



# **Executive Functions and the Importance of Meaningful, Age-appropriate Career Assessment and Vocational Evaluation**

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## **Abstract**

This paper outlines the benefits of ongoing and multiple forms of vocational assessment services for adolescents. The purpose is to discuss adolescent brain development and the roles executive functioning play in vocational assessments, especially vocational evaluation. The authors discuss the three levels of vocational assessment, recommend that vocational evaluators assess within work or learning environments, and provide recommendations and considerations for vocational evaluators as they observe manifestations of executive functioning. The authors make a case for vocational evaluators to understand the complex changes in the adolescent brain and to use current research that informs their practices and vocational evaluation recommendations to ensure that they are providing meaningful, career-focused assessment.

**Keywords:** adolescents; disability; executive functions; vocational evaluation

## **Introduction**

Various types of age-appropriate assessments, services, and approaches can inform an individual's career development and vocational future. This is as true for adolescents as it is for adults. However, because of a second sensitive period of brain development during age 13 through mid-twenties (Giedd, 2015), professionals providing assessment services can expect that adolescents may need ongoing and multiple types of assessment services as they progress through this major development period. To date, few authors have addressed the differing needs between adolescents and adults regarding

assessment of career development and vocational futures, particularly pertaining to how brain development may affect these. The term “age-appropriate” (20 U.S.C. 1416(a)(3)(B)), which is used to describe assessment required in the Individuals with Disabilities Education Act (IDEA) of 2004, takes on new meaning when considering assessment services for adolescents. Age-appropriate may refer to neurological as well as chronological age. The IDEA does not address the neurological or chronological distinction, but practitioners observe these differences daily through delivery of individualized assessments. The purposes of this paper are three-fold. First, the authors will present a brief status and description of vocational assessment, specifically reviewing the three vocational assessment levels. Second, using various forms of assessment as the foundation to provide services to individuals with disabilities, the authors will discuss adolescent brain development and the roles of executive functions in vocational and career assessment services. Finally, the authors will provide recommendations and considerations for the field of vocational evaluation and career development.

### **Status of Assessment for Adolescents with Disabilities**

Efforts to provide meaningful career development for youth, especially for those with disabilities, have fallen short in the last century and thus far in the early 21<sup>st</sup> (Carter et al., 2010; Oertle & O’Leary, 2017; Savickas, 2012; Wehmeyer et al., 2019). In fact, Oertle and O’Leary (2017) analyzed 2003 data from the National Longitudinal Transition Study-2 (NLTS-2) and found that students in special education received inadequate career development services. The researchers identified that only 61.4% had any career skill assessment, 58.1% received career counseling, and far lower percentages had job search instruction, job preparedness training, job shadowing experience, technology preparation, and job development assistance. Only 4.1% participated in internships and apprenticeships. These data are disheartening, considering that research shows students who engage in work (e.g., internships, apprenticeships, volunteer or paid competitive employment during high school) are more likely to obtain employment and earn higher wages after high school (Cobb & Alwell, 2009; Luecking & Fabian, 2000; Oertle & O’Leary, 2017).

American education often skips career development but pushes adolescents to leap into career decision making and vocational planning without providing opportunities to explore potential, lifelong employment contexts. For example, many school-aged individuals are forced to commit to four-year high school plans (college versus career courses, under the guise of becoming college or career ready) while in middle school. The absence of career development is viewed as a crisis (Savickas, 2012; Wehmeyer et al., 2019), and is emblematic of career development for all individuals. It is worse for people with disabilities (Bassett & Kochhar-Bryant, 2006; Wehmeyer et al., 2019). The lack of career exploration and development has a cascading, negative effect for adolescents making successful transitions from school to adult living or successful career transitions throughout their lives. Under or unemployment are often results of inadequate career development, especially for those with disabilities (Luecking & Fabian, 2000; Oertle & O’Leary, 2017). These circumstances, in turn, often lead to lives

of poverty (Anderson et al., 2017; Nye-Lengerman & Nord, 2016; Oertle & O’Leary, 2017).

For some adolescents, there is minimal, if any, time during their middle school and high school years to learn about, explore, or experience careers that will help them formulate vocational goals. Again, this is true especially for adolescents with disabilities (Bassett & Kochhar-Bryant, 2006; Oertle & O’Leary, 2017). For the few adolescents who have opportunities to participate in transition, career, and vocational assessment, these, albeit limited, services may provide the only career-related information they receive during their school careers. If they are fortunate enough to participate in work-based assessment, the most authentic form, their neurological responses will be informative to them and can be observed by assessors. Authentic assessment methods are actually meaningful learning processes (Fiske & Todd, 1994). They serve as positive interventions in the overall development of adolescents as they try to envision themselves in careers, work, and functioning in their communities. Again, too few of these assessment services (e.g., job shadowing and paid internships) are available to adolescents and notably, these services have diminished as federal priorities changed. The need persists whether policies support the services or not.

### **Transition, Career, and Vocational Assessment**

Assessment, or learning, within the contexts of actual work environments engage adolescents in related tasks and can ignite or reinforce their career and vocational interests and motivation. This is partly because their neurological development may be ready to make more meaning of such environments, understanding their emerging interests, as well as envisioning themselves working within them (Jensen & Nutt, 2015). This section will define differences between transition, career and vocational assessment. The latter will be divided further to describe three levels of vocational assessment. The authors will define and focus on the third level of vocational assessment, which is referred to as vocational evaluation or comprehensive vocational assessment.

Broadly, transition assessment encompasses all life roles and the supports needed before, during, and after transition to adult life; it serves as an umbrella term under which career and vocational assessment and vocational evaluation are included. Specifically, “transition assessment is an ongoing process of collecting information” about youths’ “strengths, needs, preferences, and interests as they relate to the demands of current and future living, learning and working environments” (Sitlington et al., 2007, pp. 2-3). Transition assessment uses multiple sources and approaches across multiple delivery systems (Neubert & Leconte, 2013). All stakeholders participate in the processes of information-gathering and decision-making based on the data gathered, but adolescents are always at the center of the ongoing process. Ideally, adolescents are the drivers for the whole assessment process.

Assessment for successful transitioning is holistic, in that data are collected within multiple domains (Leconte, 2011; Neubert & Leconte, 2013), such as physical and mental or behavioral health, home and family, personal responsibility and relationships,

community participation, leisure and recreation, and self-determination and advocacy (Cronin & Patton, 1993). Various transition assessment instruments have been developed for these domains appropriate for adolescents with different levels of cognitive abilities, primarily in the form of questionnaires and interviews. The Zarrow Center at the University of Oklahoma serves as a resource for free and public domain assessment instruments in a variety of domains (e.g., self-determination). Also, the National Technical Assistance Center on Transition: The Collaborative (NTACT-C) is a national resource for transition information and assessment resources.

Similar to transition assessment and subsumed under its own “umbrella” career assessment is an overarching concept which relates to life-long career development. It is an ongoing process which affects all life roles, predominantly for learning and working. Because contemporary work and workplaces are ever-changing and lack stability within a global marketplace (Savickas, 2012, p. 13), career assessment must necessarily address adaptability, flexibility, and ability to move between different career and work contexts, or jobs. These are fundamental aspects of career assessment. The National Career Development and Association (NCDA) is a national resource for practitioners regarding career assessment services and resources.

Differing from transition and career assessment, vocational assessment and evaluation are more focused on the role of the potential worker and employment. Vocational assessment and evaluation are components of the broader services just described; they play a vital role in transition, career, and other services (Leconte, 1999). Ideally, post-secondary education, employment, and independent living goals should be guided by transition and career assessment services with data provided by multiple education and rehabilitation personnel (Neubert, 2003; Rowe et al., 2015). Although vocational assessment and evaluation are accessible to some adolescents in public schools, they are often more available to those with disabilities who seek services from state vocational rehabilitation systems. This limited availability bolsters the argument for collaboration between special education and rehabilitation systems so that more adolescents can access vocational assessment or evaluation services at critical developmental times in their lives.

Vocational assessment is a process of gathering vocationally relevant information to assist in making vocational decisions. The Glossary of Terminology for Vocational Assessment, Evaluation and Work Adjustment defines (Dowd, 1993) vocational assessment as

a comprehensive process conducted over a period of time, usually involving a multidisciplinary team ... with the purpose of identifying individual characteristics, education, training, and placement needs, serving as the basis for planning an individual's educational program, and which provides the individual with insight into vocational potential (Dahl as cited in Dowd, 1993 p. 29; Leconte, 2019, p. 16).

Using the umbrella model, vocational assessment narrows the focus of assessment even more to the abilities, skills, temperaments, aptitudes, strengths, needs, work values, behaviors, etc. that are needed for actual vocational training and work or employment as well as the supports or accommodations they may need to succeed (Corthell & Griswold, 1987; Leconte & Roebuck, 1984; Thomas, 2020). Vocational assessment services may also address other aspects of one's life such as health, transportation, education, but primarily as they impact vocational aspirations, planning, and implementation (Corthell & Griswold, 1987; Leconte & Roebuck, 1984; Thomas, 2020).

The three levels of vocational assessment are described below. While vocational assessment methods are woven throughout each level, vocational evaluation is the most comprehensive service which uses real or simulated work and is customized for people who face the most daunting vocational barriers. It is still true today as it was when Crow (1975) and Nadolsky (1983) found that vocational evaluation, Level Three, was needed by a smaller percentage of the population. The other two vocational assessment options, Levels One and Two, are sufficient for people who face lesser vocational challenges or those who comprise the general population. These different levels of vocational assessment services are designed to meet the varying needs of individuals.

### **Three Levels of Vocational Assessment**

The three levels of vocational assessment descend from least intensive (Level I) to most intensive services (Level III). Each level should build off data collected in the prior level, but also each level can serve as a stand-alone service. All three levels must be tailored to the specific strengths, needs, goals, and situations of each individual. The levels begin with Level I: Needs Assessment or Screening, and move toward the final and most intensive and comprehensive service which is Level III, also referred to as vocational evaluation. Vocational evaluation differs from the other levels of vocational assessment as it is time-limited and may occur only once or at most twice in a person's life, whereas Levels One and Two may be ongoing or occur multiple times (Thomas, 1991), especially at transition points such as preparing to leave high school, identifying a major in college, or changing jobs. Each level typically requires an interview, career information, use of informal and formal instruments and techniques, and a written report, or vocational profile, which analyzes, synthesizes, and interprets assessment results. These results, in turn, form the rationale for recommendations for future planning and action.

#### ***Level I***

The first level of vocational assessment is a needs assessment or screening. The term screening should not be misinterpreted as "screening out" but refers to the process of identifying the strengths, needs, interests, preferences and goals of an individual. Data are collected via an interview, review of background information, limited use of formal or informal testing, and initial exploration of occupational information; the process culminates in decisions for providing additional services (Castiglione et al., 2018; Crow, 1975; Dowd, 1993; McCarthy, 2020). Many adolescents benefit from Level I vocational assessment and may not need more appraisal if they have clear goals and plans for education, training, and/or employment. During this level of assessment, adolescents

may simply need to explore vocations via the O\*NET or other occupational databases (e.g., the Canadian National Occupational Classification system) and analyze information gleaned from various assessment techniques. Assessment instruments and techniques typically used at this level include the aforementioned interviews, review of background information, data from informal instruments (e.g., interest inventories, temperament or values surveys), and informal conversations (Castiglione et al., 2018; McCarthy, 2020). The second vocational assessment level may build off the first level or, again, the screening assessment may be sufficient for most teens to make sound decisions regarding their desired vocational futures.

### ***Level II***

Level II, Exploratory, or Clinical Assessments, are provided if questions remain unanswered from participation in Level I or if the evaluator determines the person needs more intensive assessment and exploration. If this occurs, the first level can be skipped to initiate Level II. This Level of vocational assessment, or the intermediate process, may involve a detailed case review, vocational counseling, and/or use of informal surveys and standardized tests (Dowd, 1993); work sampling may also be included. If further information is needed, more intensive services are required, and participants may move to the next level.

### ***Level III***

The final or third level of vocational assessment is the most intensive and comprehensive process. It is recommended that Level III be conducted by a trained, certified vocational evaluator. Referral sources and vocational evaluators may confer to determine if Level III services are needed from the beginning. This third level, or vocational evaluation, is an in-depth process that systematically uses either real or simulated work as the focal point for assessment and vocational exploration; the purpose is to assist individuals in vocational development (Crow, 1975; Dowd, 1993; McCarthy, 2020). The vocational evaluation process incorporates medical, psychological, social, vocational, educational, cultural, and economic data (Castiglione et al., 2018; Crow, 1975; Dowd, 1993) as needed to develop viable, future planning.

Vocational evaluation aligns with and is an example of authentic assessment, which allows individuals opportunities to transfer knowledge into the workplace (Herman et al., 1992). Authentic assessment was defined and advocated by educators as an alternative to the testing movement (Fiske & Todd, 1994; Herman et al., 1992) and, as it happens, it serves to support and further define vocational evaluation, which itself was developed as an alternative to testing (Nadolsky, 1983). Vocational evaluation allows people for whom standardized testing is discriminatory to demonstrate their intelligence and abilities by actually performing tasks (e.g., making decisions, problem-solving, creating), usually within real or simulated work contexts. Authentic assessment, such as vocational evaluation, is a process that facilitates appropriate decision-making by giving meaningful feedback for improving learning, performing, and behaving and links educational and vocational options with “real world” performances, requirements, and experiences (Herman et al., 1992). Additionally, it requires participants to actively

accomplish complex tasks in natural environments while using prior knowledge, recent learning, and relevant skills to solve realistic, actual problems (Fiske & Todd, 1994). Work performances are not scored as much as they are observed to determine problem-solving ability, approaches to tasks, organization of working, etc.

By assessing one's ability to perform processes of learning, and application of knowledge in natural environments and situations, it allows adolescents, particularly if they have disabilities, to demonstrate abilities that cannot be captured on standardized tests. As such, authentic assessment is a low risk and low stakes (versus high stakes testing) process that is characterized by having people create, perform, produce or do, where individual performance is the focus (Fiske & Todd, 1994).

To become career-ready today, one must rely on the brain functions of problem-solving, goal setting, decision-making, self-monitoring and regulation, life-long learning, self-awareness and determination, maintaining "soft" or job-keeping skills often within new or different work environments (Morningstar et al., 2017). These skills are often discovered during Level III assessments in authentic or simulated work environments. Adolescents are still developing these abilities and skills; as a result, one-time assessments may capture a moment in time but will not represent evolving capabilities. Therefore, it is equitable and fair to offer assessment services as an ongoing process for adolescents. The following section will discuss adolescent brain development and the need for an ongoing vocational assessment and evaluation.

## **Vocational Evaluation and Executive Functions**

Vocational evaluation has an overarching goal to provide rationale and next steps for planning and preparation in education, training, and entry into a satisfying and satisfactory career or job (Nadolsky, 1981). In fact, Nadolsky articulated it well when he stated (1981) that vocational evaluation assists

individuals in determining whether they are capable of working or of successfully participating in the dynamic process, which occurs between the individual and specific work environments. Rather than observing or measuring individual traits in isolation from the work to be performed, vocational evaluation exposes the individual to a variety of practical, realistic work activities that require an active response to the tools, tasks, and procedures employed in each work situation. When confronted with various work-related situations, individuals must not only possess certain traits, but must actively express their abilities to satisfactorily perform the required tasks and activities. Thus, as individuals participate in vocational evaluation, they are given the opportunity to blend...their personal characteristics, with... the work demands, and experience the nature of working in various occupations. They are able to learn about themselves in relation to different types of work and to develop an intuitive feeling of their own vocational potential (p. 6).

The process of vocational evaluation as a continuing service emphasizes the triangulated, or expressed, tested, and demonstrated interests of adolescents along with

the compatibility, or congruence, of these interests with their abilities and aptitudes (Castiglione et al., 2018). Triangulation can occur only when evaluators use multiple sources of information and a variety of assessment instruments/tools, and methods, such as interviewing, work sampling, community-based vocational assessment (e.g., situational assessment, on-the-job evaluations, job try-outs), objective observation of behavior, etc. The purpose of triangulating is to furnish valid or true results (Leconte, 2019). Demonstrated interests are based on engagement between adolescents and their environments. For example, an adolescent's expressed and tested interests (e.g., interest inventory) indicate high preference for a computer-related career, but when performing such tasks, he has trouble paying attention, staying on task, and says he is bored. These manifested behaviors nullify his expressed and tested interests as they are more prevailing or true to actual preferences. Most evaluators will verify the adolescent's interests by describing what was observed and demonstrated. The lack of agreement of his expressed, tested, and demonstrated interests fosters discussion and usually the participant agrees that his demonstrated interests, or lack of them, are most accurate. Triangulation also considers where in the process of brain development an adolescent may be. Later or repeat assessment services might note that an adolescent's interests have changed. Being informed by adolescent neuroscience and appreciating the changes of the brain, vocational evaluators can observe the complexities of the adolescent brain and how research can inform practice and potential vocational evaluation recommendations. Changing interests are not a fault or problem, they simply are evidences of brain development.

Adolescent brain development, sometimes referred to as the second sensitive period, occurs around 13 and into the mid-twenties (Giedd & Denker, 2015; Jensen & Nutt, 2015), which causes the individual to experience intense emotional, physical, and behavior changes. During this reconstruction, the adolescent brain undergoes pruning of unused neural connections while other connections are strengthened. This allows brain functioning to be more efficient (Osher et al., 2020). The pruning of unused neural pathways occurs during early adolescence (Osher et al., 2020), whereas strengthening connections take place during later adolescence throughout the mid- to late twenties (Giedd & Denker, 2015). It is commonly known that providing education is a primary way to inform and strengthen neural pathways. Less acknowledged is that participating in transition, career, and vocational assessment processes also educates adolescents' understanding of who they are in relation to the world of work (Sitlington et al., 2007). This reinforces the necessity for vocational evaluators and other assessment professionals to understand how the brain develops during this period to ensure that knowledge of self and interests through vocational evaluation are aligned with executive development.

## **Executive Functions**

The majority of the adolescent brain reconstruction occurs in the frontal lobe, the portion of the brain behind the forehead (Kanwal et al., 2016; Meltzer, 2007). Located in the frontal lobe is the prefrontal cortex, home of the executive functions which are a set of goal-oriented, cognitive processes that assist an individual to execute goal-oriented behaviors (Dučić et al., 2018). Executive functions include but are not limited to



working memory, behavior regulation, emotional control, initiation, planning, organization, flexibility, and time management (Giedd, 2015; Giedd, 2018; Fuster, 2015; Meltzer, 2007). These cognitive skills provide adolescents opportunities to interact and implement goal-oriented behaviors in response to new or complex circumstances within an environment (Ruiz-Castañeda et al., 2020), including environments that are new to adolescents, such as work (e.g., a picker and packer job in a pet food warehouse) or learning (e.g., plumbing training in a Career Technical Education program).

Individuals' executive function abilities and personal interests change throughout the puberty and the adolescent period (Jensen & Nutt, 2015), which is why evaluating the relationship of executive functions and evolving career exploration and vocational development are vital. Prioritizing steps to reach a goal is another executive function required for sequencing one's plans to achieve a goal, such as having the ability to create a detailed plan to get a job, or to identify courses needed to graduate with a desired degree. Equally critical are the executive functions of adjusting or adapting to changing plans, responding to varying environmental conditions, and having overall flexibility. The ability to think before acting, or response inhibition, is part of executive functioning that helps one manage anxiety and control impulsive behaviors (Jensen & Nutt, 2015). Many of these types of executive functioning (e.g., emotional control) are more evident and demonstrated when adolescents are engaged in activities outside of a controlled laboratory (Skogli et al., 2017) or classroom. For example, hands-on activities within simulated or real work contexts heavily engages emotions and can provide a clearer understanding of adolescents' needs for success in the workplace. For instance, exhibiting anger by throwing down a lug wrench when she cannot remove a lug nut while trying to rotate tires indicates the need for alternative problem solving, such as asking an instructor or colleague for help. Such assessment data exceeds and is more meaningful than that which is gleaned from using paper-pencil or computer-assisted assessment instruments and holds more meaning for the adolescent.

Regardless of which methods, techniques, or instruments are used in career and vocational assessment, including vocational evaluation, adhering to the guidelines provided in the Revised Position Paper of the Interdisciplinary Council on Vocational Evaluation and Assessment (Castiglione et al., 2018) is necessary. The revised position paper provides guidance which are founded on premises of assessment being meaningful, holistic, humanistic, therapeutic, and equitable. To attain meaningful, holistic, humanistic, therapeutic, and equitable services, understanding hot and cold executive functions via engagement is useful.

### ***Hot and Cold Executive Functions***

Observing engagement, such as an individual in relation to the workplace, illustrates executive functions that are assisting adolescents as they develop and solidify their vocational goals. This is true especially if they are performing skills required in their preferred occupational areas. Furthermore, their executive functions assist in the execution of emotions that accompany the successful or unsuccessful implementation of behaviors when attempting to perform or master a skill (Fuster, 2015). Providing multiple opportunities to assess adolescents' abilities can provide insight to their

emotional control when they experience either hot or cold executive functions. Hot executive functions emerge when the situation, usually with some degree of uncertainty, can create an emotional response (e.g., motivation, fear). Simply, the hot executive functions have an emotional component (e.g., emotional regulation) (Chavez-Arana et al., 2018; Ruiz-Castañeda et al., 2020). Cool executive functions represent less emotional responses such as when one engages in analytic reasoning, cognitive flexibility, abstract thought, and organization and ranking of information (Ruiz-Castañeda et al., 2020).

When adolescents, including those with disabilities, have access to multiple opportunities to engage with work during vocational evaluation, their levels of hot and cold executive functions are most evident and pronounced. Using vocational or career interest as an example, most formal interest inventories (e.g., O\*Net Interest Profiler, Self-Directed Search) assess a person in a cool executive state. With these forms of assessments, there are no time requirements, incorrect answers, or outcome-related consequences. While formal assessment instruments play a part in vocational evaluation, they do not provide the opportunity for hot executive functions to respond to new, complex tasks encountered on the job. Using only paper and pencil career-focused tests or inventories may not provide evaluators with opportunities to differentiate how an adolescent engages in both hot and cool executive functions to complete a task.

Often vocational evaluators use multiple types of assessment strategies in a variety of environments because some formal and informal assessment instruments cannot discriminate between hot and cold executive functions. For example, Skogli et al. (2013) found that when performing assessments in the laboratory that analyzed working memory, planning, cognitive flexibility, and hot decision making, there was no difference between individuals with attention deficit hyperactivity disorder (ADHD) inattentive type and ADHD-combined (inattentive and hyperactivity) type in regards to hot and cool executive functions. Furthermore, adolescents with ADHD-combined demonstrated a greater need in cool executive functions skills when completing the Behavior Rating Inventory Executive Function (BRIEF) compared to ADHD-inattentive or the control group (Skogli et al., 2013). These findings are significant as the assessments were intended to measure hot and cool executive functions, yet were delivered in a controlled environment. The workplace is not a controlled environment, which can create unanticipated stressors (e.g., sustained eye-contact for long periods of time) for an adolescent to which he must respond and adapt throughout an extended time period (e.g., working for long periods without a break). Authentic environments provide vocational evaluators opportunities to observe hot and cool executive functions over a period of time in an uncontrolled setting.

Skogli et al. (2017) conducted a two-year longitudinal study to understand the development of hot and cool executive functions. The study included individuals with ADHD compared to peers without disabilities. Adolescents' ages ranged from 9-16 years old. Throughout the course of the two years, both groups demonstrated improvement in cool executive functioning; however, those with ADHD performed below their peers without disabilities. Adolescents with ADHD and peers without disabilities who showed hot executive functioning, specifically decision making, did not improve throughout the

study. The researchers stated that hot executive functions mature later in brain development this is due to the development of the adolescent brain (Skogli et al., 2017). Thus, there is a clear rationale for providing a spectrum of opportunities to ensure participants indicate their tested, expressed, and demonstrated career interests through various assessments and environments as hot and cool executive functioning develops at different rates throughout adolescence.

Interest in job or work tasks may increase motivation. Work motivation can be challenging to assess, but is critical when assessing skills, because one is evaluating the “arousal, direction, magnitude and maintenance of effort in a person’s job” (Katzell & Thompson, 1990, p. 144). The emotional arousal, observed as hot executive functions of motivation, may be seen through various executive functioning skills and behavioral regulation such as focus, attention to detail, self-correction, and time management. Observing emotional arousal reinforces the need for vocational evaluators to assess adolescents with multiple assessments so they understand how motivation may influence career exploration and future employment opportunities. Furthermore, vocational evaluators can identify potential changes in hot and cool executive function skills. They can observe the impact motivation has on these goal-oriented behaviors as adolescents perform work tasks.

A benefit of performing assessments in community settings, where vocational evaluators can observe specific work-related behaviors is that they gain insight into various ways adolescents respond to their environments. This reaffirms the importance of providing people, especially those with disabilities, opportunities to have authentic work experiences within the community based on their abilities, interests, preferences, and needs for supports or accommodations. These authentic work environments are particularly critical when considering adolescents’ executive response and control during novel work experiences. They may demonstrate emotional control when performing tasks in which they have expressed interest on an interest inventory, but actually performing tasks of interest allows vocational evaluators to observe how adolescents implement executive functions to avoid distractions, manage tasks, initiate behaviors to begin tasks or conduct self-assessment. Furthermore, self-regulation and social skills can be identified while observing how adolescents interact with various personalities provided in a real-time working environment (Fuster, 2015).

Though time-consuming, opportunities to create workplace assessments are needed to identify how the brain is communicating with the prefrontal cortex and which behaviors an adolescent chooses to implement while performing the tasks (Poon, 2018; Zimmerman et al., 2016). This will provide clues to understanding how one demonstrates motivation during internships, situational assessments, or on-the-job evaluations. Motivation, coupled with positive emotions, will provide vocational evaluators with data (i.e., rationale) to recommend specific opportunities to explore job-related tasks within the community for potential employment. Since adolescence is a crucial period of ongoing development, evaluators (and others) must try provide multiple opportunities to exhibit hot and cold executive functioning and to demonstrate motivation and skill development throughout the transitioning period from a child to an adult (Kanwal et al., 2016).

## Discussion

Adolescence can be a difficult period for young people as they are learning who they are in relation to the world. While they are adjusting to frequent brain changes, they must also meet typical demands of achieving academically, participating in social activities, and making career decisions which may shape their adult lives. Taking adolescent brain development into account, vocational evaluators and their referral sources will provide most effective services if they understand basic developmental brain changes and the manifestations of these changes. Along with this understanding, both referral sources (e.g., counselors, teachers, parents) and evaluators must be knowledgeable about the three levels of vocational assessment services in order to request and implement specific intervention services (i.e., vocational assessment) that align with adolescents “where they are” and where they hope go. Having knowledge about the levels will enable optimal outcomes for adolescents, most of whom are trying to acclimate to neurological changes.

To reiterate, Level I and Level II can provide sufficient services for many adolescents, they rely primarily on paper and pencil or computer testing along with interviews, career exploration activities, and, possibly, some work-based assessment methods. In addition to the methods used in Levels I and II, Level III allows vocational evaluators to observe adolescents in simulated or authentic work environments. Thus, they can identify how adolescents may respond to unanticipated incidents experienced while performing work or a job. For example, an adolescent interested in mechanics and they are shadowing an employee in automotive shop. The employee, not paying attention while changing a battery places a wrench on a battery terminal. The resultant, unanticipated connection causes sparks to fly. The real-life, authentic incident allows evaluators to observe how the adolescent responds before, during, and after the incident and also provides insight into her hot and cool executive functions.

Again, adolescence is a time when significant physical changes along with neurological restructuring of the brain (Jensen & Nutt, 2015). Some adolescents physically look like adults, yet, due to the developing brain and executive functioning needs, they may emotionally respond similarly to those who appear much younger. Professionals’ subconsciouses may set up unrealistic expectations for adolescents based primarily on physical appearance. As a result, vocational evaluators may unintentionally have unrealistic expectations unless they have an informed understanding of adolescent brain development. Also, this understanding will help practitioners customize and nuance practices. Nuanced and tailored services acknowledge and value how intense brain changes impact individuals’ goals, preferences, dislikes, and dreams (Jensen & Nutt, 2015), and why it is important for professionals to provide multiple opportunities in multiple ways to educate and empower adolescents as they relate to the world work (Castiglione et al., 2018). An essential take away from neuroscience research is that connections across the brain strengthen from experiences and understanding consequences (Fields, 2015; Fuster, 2015). Retrieval of skills are related to these brain pathways and provide the ability for adolescents to implement behaviors that are expected in their desired career or vocational environments. Exposure and experience

provide opportunities for adolescents to voluntarily, or involuntarily, respond to triggers within the environment (Fields, 2015) which allows self-reflection and adaptation. The latter is possible due to the plasticity and flexibility of the adolescent brain (Kanwal et al., 2016).

Because the executive functions are undergoing constant and dramatic development during adolescence through the mid-twenties (Poon, 2018) and developing at different time periods (Skogli et al., 2017), evaluators are front-line observers of behaviors and performances during the assessment process. Valuable information gained from observing adolescents in authentic work environments, real or simulated, can validate the needs of adolescents so relevant data represent where the individuals are currently presenting success, and not where we think they should be performing. By triangulating and synthesizing the results of all assessment methods and techniques, adolescents, evaluators and referral sources will be informed about which environments, meaning careers and jobs, will make the best matches for their preferences, abilities, aptitudes, skills, needs, and behaviors. It is understood that vocational evaluators start “where the person is” rather than where someone thinks they should be. Again, chronological ages often may not align with adolescents’ neurological development.

## **Recommendations for Practice**

Understanding adolescent brain development and subsequent behaviors helps vocational evaluators understand exactly what and possibly why they are observing certain adolescent performances and behaviors as adolescents perform assessment activities. This means evaluators must seek information and training about teenage behaviors and brain development, since they commonly view behaviors that are associated with adolescents (e.g., response to peers, sensation-seeking actions, risk-taking behaviors) as a part of a developmental period. However, to identify if these behaviors are typical of chronological brain development, if they are manifestations of disability, or if the adolescents have ready rationale for their behaviors, observations must occur either over time or more than once. Some professionals may be tempted to interpret such behaviors as being immature, defiant, or troublesome (Fuster, 2015; Galván, 2017; Giedd, 2015), but by educating themselves about adolescent brain development they may see behaviors through a different lens. Some adolescent behaviors actually may be helpful within the evaluation process, such as a propensity for risk-taking, which may foster exploration of careers and/or jobs adolescents ordinarily may not consider. Also, inclusion of work samples, simulated work tasks, and community-based vocational assessment techniques allow them to try different types of work without the usual risks of failing on a job.

When considering how to better support adolescent executive functioning needs during career exploration and vocational evaluation, practitioners can follow guidelines contained in the “Revised Position Paper of the Interdisciplinary Council on Vocational Evaluation and Assessment” (Castiglione et al., 2018). The guidelines and principles serve to operationalize the field’s philosophical premises (e.g., holistic, humanistic, therapeutic, and equitable) as professionals seek to “do no harm” to those they serve (Castiglione et al., 2018; Smith et al., 1996). Specifically, principles state that

practitioners should use a variety of sources to gather information, they should assure that assessments are systematic and that adolescents know why they are performing these activities. Also, assessments should be based on objective behavioral observations and feedback (Castiglione et al., 2018; Smith et al., 1996). These universal guidelines reinforce the importance of ongoing, appropriate, authentic assessment to understand how, or if, certain environments influence hot and cold executive functions on the job.

## **Recommendations for Professional Development**

There is a need for professional development that focuses on adolescent brain development. Advocating for additional professional development for vocational evaluators in general has been well-documented (Leconte, 2014; Reid, 2020; Tidwell, 2016) to develop knowledge and skills to provide assessment within authentic environments. Professionals have requested that federal policy makers include training that includes adolescent brain development to help them understand what they are observing in all environments and how to interpret their observations and other evaluation data accurately (Leconte, 2020). Unfortunately, federal policy makers and allocators of federal training funds have not been responsive to training needs requests, (primarily due to having too few professional development dollars available to meet multiple needs), yet most evaluators have waiting lists for their services. As a result, local and state administrators as well as professional associations (e.g., Vocational Evaluator and Career Assessment Professionals, VECAP) must try to fill this training void with short-term training. Meanwhile, professionals, especially members of the Interdisciplinary Council on Vocational Evaluation and Assessment, should continue to recommend formal graduate education for vocational evaluation.

A second recommendation addresses meaningful, universal access to Level III vocational assessment (i.e. vocational evaluation). Adolescents should have access, both in school and in adult services, to Level III: Vocational Evaluation services, to help them take next steps toward their career and vocational futures. To provide this, referral sources such as transition specialists, secondary education special education teachers, school and vocational rehabilitation counselors, and parents should have access to professional development that acquaints them with the different levels and benefits of vocational assessment. As they become educated about the benefits of these services, time may be saved (and potential, unnecessary failures) in adolescents' quest for careers or jobs which match their abilities, strengths, temperaments, and wishes. Providing a variety of assessment options (Castiglione et al., 2018) which include work gives evaluators opportunities to understand teens' emotions. Positive and negative emotions provide crucial data to make recommendations for individuals (noted in evaluation reports) and they showcase interests, preferences, and needs of the adolescents while they interact within certain environments or while performing specific work tasks. The more positive the emotion, the stronger the connection throughout adolescents' brains (Galván, 2017; Joseph, 2017). The movement away from paper and pencil or computer tests towards using work in authentic work environments, allows evaluators to better gauge emotions and preferences of adolescents. There needs to be a focus by all professional assessment entities to encourage the use of stimulated or real work settings to understand the potential role of emotions on the job. All this said, a third

recommendation regarding professional development includes the need to train assessment personnel, particularly vocational evaluators, to use authentic assessment based on work, real or simulated. Since there are no longer graduate education degrees for vocational evaluation, evaluators must resort to on-the-job training or on what they have learned in rehabilitation or special education graduate programs. Unfortunately, because vocational assessment, especially vocational evaluation is not emphasized in these programs (due to lack of time and to meeting the requirements of accrediting bodies), vocational assessment is addressed in a cursory fashion and the focus is on testing.

To increase the availability of vocational evaluation services, the general public, particularly professionals working with adolescents must understand what they are and their value. Once they understand the benefits to adolescents through professional development, they can advocate for the inclusion of services in secondary and postsecondary education, vocational rehabilitation, and workforce development. A few vocational evaluators volunteer to do presentations in college and graduate school vocational rehabilitation and special education programs. This is a positive step, but, again, the Interdisciplinary Council and VECAP could craft a systematic campaign to encourage that training related to vocational evaluation be incorporated into local graduate educational programs.

## **Conclusion**

Adolescents have years when their brains constantly develop and respond to the environment (Armstrong, 2016; Banich et al., 2013; Fuster, 2015). While prefrontal cortex development can begin to have strong influences on behaviors as early as ages 10-12, the developmental period may not end until around ages 25 or older (Fields, 2015; Fuster, 2015; Giedd, 2015). While no one age denotes the move from adolescence to adult maturity, maturity evolves over a range of years when connections to brain regions occur and influence behaviors (Galván, 2017; Giedd, 2015; Poon, 2018). Vocational evaluation provided by professionals who understand executive functioning within adolescents' pre-frontal cortex can be the conduit that ensures adolescents are receiving meaningful opportunities to explore and reflect on the world of work—which can lead to satisfying, economically sound employment.

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