nangle et al., 2003). Occupational therapy researchers and practitioners must consider both developmental concerns (e.g. relationship quality) and in-context performance (e.g. relationship quantity). Our study measured social support provided by network members; however, future studies should incorporate more robust investigation of relationship quality within the social network. The personality and social psychology literature provides clear evidence that situational considerations, such as social networks, moderate personal dispositions and behaviour in social situations (Snyder & Deaux, 2012). Additional important considerations for future network studies include incorporation of social participation preferences. For example, preferences for quiet independent pursuits versus preferences for social pursuits can certainly influence the development and maintenance of, as well as the behaviour within, a youth's social network.

Qualitative interviews yielded nuanced description of ways in which youth from the clinical group understood, applied and weighed social rules in building and shaping their social networks. Regardless of personal desires or preferences regarding knowing or interacting with others, all youth understood that there existed societal expectations for their

engagement with others; all youth actively pursued social interactions and development of friendships. Unfortunately, several youth interpreted or applied social rules and unspoken codes (e.g. long periods of silence) in ways that likely did not serve to enhance their connectedness or participation with peers. The level of persistence needed by some of the youth in our clinical group in building their social network was especially striking; some persisted despite years of marginal acceptance from their classmates. Diagnostically associated cognitive and linguistic difficulties were explicated within the youths' social contexts. Difficulties in interpreting social rules, as well as use of interaction styles typically used by younger children, suggest potential reasons youth in the clinical group had fewer peers in their network as well as proportionally fewer engagements with peers during physical and social activities. Future network investigations should incorporate measurement of personal factors such as personality traits (e.g. introvert) or activity engagement preferences.

Parental interjections during the qualitative interviews included description of strategies employed to build or shape their child's social network. Notably, the strategies shared by parents focused on only narrow aspects of participation. Specifically, parents focused on increasing their child's involvement with others; there was no mention of on increasing or expanding the types of activities engaged in with others, where the involvement with others occurred (e.g. such as promoting activity engagement within community settings), or even if the youth enjoyed participating with others. These comments point to the need for further investigation of the ways that parents shape, and their motivations for shaping, their child's social participation experiences. Additionally, development of parent-based interventions for facilitating participation and performance within social networks should be pursued.

Study findings add to understanding of social participation by characterizing the people surrounding and engaging with study youth, and elucidating social processes regarding the ways in which youth from the clinical group engaged with others. This research was unique in that interpretation of CAPE With Whom metrics was enhanced by characterization of the youths' social networks, which was further augmented by qualitative findings. Explication of engagement in activities with others and social network characteristics contributes to the *with whom* dimension of social participation as described by Levasseur and colleagues (2010) in their review of social participation definitions from the public health and rehabilitation literature. Qualitative findings detailing how social networks were built and maintained contribute to the *why* dimension of social participation (Levasseur et al., 2010). However, our study findings provide only a limited characterization of the youth's social participation; this is because of the multifaceted nature of social participation, which is far broader than who surrounds and engages with a youth. Future research using methods of SNA should incorporate investigation of the social participation dimensions of where (e.g. social environment, where activities are engaged in), what (e.g. activities) and why (e.g. social roles, enjoyment) youth interact with their network members. Such investigation can enhance our growing understanding of participation as measured by the CAPE, which also measures the diversity, intensity, with whom, where and enjoyment dimensions of participation.

Limitations

This research was an exploratory study with a limited sample size; therefore study findings cannot be generalized and findings should be replicated in larger studies. However, application of methods of personal network analysis to an adolescent clinical group was a strength of this study. Use of personal network analysis allowed for systematic and client-centered measurement of structural, and often intangible, aspects of the youth's network. Personal network analysis methods can be applied to individualized measurement of occupational therapy clients' environments. Moreover, personal and social network analysis offers a ready-established language and framework for understanding and quantifying environmental nuances that may influence behaviour. This research demonstrates the feasibility of using methods of personal network analysis with a sample of individuals from an adolescent clinical population. At present, no benchmarks exist regarding what are considered optimal social network compositions or structures, and very little is understood regarding the predictive power of structural network variables for youth growing up with disabilities. Continued work is needed to better understand specifically which aspects of social networks might have an influencing effect on desired behaviours or rehabilitation outcomes of interest. Within rehabilitation research and practice, understanding and measuring the environmental contexts of a client's participation is important for characterizing and interpreting the multidimensional aspects of clients' engagement in roles and activities (McConachie, Colver, Forsyth, Jarvis, & Parkinson, 2006).

Conclusion

Study youth with learning, attention and autism spectrum disorders had measureable differences in their social networks and with whom they engaged in activities; qualitative findings suggested potential reasons for observed differences. Social network analysis enhanced understanding of with whom youth participated as measured by the CAPE. Better discernment of both the properties of and the personal experiences within the social networks can contribute to understanding of the social participation of youth growing up with disabilities.

Acknowledgements

The authors acknowledge Christen Fechtel Stevens for contributions to data collection and analysis.

Declaration of Interests/Funding

The project described was supported in part by the National Center for Medical Rehabilitation Research and the National Institute of Neurological Disorders and Stroke Rehabilitation Research Career Development Program Award (K12 HD055929), and the Eunice Kennedy Shriver National Institute of Child Health and Human Development (K01 HD064778). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Center for Medical Rehabilitation Research and the National Institute of Neurological Disorders and Stroke, and the Eunice Kennedy Shriver National Institute of Child Health & Human Development or the National Institutes of Health.

Portions of qualitative findings were previously presented at the 2014 American Occupational Therapy Association Annual Conference and Expo, RP 310. Portions of the quantitative and qualitative data collection and analysis were conducted as part of the first author's doctoral dissertation research. Portions of the quantitative data analysis were conducted as part of the forth author's undergraduate thesis and supervised by the first author.

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Key Messages

- Understanding social network contexts can add to understanding of social participation patterns.
- Social networks can be measured from a client-centered perspective.

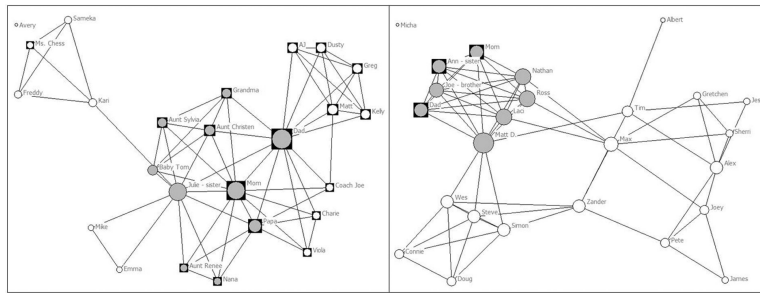


Figure 1. Example of a clinical youth's and a typically developing youth's social network map from “Mixed-Method Exploration of Social Network Links to Participation,” by C. M. Kreider, R. M. Bendixen, W. C. Mann, M. E. Young, and C. McCarty, in press, *OTJR: Occupation, Participation and Health*. Copyright 2015 by Kreider et al.

Note: Network on left example from clinical youth, network on right from youth in typically developing comparison group. Shape = age category (square/circle=adult, circle=child/youth); Color = relationship (grey=kin by blood or marriage, white=non-kin); Size = number of connections to others in the network (i.e. degree centrality; larger shape = more connections to others in the network); Names have been changed to protect privacy

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Table 1

Social network variables

Network variable	Description
Entire network - Compositional network variables	
Number same gender	Number of network members same gender as youth.
Number kin	Number of network members related to youth by blood or marriage.
Number adults	Number of network members youth considers a grown-up.
Number weak ties	Number of network members youth reports to <i>know a little or just know who he/she is</i> .
Entire network – Structural network variables	
Density	Gross measure level of integration of entire network. Number of existing network ties proportional to number of total possible ties (sum total of raw degree centrality divided by 300).
Average number ties	Gross measure of level of network integration. Mean number of direct connections each network member has to others in network (mean degree centrality).
Number ties most central	Refers to social power that can be derived from being directly connected to others. Number of connections to others in network by most connected member of network.
Sibling network (subgroup) variables	
Average number ties - all siblings	Gross measure of integration of sibling subgroup within network. For all participants with siblings ($n = 33$), average of each sibling's number of connections to others in entire network (mean degree centrality of all siblings).
Support network (subgroup) variables	
Size - support network	Number of network members providing at least one kind of social support (i.e. can share feelings with, is helpful to youth, gives information, sticks up for youth).
Average number ties – support network	Gross measure of integration of support from subgroup within network. For all network members providing at least one kind of social support, average of the number of connections to others in entire network (mean degree centrality of all supportive network members).
Peer network (subgroup) variables	
Size - peer network	Number of network members neither kin nor grown-up.
% Same gender - peers	Proportion of peers same gender as youth.
Weak tie peer network (subgroup) variables	
Size - weak tie peer network	Number of peer acquaintances (network peers youth reports to <i>know a little or just know who he or she is</i>).
% Same gender - weak tie peers	Proportion of acquaintance peer network same gender as youth.
Average number ties – weak tie peers	Gross measure of integration of acquaintance peer subgroup within network (mean degree centrality of acquaintance peer subgroup).
% Social support – weak tie peers	Proportion of acquaintance peer network members providing social support.
Strong tie peer network (subgroup) variables	
Size – strong tie peers	Number of close peers (network peers youth reports to <i>know really well or is close to</i>).
% Same gender – strong tie peers	Proportion of close peers same gender as youth.
Average number ties – strong tie peers	Gross measure of integration of close peer subgroup within network (mean degree centrality of strong tie peer subgroup).
Social support – strong tie peers	Proportion of all strong tie peer network members providing social support.

Note. From “Mixed-Method Exploration of Social Network Links to Participation,” by C. M. Kreider, R. M. Bendixen, W. C. Mann, M. E. Young, and C. McCarty, in press, OTJR: Occupation, Participation and Health. Copyright 2015 by Kreider et al.

Table 2

Group differences and effect size from the CAPE With Whom questions.

	Overall	Recreational	Physical	Social	Skill	Self-improvement	Informal	Formal
Alone	$U = 140.5$ $p = 0.51$ $r = .11$	$U = 175.5$ $p = 0.66$ $r = .07$	$U = 183.0$ $p = 0.49$ $r = .07$	$U = 122.5$ $p = 0.21$ $r = .21$	$U = 154.0$ $p = 0.79$ $r = .04$	$U = 197.0$ $p = 0.18$ $r = .23$	$U = 143.5$ $p = 0.57$ $r = .23$	$U = 168.5$ $p = 0.81$ $r = .04$
With Family	$U = 264.5$ $p = 0.001$ $r = .54$	$U = 192.0$ $p = 0.33$ $r = .16$	$U = 226.5$ $p = 0.04$ $r = .16$	$U = 268.5$ $p = 0.001$ $r = .57$	$U = 217.0$ $p = 0.06$ $r = .32$	$U = 217.5$ $p = 0.08$ $r = .30$	$U = 262.0$ $p = 0.001$ $r = .30$	$U = 202.0$ $p = 0.19$ $r = .22$
With Relatives	$U = 140.5$ $p = 0.47$ $r = .12$	$U = 148.0$ $p = 0.48$ $r = .12$	$U = 151.0$ $p = 0.58$ $r = .12$	$U = 151.0$ $p = 0.72$ $r = .06$	$U = 159.0$ $p = 0.89$ $r = .02$	$U = 168.5$ $p = 0.71$ $r = .06$	$U = 144.0$ $p = 0.55$ $r = .06$	$U = 169.0$ $p = 0.73$ $r = .06$
With Friends	$U = 55.5$ $p = 0.001$ $r = .56$	$U = 94.0$ $p = 0.03$ $r = .36$	$U = 65.5$ $p = 0.002$ $r = .36$	$U = 83.5$ $p = 0.013$ $r = .41$	$U = 118.0$ $p = 0.14$ $r = .24$	$U = 121.5$ $p = 0.12$ $r = .26$	$U = 65.5$ $p = 0.002$ $r = .26$	$U = 64.0$ $p = 0.002$ $r = .52$
With Others	$U = 195$ $p = 0.29$ $r = .18$	$U = 167.0$ $p = 0.80$ $r = .04$	$U = 167.0$ $p = 0.85$ $r = .04$	$U = 134.0$ $p = 0.15$ $r = .24$	$U = 197.0$ $p = 0.18$ $r = .22$	$U = 175.5$ $p = 0.64$ $r = .08$	$U = 164.5$ $p = 0.92$ $r = .08$	$U = 195.0$ $p = 0.27$ $r = .18$

Note. Effect size: small ($r < .01$), medium ($r < .30$), large ($r > .5$)

Table 3

Medians and interquartile ranges (IQR) from the CAPE With Whom questions.

	Overall		Recreational		Physical		Social		Skill		Self-Improvement		Informal		Formal	
	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison	Clinical	Comparison
Alone	24.2 (19.6)	28.9 (11.1)	44.4 (41.2)	40.0 (25.0)	16.7 (33.3)	12.5 (18.3)	12.5 (15.0)	11.1 (12.3)	0.0 (33.3)	0.0 (36.7)	42.9 (28.6)	50.0 (30.8)	29.6 (20.9)	31.3 (12.3)	0.0 (20.0)	0.0 (28.6)
With Family	42.4 (27.2) *	23.1 (11.2) *	42.9 (33.3)	37.5 (31.7) *	33.3 (46.4) *	22.2 (19.9) *	50.0 (36.7) *	20.0 (16.8) *	33.3 (66.7)	0.0 (26.7)	37.5 (28.6)	25.0 (42.9)	46.4 (24.6) *	26.1 (14.3) *	25.0 (60.0)	20.0 (31.0)
With Relatives	0.0 (7.41)	2.63 (11.4)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (14.3)	0.0 (17.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (7.1)	3.1 (9.0)	0.0 (0.0)	0.0 (0.0)
With Friends	17.2 (20.2) *	35.1 (17.70) *	14.3 (13.1) *	22.2 (19.0) *	25.0 (40.0) *	50.0 (27.1) *	22.2 (40.0) *	40.0 (23.8) *	0.0 (87.5)	33.3 (87.5)	0.0 (0.0)	0.0 (18.3)	17.2 (20.2) *	32.3 (19.0) *	16.7 (33.3) *	50.0 (30.0) *
With Others	6.06 (8.10)	3.57(10.11)	14.3 (13.1)	22.2 (18.3)	0.0 (28.6)	0.0 (18.3)	0.0 (0.0)	0.0 (5.0)	0.0 (33.3)	0.0 (10.0)	12.5 (14.3)	0.0 (20.0)	3.1 (7.1)	0.0 (5.6)	33.3 (42.9)	16.7 (33.3)

Note: Data are reported Median (IQR)

* Significant at $p < 0.05$

Table 4

Social network group means and differences

Network variable	Clinical group (n = 19) Mean (SD)	Comparison group (n = 17) Mean (SD)	Group differences		Effect size ^{††}
Entire network - Compositional network variables					
Number same gender	14.3 (3.1)	16.5 (3.1)	<i>t</i> (34) = 2.01	<i>p</i> = 0.05	<i>d</i> = 0.67
Number kin	7.7 (2.5)	6.1 (2.1)	<i>t</i> (34) = 2.02	<i>p</i> = 0.05	<i>d</i> = 0.67
Number adults [†]	9.0 (2.7)	6.0 (2.7)	<i>t</i> (34) = 2.25	<i>p</i> = 0.03	<i>d</i> = 0.75
Number weak ties	5.1 (3.6)	6.7 (4.3)	<i>t</i> (34) = 1.27	<i>p</i> = 0.21	<i>d</i> = 0.42
Entire network - Structural network variables					
Density	55.6 (21.9)	62.3 (17.6)	<i>t</i> (34) = 0.99	<i>p</i> = 0.33	<i>d</i> = 0.33
Average number ties	6.7 (2.6)	7.4 (2.1)	<i>t</i> (34) = 0.96	<i>p</i> = 0.34	<i>d</i> = 0.32
Number ties most central	14.6 (4.1)	14.7 (2.8)	<i>t</i> (34) = 0.06	<i>p</i> = 0.95	<i>d</i> = 0.02
Sibling network (subgroup) variables					
Average number ties - all siblings	10.5 (13.0) [‡]	9.0 (14.0) [‡]	<i>U</i> = 118.03	<i>p</i> = 0.52	<i>r</i> = .09
Support network (subgroup) variables					
Size - support network	12.4 (13.0) [‡]	9.0 (19.0) [‡]	<i>U</i> = 181.0	<i>p</i> = 0.55	<i>r</i> = .10
Average number ties - support network	7.7 (20.4) [‡]	8.0 (7.2) [‡]	<i>U</i> = 130.0	<i>p</i> = 0.33	<i>r</i> = .17
Peer network (subgroup) variables					
Size - peer network [†]	13.2 (5.1)	16.4 (2.3)	<i>t</i> (34) = 2.35	<i>p</i> = 0.03	<i>d</i> = 0.78
% Same gender - peers [†]	33.7 (15.9)	47.1 (13.1)	<i>t</i> (34) = 2.74	<i>p</i> = 0.01	<i>d</i> = 0.92
Weak tie peer network (subgroup) variables					
Size - weak tie peer network [†]	8.6 (4.5)	12.5 (3.0)	<i>t</i> (34) = 3.04	<i>p</i> < 0.01	<i>d</i> = 1.00
% Same gender - weak tie peers [†]	40.3 (23.0)	60.7 (19.8)	<i>t</i> (33.9) = 2.85	<i>p</i> = 0.01	<i>nc</i>
Average number ties – weak tie peers	5.3 (3.3)	6.3 (1.9)	<i>t</i> (34) = 1.08	<i>p</i> = 0.29	<i>d</i> = 0.37
% Social support – weak tie peers	12.5 (57.8) [‡]	7.7 (71.4) [‡]	<i>U</i> = 179.5	<i>p</i> = 0.57	<i>r</i> = .09
Strong tie peer network (subgroup) variables					
Size – strong tie peer network	3.0 (16.0) [‡]	4.0 (10.0) [‡]	<i>U</i> = 159.0	<i>p</i> = 0.95	<i>r</i> = .01
% Same gender – strong tie peers	62.5 (100.00) [‡]	66.7 (100.0) [‡]	<i>U</i> = 147.5	<i>p</i> = 0.66	<i>r</i> = .07
Average number ties – strong tie peers [†]	4.9 (2.9)	7.7 (4.5)	<i>t</i> (34) = 2.23	<i>p</i> = 0.03	<i>d</i> = 0.75
% Social support – strong tie peers	44.2 (28.8)	48.9 (29.8)	<i>t</i> (33.3) = 0.48	<i>p</i> = 0.63	<i>nc</i>

Note. *nc* = not calculated due to lack of equality of variance

[†] Network variable significantly different between groups (*p* < 0.05, 2-tailed assumed)

[‡] Data are Median (Range)

^{††} Effect size: small (*d* = 0.2; *r* = .01), medium (*d* = 0.5; *r* = .30), large (*d* = 0.9; *r* = .5)