
The Apple iPad™ as an Innovative Employment Support for Young Adults with Autism Spectrum Disorder and Other Developmental Disabilities

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Abstract -- Recent studies on the use of iPad™, iPhone™, and iPod™ touch as assistive technology have been largely limited to young students with disabilities. The purpose of this project was to investigate the use of the iPad™ as an innovative employment support tool to increase the independence and success of young adults enrolled in a program that provides employment support through comprehensive services of life-coaching, job coaching, and therapy as these individuals transition into their adult roles. Case studies of three young adults with developmental disabilities that include autism spectrum disorder, ADHD, and Tourette's syndrome are provided. The case studies exemplify the development, implementation, and use of the iPad™ to support not only independence in daily living, but to enhance the interpersonal skills needed to contribute to a positive work experience and successful outcomes.

Keywords: autism, adults, technology, medication management, schedules, anxiety, life coaching

Autism and Asperger's syndrome (AS) are currently classified as pervasive developmental disorders (PDD) under the autism spectrum disorder (ASD) umbrella in the *Diagnostic and Statistical Manual of Mental Disorders-IV* (American Psychiatric Association, 2000). In the proposed *Diagnostic and Statistical Manual of Mental Disorders-V*, scheduled for publication in 2013, ASD will be classified as a neurodevelopmental disorder and the diagnosis of Asperger's disorder will no longer exist (American Psychiatric Association, 2011). Regardless of the DSM categorization, autism will continue to impact communication, social interaction, and behavior, requiring varying levels of support, depending upon severity. As reported by the Centers for Disease Control (2012), the incidence of ASD is 1 in 88 children nationwide. No biological markers have been associated with autism, and therefore no "cure." A mixture of behavioral and other therapies, life coaching, educational strategies, environmental modifications, assistive

technologies, and medication (when needed) can mitigate the symptoms of ASD (National Autism Center, 2009a; Tsai, 2007).

Behavioral variability in individuals with ASD can interfere with diagnosis, especially if the diagnosing clinician lacks experience with the disorder (Tsai, 2007). Most of the literature regarding interventions and behavior management for ASD has focused on children who will soon make the transition to young adulthood. Effective interventions that increase socially appropriate behavior, foster independence, lead to employment, and allow the possibility of living life in the community of choice may be of particular value to these individuals and their families (Broadstock, Doughty, & Eggleston, 2007; Taylor & Seltzer, 2011).

Assistive Technology

Assistive technology (AT) has successfully been used alone or in conjunction with other interventions to change behavior or foster communication. AT is defined as “any item or piece of equipment or product system acquired commercially, off the shelf, modified, or customized, and used to increase, maintain, or improve functional capability for an individual with disabilities” (Beard, Carpenter, & Johnson, 2007, p. 4). AT has the potential to help individuals with disabilities mitigate barriers that occur in daily life. Personal Data Assistants (PDAs), or palmtop computers (i.e., small computers that fit into the palm of your hand) provide a particularly promising platform to address some of the barriers for people with cognitive impairments. These devices are portable, relatively affordable, customizable, capable of handling large amounts of data storage, and have features such as touch screens and multimedia input and output capabilities. Several software applications for PDAs and palmtop computers have been developed for use to promote increased independence by providing structure and cues, assisting with schedule and time maintenance, task completion, and decision making (Myles, Ferguson, & Hagiwara, 2007; Stock, Davies, Davies, & Wehmeyer, 2006).

Use of PDAs by persons with ASD can help increase independence by removing reliance on an adult to prompt them to complete tasks. Video technology, including video modeling and video prompting, has been effective in providing model performers of desired behavior. Such technologies allow for individual customization and program adjustment as tasks are learned (Mechling, Gast, & Seid, 2009). Research supports the use of brief, participant-centered, home-based training interventions and the use of consumer-level PDAs as cognitive aids for teenagers with challenges in executive functioning. Teens with ASD have learned to operate off-the-shelf PDAs as AT and improve independent functional performance in everyday life tasks, as well as during transitional work exploration and employment (Gentry, Wallace, Kvarfordt, & Lynch, 2010).

People with ASD often experience difficulty with tasks involving perspective, memory, organization, and planning. Though these individuals may be intelligent and articulate, they may perform poorly because of an inability to independently initiate, organize, and complete tasks (Gentry et al., 2010). The use of PDAs, mobile information managers, or palmtops as task management aids may be especially appropriate for transition age students. AT devices designed for persons with disabilities have often been bulky and stigmatizing (Davies, Stock, & Wehmeyer, 2002). Popular consumer devices such as PDAs and mobile devices carry no “AT stigma”, and teens, often quite adept with the use of gaming devices, might readily adopt these products. Research has shown that students with ASD may prefer instruction by computers to that offered directly by teachers. The shift from reliance on a teacher to independent functioning with AT makes sense in the transition to adulthood when many supports available in public schools are no longer provided (Gentry et al., 2010).

Schedulers, charts depicting steps in a task, and prompting devices have been shown to promote independence in work and daily living activities (Cihak, Kessler, & Alberto, 2007; Davies et al., 2002; Ferguson, Myles, & Hagiwara, 2005; Furnis et al., 2001; Van Laarhoven, Johnson, Van Laarhoven-Myers, Grider, & Grider, 2009; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2007). These interventions may facilitate employment opportunities previously unavailable to people with ASD and cognitive impairments. Schedulers can provide reminders, such as when to take which type of medicine. For people with more significant cognitive impairments, schedulers can be used to assist in following the steps to complete a task. Results of studies demonstrate that out-of-the-box personal electronics can increase independence for everyone, including people with cognitive disabilities (De Joode, Van Heugten, Verhey, & Van Boxtel, 2010; Tsui & Yanco, 2010). Research using the iPad™ to foster communication and enhance social skills in students with ASD has been the focus of other recent studies (Flores et al., in press; Weller-Clarke, 2012).

We contend that use of the iPad™ as an antecedent intervention to assist young adults with ASD and other developmental disabilities in areas such as organization, communication, anxiety control, social interaction, task engagement, self-regulation, and medication management can foster independence and enhance self-esteem, making the iPad™ an AT device. Utilizing the iPad™ to assist in these areas seems logical since it can be individualized through the use of different applications, is age appropriate, inexpensive (compared to some AT devices), and portable, making it a tool for use in any environment. The iPad™ may also provide social capital for individuals with ASD as they transition into adult roles.

Behavioral Assessment

When behavior negatively impacts independence, employment, and/or living in the community of choice, valid interventions to address and change that behavior should be considered. Before developing an intervention plan or referring an individual for medical treatment, a functional behavior assessment (FBA) is recommended to identify behavioral deficits or excesses that can be managed through therapy or training in certain skills (e.g., social or problem solving) by certified personnel.

Conducting a FBA involves the following steps: (1) operationally defining the problem behavior, (2) collecting data on the behavior (i.e., indirect or direct observation), (3) analyzing data to develop a hypothesis regarding the purpose (i.e., function) that the behavior serves for that individual, (4) testing the hypothesis using functional analysis by manipulating what occurs before (i.e., antecedents) and after (i.e., consequences) the problem behavior, and (5) developing a behavior intervention plan (Cooper, Heron, & Heward, 2007; Heflin & Alaimo, 2007). When data indicate that the environment is not the sole factor connected to the behavior, then the multidisciplinary team (e.g., individ-

ual, life and job coaches, therapists, and/or parents or other family members) may decide to refer the patient for further evaluation (Tsai, 2007).

Antecedent Interventions

Environmental changes that involve modifying situational events to reduce the likelihood of problem behavior and foster success are considered antecedent interventions. These interventions, such as providing visual schedules, social commenting, task organizers, warning of upcoming transitions, adult presence, incorporation of preference and choice, and stimuli changes to support sensory issues, can be designed and put in place at minimal cost in time and money before a behavior occurs. Antecedent interventions have proven effective with diverse behaviors demonstrated by individuals with ASD (National Autism Center, 2009b).

Medication and ASD

According to a study by Rosenberg et al. (2010), approximately 35% of individuals with ASD use at least one psychotropic medication (stimulants, neuroleptics, and/or antidepressants). The problem with using psychotropic medication, according to Loschen and Doyle (2007), is that it is primarily used to treat mental illness. Since ASD is a developmental disability (DD), and not a mental illness, these medications suppress all behavior, adaptive and maladaptive. Even when comorbidity with mental illness and other disorders exists, some medications have the potential to improve behavioral or psychiatric conditions that interfere with an individual's ability to participate in all aspects of society. Medical treatments can mitigate characteristic manifestations of coexisting conditions such as attention-deficit/hyperactivity disorder (ADHD), obsessive-compulsive disorder (OCD), tic disorders, Tourette's syndrome, schizophrenia, anxiety disorder, seizure disorder, mood, and sleep disorders (Tsai, 2007). One study found that individuals with ASD have higher comorbidity rates with other disorders, and the use of medication may mitigate comorbid symptoms (Klin, Pauls, Schults, & Volkmar, 2005).

Medications, in conjunction with other therapies, can help lessen some of the challenges to daily living that impact independent functioning and quality of life for individuals with ASD and their families (Tsai, 2007). When individuals do choose medication, ensuring proper dosage and scheduled administration are important to ensuring fewer side effects. Medication usage should be approached "in a logical, methodical manner" (Grandin, 2011, p. 198). The iPad™ can be used as a medication management tool that allows individuals to enter all their medications, set up reminders, and track when they have taken the medication. The iPad™ will remind individuals when they are low on a medication and can be set up to order the medication from the pharmacy. It allows individuals to photograph their medication so they can see visually what they are supposed to take along with the reminder. The iPad™ can be set up to

provide auditory and visual cues when it is time to take a medication. Individuals with ASD may struggle with this task as they may forget to take medication, or forget their dosage. The iPad™ can facilitate independence in this daily living skills area.

Independence

Fostering independence and self-esteem are important to remember when working with any individual. For young adults with ASD, this is no exception. Some individuals are twice exceptional, meaning they can be gifted in certain areas while at the same time dealing with the diagnosis of ASD (Grandin, 2011). Depression and anxiety are common in adolescents and adults diagnosed with ASD, and antecedent, behavioral, and medical interventions may be implemented to ease symptoms and improve quality of life (Broadstock, Doughty, & Eggleston, 2007; Ghaziuddin, 2002). For these reasons, the iPad™ may be used as an antecedent intervention to address behavior, foster independence, assist with self-management and management of medication in order to help the individual with ASD develop the life skills necessary to actively participate in the community and enter the world of work.

Vocational Rehabilitation

All students, ages 3-21 years, are entitled to a free appropriate public education when diagnosed with one of thirteen disabilities, including ASD, under the Individuals with Disabilities Education Act (Yell, 2006). The move from the public education system to the vocational rehabilitation (VR) system is a move from entitlement to eligibility. Students who were entitled to receive special education services are not automatically eligible to receive VR service (Rabren & Curtis, 2007). They must apply for services, a process that begins by completing an initial interview with a VR counselor to discuss how and why the disability impedes employment. The counselor then conducts a comprehensive review, analysis, and diagnostic evaluation (Martin & Wright, 2007).

Unique VR guidelines and procedures add to the complexity of finding employment for young adults with DD and ASD. As a spectrum disorder, ASD impacts persons differently, and the VR eligibility determination process may lead to ineligibility decisions for persons at the extremes of the spectrum. Some applicants with ASD may be considered too high functioning to receive services (McDonough & Revell, 2010), while others may be considered too severe (Lawer, Brusiovskiy, Salzer, & Mandel, 2009). Despite eligibility considerations, the number of individuals with ASD qualified for VR services has risen dramatically. From 2002 to 2006, the number of adults with ASD served by VR rose more than 121%, while the overall population served rose 4% during the same years (Cime & Cowan, 2009).

A study of all VR closures in the U.S. for fiscal years 2002, 2005, and 2006 revealed that adults with ASD received the most expensive set of services, but were al

more likely to be competitively employed at case closure than all other groups of consumers (Lawer et al., 2009). For individuals with ASD who are able to access VR services, a small body of research has begun to examine practices and services that may contribute to successful employment outcomes (Hendricks, 2010; Lawer et al., 2009; Schall, 2010; Standifer, 2009). Using the successes of several educational interventions, Standifer (2009) developed a guide for VR professionals working with consumers with ASD. Educational interventions such as Applied Behavioral Analysis, positive behavioral supports, picture exchange communication systems, story-based interventions, and scripts could be used in the context of VR services to assist consumers in obtaining employment (National Autism Center, 2009b; Schall, 2010; Standifer, 2009). For example, a work-related story-based intervention developed for an adult with ASD might be written to enhance understanding of why transportation (e.g., the city bus) does not always arrive on time.

In an extensive review of the existing literature, Hendricks (2010) identified five major themes for recommended vocational supports: (a) individualized job placement, (b) supportive supervisors and coworkers, (c) extensive on-the-job training, (d) workplace modifications, and (e) long-term support. Some of Hendricks's themes came from an analysis of successful supported employment (SE) programs for individuals with ASD. Lawer et al. (2009) revealed that a majority of consumers placed into competitive employment had received on-the-job supports as a service from VR. Such services include job coaching, follow-up and follow-along, and job retention services (p. 28). On-the-job supports are a service often provided as a component of SE services.

The iPad™ may be used to enhance vocational supports in a variety of ways. For example, to enhance on-the-job training, task analysis applications on the iPad™ can be individualized for an employee's job duties so that an employee can complete tasks and receive reminders as necessary without depending on a coworker or supervisor. Also, to enhance long-term supports, the iPad™ can assist employees with independent living tasks (e.g., navigating public transportation and complying with medication) that are necessary for maintaining and retaining employment. The potential uses for the iPad™ to enhance vocational supports may be as infinite as the applications available.

Supported Employment

The Rehabilitation Act of 1973 (amended) defines supported employment as:

competitive work in integrated work settings, or employment in integrated work settings in which individuals are working toward competitive work, consistent with the strengths, resources, priorities, concerns, abilities, capabilities, interests, and informed choice of the individuals, for individuals with the most significant disabilities [Section 7(35)(A)]

and

ongoing support services and other appropriate services needed to support and maintain an individual with a most significant disability in supported employment [Section 7(36)]

The Rehabilitation Act further defines populations for whom this service is intended:

- for whom competitive employment has not traditionally occurred; or
- for whom competitive employment has been interrupted or intermittent as a result of a significant disability; and
- who, because of the nature and severity of their disability, need intensive supported employment services for an extended period of time [Section 7(35)(A)(i)(I)(II)(ii)]

Based on this definition, persons with ASD determined eligible for VR services must also meet the agency's criteria for having a most significant disability. Each state VR agency can determine its own criteria for most significant disability as long as the foundation of the criteria is consistent with the definition of significant disability as outlined in the Rehabilitation Act [Section 7(21)(E)]. This highlights the importance of understanding federal/state guidelines impacting the access persons with ASD have to SE services provided through state VR agencies.

Research has shown that SE services can be effective for individuals with ASD in obtaining competitive employment (Hendricks, 2010; Howlin, Alcock, & Burkin, 2005; Lawer et al., 2009). However, access to services depends on several factors. These include (a) VR counselors' knowledge of SE services, (b) VR counselors' understanding of service provision to persons with ASD, and (c) the availability of SE providers and funding. The majority of VR professionals lack the training to serve individuals with ASD due to a shortage of courses on ASD at universities and limited training opportunities (Dew & Alan, 2007).

According to the Rehabilitation Act, extended services inherent to SE, along with the funding for these services, cannot be provided due to VR service time limits. Funding for extended services is often provided through Medicaid Waivers administered through DD agencies, but persons with ASD may not meet a state's eligibility criteria for a Medicaid Waiver. Individuals with ASD can receive assistance from DD agencies, but many agencies only serve individuals with a diagnosis of intellectual disability. The lack of services and funding illustrate the significant need for specialized employment services that provide long-term supports for this population (Dew & Alan, 2007; Howlin et al., 2005).

Howlin et al. (2005) investigated a specialized SE service for adults with ASD. They found that the specialized program increased the participants' salaries and decreased their need for government benefits. Many individuals with ASD have talents and skills that can be

conveyed into meaningful employment. These individuals have a strong desire to be productive, contributing members of society; however, they need appropriate interventions to achieve this goal (Dew & Allan, 2007). Though specialized SE services may be a promising VR service for persons with ASD, the lack of such programs presents a significant barrier (Jarbrink, McCrone, Fombonne, Zaden, & Knapp, 2007).

The iPad™ can be used in SE to support employees' vocational tasks and the independent living tasks necessary for maintaining employment. For example, employees with autism may require a video story-based intervention that shows how to appropriately greet coworkers or customers. This video can be created and saved on the iPad™ so that an employee can access the video while working (e.g., during a break or prior to starting a shift) as a reminder of appropriate social interactions. Additionally, the iPad™ may be used for a variety of reminders throughout the employee's day away from work, such as taking medication, paying bills, catching the bus for work, or grocery shopping. Completing all of these independent living tasks enhances the employee's ability to maintain employment.

The Triumph Project

Community rehabilitation programs have been providing SE services in partnership with VR agencies for a number of years, but services targeted to persons with ASD are limited. An innovative nonprofit, urban-based, alternative program of support provided to individuals with DD was chosen as the focus of this project. The organization provides supports to individuals who meet the following criteria: (a) have a DD; (b) are at least 18 years of age; (c) require no skilled nursing; (d) have the ability to feed, clothe, toilet, and medicate independently; and (e) live independently or have the goal to live independently (Triumph, 2011). Though a diagnosis of ASD is not required to receive services from this program, a majority of participants are on the spectrum. This program is a vendor with the state VR agency and receives funding to provide SE services.

Individuals enrolled in the program live in various settings at various levels of independence ranging from supported living in a family home to living independently in a community apartment. The organization assists individuals in developing personal goals for independent living, SE, and social activities, while fostering and expanding a sense of self-determination and fulfillment in life. This organization is unique because life-coaching is an integral part of the interventions provided. The iPad™ has been incorporated into vocational training, life-coaching, and therapy sessions as an antecedent intervention to assist each participating individual in achieving more independence and reducing the need for one-to-one supervision and/or job coaching. This program does not receive funding from VR for the extended services provided to participants. Additionally, the state's Medicaid Waiver that could provide

funding does not apply to most of the program's participants because they exceed the minimum IQ of the state Medicaid Waiver.

The three individuals highlighted in this article were trained, received an Apple™ iPad™, and then received follow-up training two months later. Applications for the iPad™ were selected to help with organization, scheduling, task sequencing, social skills, appropriate behavior and anxiety management, as well as leisure applications for developing coping and waiting skills. Training on the iPad™ was reinforced through weekly life coaching and therapy sessions. Life coaches also attended training on iPad™ applications.

Applications were selected based on individual needs and input from life coaches and program directors, and they were then introduced in training sessions. Training involved familiarization with the iPad™ and applications, and it was given by coordinators from a Center for Disability Research and Service located at a university in the southeastern United States. Two individuals received training in a small group setting and one received individual training because of the nature of her disability (Tourette's and ASD). Each session lasted approximately three hours.

Social Validity

It is important to assess social acceptability in terms of satisfaction, importance, and value of intervention procedures to relevant parties (e.g., individual, life and job coaches, therapists and/or parents or other interventionists). If an intervention is viewed as socially acceptable, there is higher probability that it will be implemented. Whether the intervention is maintained should be measured through data collection (Cooper, Heron, & Heward, 2007; Lane & Beebe-Frankenberger, 2004). The use of the iPad™ was deemed as socially valid by all stakeholders due to its portability, ease of use, age-appropriateness, versatility (i.e., ability to adapt applications to the individual user), and the positive social image it created for the individual. All of these factors led us to believe the iPad™ would assist individuals with integrating into their work environments and would be readily accepted by supervisors/co-workers as a useful technology with the potential to reduce the number of hours needed from a job coach.

Participants

Eight individuals receiving services from Triumph were selected for iPad™ use. Three individuals (one male, two female) with an ASD and/or comorbidity with another disorder were chosen to demonstrate how AT such as the iPad™ can impact independence. The individuals described were enrolled in a community-based rehabilitation program of support for individuals with DD, and they received funding through the state VR program for SE services.

Case Study: Eileen

Eileen is a 25 year-old woman with ASD, Tourette's syndrome, ADHD, and mobility orthopedic/neurological impairments. She lives with her mother and grandmother and receives services through the state VR program. The behaviors that impede her socially and in employment are (a) tics that include racially and socially inappropriate language, (b) perseveration on inappropriate behavior, (c) increased anxiety in social situations, (d) lack of understanding of social cues, and (e) difficulty maintaining age appropriate language. These behaviors impact independence, create problems during initial meetings with potential employers, and impact work relations and productivity. Her anticipation of tics often increased her anxiety and impacted her confidence level in the community and workplace.

Eileen had some volunteer supervised work experience in high school (e.g., shelving books in a library, cleaning a church auditorium, and organizing office supplies at a school). Job coaching for Eileen consisted of finding a volunteer position where she could eventually work independently. She began volunteering in the nutritional center at the local zoo. This lasted for several months and, with the assistance of a job coach, she became very competent in her position of preparing the correct diets for a variety of animals. Despite her success, the zoo would not allow her to work independently, so Eileen transitioned to a different volunteer position at a local non-profit organization where she assisted with office duties. She began this position with constant job coaching, which was faded. At the end of the study, Eileen was working independently for a four-hour shift.

Prior to receiving the iPad™, Eileen began working on gaining independence in the home with the support of a life coach. Eileen's independent living skills focused on grocery shopping and cooking, home organization, and time management. She conducted YouTube™ searches to observe appropriate behavior. Because of her fear of experiencing tics and her struggle to communicate feelings, Eileen limited her interactions with peers. She worked with her therapist to identify and communicate feelings, including the nuances between emotions and the ability to feel more than one emotion at the same time (e.g., excited and scared or happy and sad). Eileen also worked to express feelings appropriately and assertively, on decreasing attention seeking behaviors, and increasing her sense of control.

Eileen used Safari™ (the Internet web browser developed by Apple™) to access and search the Internet when stressed about the possibility of tics in public, and as a recreational tool to play her favorite word search games (e.g., Ultimate Wordsearch Free™). Each of the applications helped Eileen by lowering both her reported and observed anxiety level. The decrease was discussed in both therapy and life coaching, where she reported that her confidence increased with her family and in the community.

To expand on her positive experience with modeling of appropriate behavior on Youtube™, an individualized story-based video intervention was developed for Eileen. She used it on her iPad™ to help her increase independence at a new volunteer position (see Table 1 for script). This video story-based intervention, similar to a Social Story™ (Gray, 2000), depicted a normal work routine and prompted her in a positive manner to follow a sequence and remain on task. Prior to using her personalized video story, Eileen continuously needed a job coach present to prompt her, both verbally and physically, to stay on task during her shift to maintain appropriate social boundaries. The personalized video story provided prompts that aided Eileen with structuring her day, planning leisure time, and assisting her in knowing how to interact appropriately with co-workers.

Table 1

Script of personalized video for Eileen

A day at work for Eileen

Starring Eileen

I work for Alabama Justice Ministries

When I get to work I say good morning to everyone

If I bring a drink I put it in the refrigerator

After I put it in I close the refrigerator

I go to Beth and ask her what to do first

I do the work Beth gave me until it is done

If I need help I can go ask Beth

When I finish my work I ask Beth what to do next

If I get a break I can use my iPad

When the break is over I get back to work

I usually work until 1PM

Before I leave I say goodbye to everyone

The End

Eileen's overall independence increased using her iPad™. The use of her apps (e.g., reminders of the next task) while in the community increased her ability to stay focused, decreased her tics and, by Eileen's report, helped to increase her confidence and reduce stress. This positive trend contrasts with her former cycle of stress about the so-

cially awkward tics that often occurred in public when she was worried most about their occurrence, a cycle she worked for years to extinguish. Her increased independence at the volunteer position through the use of the personalized video story on her iPad™ eliminated the need for a job coach, another positive outcome.

Case Study: Erik

Erik is a 26 year-old male with ASD who lives independently and receives VR services. The behaviors that impede him socially and in employment are (a) inappropriate comments that often have sexual content, (b) impulsivity, (c) difficulty with boundaries, (d) poor hygiene, (e) difficulty remembering to eat prior to work, and (f) difficulty deviating from routine. These behaviors impacted relationships with employers and were seen as a liability to customer relations. His perseverative comments on change in routine distracted others, served to decrease his productivity, and were often interpreted by the employer as complaints about job task/duties. His lack of self-control and impulsivity manifested during interactions with customers and coworkers, as he frequently inserted himself into the conversations of others.

Erik's vocational history included volunteer positions at the zoo, an animal hospital, a service organization, and a support service agency for the elderly. Erik worked at a local grocery store for three weeks, but was terminated for poor social skills. He was then employed as a mail clerk at a large mental health center, where he worked in data entry and basic office tasks for almost a year. He required support provided by a complex reinforcement system that rewarded him monetarily for speed and accuracy.

With two months of extensive job coaching that involved task analysis of job skills and teaching socially appropriate responses, Erik began working independently at a local pizza chain as a sign advertiser and maintained this position for eleven months. Erik's managers spoke highly of him because he arrived on time, worked to develop new customers, and demonstrated a belief in the product. He decided to resign from his position at the pizza chain because of a growing difficulty understanding how the weather impacted his schedule. Erik resigned in a professional manner that included an appropriate two-week notice.

After receiving four months of biweekly life coaching focused on medication management, hygiene, daily organization, and scheduling, as well as SE services with the community-based program, Erik made the decision to move into his own apartment. He also maintained therapy with a private psychologist with whom he had been receiving services prior to his involvement in the community-based program.

After training on the iPad™, Erik began utilizing the standard calendar application to structure his time and maintain a central place to visually remind him of appointments. A music cue was used intermittently to add variety to the reminders. He used the device to

make a daily "to do" list (A Notepad HD™) as well as a weekly grocery list (Shopping List Lite™) and meal planner (A Notepad Lite™). Erik was able to shop independently and make healthy food choices – both of which were a challenge prior to using the iPad™. Additionally, he used several age appropriate gaming apps (e.g., Angry Birds™) to reduce anxiety, ease frustration, and reduce boredom. Other areas of improvement include medication and time management, personal hygiene, and apartment cleanliness.

The use of the iPad™ calendar helped Erik maintain independence from his family and life coach. He now has a consistent place to look when organizing his day and week. Erik had mixed results with using the "to do" list. A phone call from the life coach was initially used to supplement the iPad™ "to do" list. Then he transitioned to using a self-reminding cell phone alarm in addition to the "to do" list. These supplemental interventions did not slow a clear decline in progress. The "to do" list had to be coupled with another strategy to help Erik finish daily tasks.

Erik was able to meet several new peers in the lobby of his apartment building where he would go to gain Internet access and use the iPad™. He currently hangs out with these peers on a regular basis and has developed several friendships. Through the use of the iPad™, some difficulties that have plagued him in different employment settings are currently less significant. The use of the iPad™ grocery list application helped him to keep healthy food in the house, which in turn led to the behavior of eating prior to and packing a snack for work. Finally, the use of his iPad™ to keep track of his work schedule is opening up a whole new level of independence for Erik.

Case Study: Gwen

Gwen is a 23 year-old woman with diagnoses of ASD, ADHD (combined type), and Psychotic Disorder-Not Otherwise Specified. She currently lives independently and receives services from VR. The behaviors that have impacted her ability to maintain employment include (a) impulsivity, (b) difficulty with reasoning and decision making skills, (c) poor hygiene, (d) apartment cleanliness, (e) problems maintaining boundaries, (f) poor time management, and (g) thoughts of grandiosity. Her struggles with timeliness and hygiene were addressed in the workplace, as well as her difficulty understanding role/policies in the workplace and in the community. She often chose to trust information given to her by peers, even when it conflicted with the instructions of her employer. She had difficulty understanding money and the concept of not over spending.

Three years before participating in the community-based program, while living in another state with her mother and stepfather, Gwen worked for a fast food restaurant making French fries and at the drive-thru window. She was let go from the position for refusal to complete job tasks. She worked in another restaurant for a short amount

of time where she was also terminated for refusal to complete tasks. Gwen was then hired at a retail food chain and restaurant as a seasonal associate. After the seasonal position ended, Gwen began working at a local barbecue restaurant. Here she had a difficult time requesting her schedule, remembering her schedule, and showing up for her work shifts. Gwen was terminated from this position one month later.

Money management has created issues with peers because Gwen would often borrow money, fail to pay it back, or find a reason why she should not pay it back. In addition, Gwen's hygiene has added to difficulty with social situations. While participating in the community-based program, Gwen's life coaching focused on money management, time management, and medication management. Her therapy focused on grounding her thought process in reality, processing past hurt, identifying and exploring feelings, and taking responsibility.

When Gwen began using her iPad™, she asked to synchronize it with her phone using a general Google™ application so that both devices would help her remember her schedule and appointments. She was trained to use the iPad™ calendar to assist in organizing her daily home routine, increase time-management skills, increase independence in monitoring and making doctor appointments, and maintain her work schedule.

When trained in a group on the MedsLog™ application, Gwen shared that she had been prescribed medication, which she had not filled and was not taking. She had been prescribed Deplin (to stabilize her mood), and her desire to use the Medslog™ application motivated her to take her medication. This was an important outcome that impacted her ability to function in a work and social environment. The staff involved with Gwen reported that it made a big difference in Gwen's overall functioning, increased her mood stability and decreased her thoughts of grandeur.

A month after being trained and receiving the iPad™, Gwen started a job at a local grocery store as a cashier. By this time, she was competent in using her iPad™ for scheduling, organizing her time, and making sure she took her medication as prescribed. Since beginning work after receipt of the iPad™, Gwen has not missed any shifts, has required minimal job coaching, and takes her medication as prescribed. The management at Gwen's job reports that she is performing "above satisfactory" in all areas assigned.

Discussion

Best practices for working with individuals with ASD include positive, proactive, antecedent interventions that include teaching self-management skills (National Autism Center, 2009b). We sought to investigate the iPad™ as an AT device to assist individuals with ASD to structure their employment and day, reduce anxiety, self-monitor, manage their own medication, and provide coping applications that replicated what typical adults already used. Implementing these strategies culminated in increased independence, job placement, and job retention.

The iPad™ with the Apple™ MedsLog application was identified as a device that could be used in any setting, and in conjunction with other applications as an alternative stimulus to provide cues and reminders to take medication (instead of reminders from another adult). The Apple™ MedsLog application also notified the pharmacy when the prescription needed to be refilled.

Adults with ASD may have difficulty accessing the VR system because they do not meet eligibility criteria or because of limited services. State funding cuts to DD agencies and the reduction in Medicaid Waivers, which restricts the ability of VR agencies to utilize SE services (Dew & Alan, 2007), also impact access to these services. Organizations such as the Triumph Project assist those individuals who often fall in the gap of service delivery.

Apple™ applications for the iPad™, iPod™, and iPhone™ designed to support individuals with DD trying to live independently are being tested and made available in ever increasing numbers. Programs like Triumph, that assist individuals with ASD and other developmental disabilities who do not qualify for other support, help them develop personal goals for independent living, employment, and social activity, while fostering and expanding a sense of self-determination and fulfillment.

Conclusions

The authors realize that there has been much fanfare about the iPad™ and its implications for use by individuals with ASD and DD. This investigation has been an opportunity to explore the iPad™ as an innovative employment support for young adults with DD striving for independence. The iPad™ is not a miracle device and of major concern to many practitioners and professionals is that the device not be used excessively for individuals to overstimulate or self-stimulate. It does not replace the need for active engagement and other interventions that support employment, education, personal growth, and development (Donahoo, 2011). If individuals can reach independence through use of applications placed on the iPad™, it has the potential to be a useful AT device.

Individuals with ASD vary with regard to how the disability impacts their world. If the iPad™ helps with organization for one individual (to include proper taking of prescribed medicine), acts as a communication device for another, or a tool for anxiety reduction for yet another, then it is a tool that can make a difference in the lives of those individuals. Research should focus on the ways in which individuals respond to the device as a tool, as well as how it can be adapted for other populations. Using the iPad™, or similar devices, to increase independence has implications for VR service delivery.

Budget reductions often impact services to people with disabilities, yet the need for such services often increases. The need for services for persons with ASD has increased due to prevalence alone. This population can benefit from the provision of SE services such as those described in this study. Instead of waiting for increased fund-

ing or policy changes, identifying creative solutions that reduce the need for extended services may provide a better, more immediate solution. Use of the iPad™ is one such solution that provides immediate as well as long-term support to individuals in employment and reduces the costs associated with extended one-on-one job coaching and other traditional on-the-job supports.

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