

UNDERSTANDING AND SUPPORTING MASTERY MOTIVATION IN EVERYDAY ACTIVITIES: A FOCUS ON EARLY CHILDHOOD INTERVENTION

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Abstract

Mastery motivation involves a child's attempts, even if unsuccessful, to master challenging tasks; thus, it is different from competence. The purpose of this article is to describe the construct and measures of mastery motivation and motivation-enhancing strategies in early intervention for young children with delays. Mastery motivation predicts children's school performance and executive function. Caregivers of young children with delays tended to view their children as having lower mastery motivation; however, children did not show lower motivation when given tasks that were moderately challenging. The quality of caregiver-child interaction and mastery motivation are highly correlated. We propose a 5-Step Enhancing Mastery Motivation model (5-SEMM) in early intervention services. Based on the model, practitioners collaborate with children's caregivers to evaluate children's mastery motivation and related factors, and to set motivation-related goals. Under practitioners' support, caregivers build capacities and can use motivation-enhancing strategies for enhancing children's engagement in daily activities.

Keywords: mastery motivation; early childhood; developmental delay; early intervention; assessment

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Introduction

Mastery motivation involves a child's attempts, even if unsuccessful, to master challenging tasks (Morgan et al., 2017). Mastery motivation is the drive that occurs in order to achieve competence, and considered as a key element to predict competencies in various developmental domains, during daily routines for young children, through school academic performance for children with and without developmental delays (Fung & Chung, 2019; Gilmore & Cuskelly, 2009; Gilmore & Cuskelly, 2017; Hauser-Cram et al., 2001; Józsa & Barrett, 2018; Hauser-Cram et al., 2014; Wang, Chen et al., 2019; Wang, Liao et al., 2019). One study found that children with high motivation were more likely to be compliant with physical therapy and thus had a better functional outcome after intervention (Meyns et al., 2018).

The young child engaging in mastery motivation is demonstrating emerging abilities that may or may not achieve mastery and competence. However, most parents of young children with special needs and some early childhood interventionists might still focus only on the child's developmental abilities. This paper focuses on mastery motivation during assessment and considers mastery motivation as an important focus of early intervention practices to promote optimal developmental competence and social engagement and enhance collaboration with their families during daily routines.

The construct of mastery motivation

Mastery motivation is a multifaceted, psychological construct that stimulates the child's attempts to master tasks that are at least moderately challenging for him/her personally (Morgan et al., 2017). It has two major aspects: instrumental and expressive (Barrett & Morgan, 2018). The instrumental aspect motivates a child to attempt, in a focused and persistent manner, to solve a problem or master a skill or task, which is at least moderately challenging for him or her (Morgan et al., 1990). The expressive aspect of mastery motivation produces affective reactions while the child is working at such a task or just after completing it. Positive affect such as smiling after finishing a task and/or while working on a task is called mastery pleasure.

The two-aspect framework of mastery motivation, instrumental and expressive aspects was proposed by Barrett and Morgan in 1995. They proposed this conceptual framework for the development of mastery motivation behaviors in infancy and toddlerhood based on effectance motivation models (Harter, 1978;

White, 1959) and empirical research. The two-aspect conceptualization is supported by studies of English-, Chinese-, and Hungarian-speaking children's mastery motivation (Hwang et al., 2017; Józsa et al., 2014; Józsa & Morgan, 2015).

The term "multifaceted" highlights the several different domains of development and the contexts in which mastery motivation occurs, as well as the fact that mastery motivation might differ across these contexts and domains (Barrett & Morgan, 1995; Józsa, Kis et al., 2017; Wang & Barrett, 2013). Four current domains for the instrumental aspect of the mastery motivation have been studied: (a) Cognitive/Object Persistence, a child's motivation to persist at and master cognitive and school-related tasks; (b) Gross Motor Persistence, the motivation to master physical skills; (c) Social Persistence with Adults, the motivation to master interpersonal relations with adults; and (d) Social Persistence with Children, the motivation to master interpersonal relations with peers. The Cognitive/Object Persistence domain is observable when the child tries to master toys or objects, *e.g.*, "Works for a long time trying to do something challenging". The Gross Motor Persistence domain is when the child tries to master physical or gross motor activities, such as "Tried to do well in physical activities even when they are challenging (or difficult)" (Morgan et al., 2020). Social mastery motivation includes persistence or the motivation to control and be effective in social environments (Blasco, 2008), such as "Tries to say and do things that keep others interested" in Social Persistence with Children domain and "Tries (hard) to get adults to understand him or her" in Social Persistence with Adults domain (Morgan et al., 2020). Mastery motivation emphasizes the process of trying to master the task, rather than the child's ability to solve it (Barrett & Morgan, 2018; Busch-Rossnagel & Morgan, 2013).

In Shonkoff and Phillips (2000) National Academy of Sciences report mastery motivation was affirmed as an important factor in young children's development, and highlights the need for research in this field, stating that the assessment of mastery motivation should be an important part of the assessment of a child's development. The following section introduces two measures used to assess mastery motivation in young children.

Measures of mastery motivation for young children

Both the Dimensions of Mastery Motivation Questionnaire (DMQ; Morgan et al., 2020) and the individualized moderately challenging mastery tasks (Barrett et al., 2017; Józsa, Barrett, & Morgan, 2017; Morgan et al., 1992; Wang,

Liao et al., 2016; Wang, Morgan et al., 2016; Wang et al., 2017) have been used frequently in previous studies. The various language versions of the DMQ have been used to measure mastery motivation in many countries around the world (Morgan et al., 2020). The questionnaire assesses children's mastery motivation using ratings by parents, caregivers, teachers or older students themselves. It is available free online in three official languages, English, Chinese, and Hungarian and other 9 languages with acceptable reliability and validity (Morgan et al., 2020). There are four parallel age-related versions of the DMQ 18: infant (6 to 23 months); preschooler (2-6 years); and school-age by adult-rating (6-18 years) and by self-rating (9-18 years) (Morgan et al., 2020). The Infant version and Preschool version are rated by an adult familiar with the child (parents, caregivers, or teachers). The four scales of Cognitive/Object Persistence (COP), Gross Motor Persistence (GMP), Social Persistence with Adults (SPA), and Social Persistence with Children (SPC) measure the instrumental/persistence aspect of mastery motivation. Mastery Pleasure (MP) scale and Negative Reactions to Challenge (NRC) scale assess the expressive/affective aspect of mastery motivation.

In the individualized mastery tasks, sets of toys were used to identify the moderately difficult level of mastery task for each child and to rate the persistence and pleasure of cognitive/object behaviors (Barrett et al., 2017; Morgan et al., 1992; Wang, Liao et al., 2016; Wang, Morgan et al., 2016; Wang et al., 2017; Wang, Chen et al., 2019). The reliability and validity of the individualized mastery tasks have been demonstrated in previous studies (Hauser-Cram, 1996; Gilmore et al., 2003; Wang et al., 2016; Wang et al., 2017). Another recent moderately challenging mastery task method uses a computer tablet program to assess mastery motivation in 3-8-year-old children. The software assesses children's persistence while searching for letters or numbers in increasingly challenging arrays. This method shows promise for predicting children's success in school (Józsa, Barrett, Józsa et al., 2017).

Most previous studies have found that children with motor or cognitive impairments were perceived to be deficient in mastery motivation when rated by the caregiver using DMQ (Gilmore & Cuskelly, 2011; Gilmore et al., 2003; Glenn et al., 2001; Majnemer et al., 2010; Wang et al., 2013); however, children with delays did not show lower motivation compared with mentally age-matched typically developing children when given tasks that were moderately difficult for them personally (Wang et al., 2013; Gilmore & Cuskelly, 2011). Accordingly,

we suggest that clinicians and researchers use both the tasks and the DMQ to assess mastery motivation in young children with delays.

Mastery motivation in children with risk factors or delays

A number of studies have used mastery motivation measures to help understand the motivation of children with risk factors or delays (Gilmore & Cuskelly, 2011; Morgan et al., 2017; Wang et al., 2013; Wang et al., 2016). Other studies have examined factors that might influence the development of mastery motivation for children with risks or delays (Hauser-Cram, 1996; Gilmore et al., 2009; Glenn et al., 2001; Majnemer et al., 2010; Miller et al., 2014; Miller et al., 2016; Salavati et al., 2018; Wang et al., 2014; Young & Hauser-Cram, 2006).

Factors influencing mastery motivation for young children with DD have been reported in several studies. For example, better cognitive, gross, and fine motor functions were associated with higher levels of motivation in children with DD (Hauser-Cram, 1996; Salavati et al., 2018; Young & Hauser-Cram, 2006). A greater degree of prematurity and a history of seizure disorders were associated with lower levels of mastery motivation (Hauser-Cram, 1996). Mastery motivation is associated with academic competence, prosocial skills, and emotional functioning in preschoolers at risk for delays, such as preschoolers experiencing homelessness or low socioeconomic status (Ramakrishnan & Masten, 2020; Turner & Burke, 2003). Majnemer et al. (2010) found that children with cerebral palsy had significantly lower motivation rated by their caregiver than those with typical development; their prosocial behavior was also correlated with their mastery motivation.

Previous studies also showed that the higher the quality of caregiver-child interactions (*e.g.*, maternal sensitive-responsiveness, cognitive growth fostering, and supporting child's autonomy) the higher the level of mastery motivation in young children with DD (Gilmore et al., 2009; Kim & Mahoney, 2004; Wang et al., 2014; Wang et al., 2019; Young & Hauser-Cram, 2006). Similarly, maternal over-controlling behaviors were negatively associated with mastery motivation in toddlers with Down syndrome (Glenn et al., 2001). In clinical settings, therapeutic context was also demonstrated to play an important role in harnessing motivation and further enhancing engagement in therapy for children with unilateral CP aged 5-16 years (Miller et al., 2016). Difficulty level of tasks and children's preferences also influence the level of motivation (Miller et al., 2016; Odom et al., 2000). Therefore, children's motivated behavior will be influenced

by their developmental abilities, as well as environmental and personal factors (Imms et al., 2016). Practitioners of early childhood intervention (ECI) services should be aware of the above factors that influence motivation when conducting assessment, designing and providing ECI services.

Young children can learn better when they engage in daily activities with family and community supports (Division for Early Childhood, 2014; Guralnick, 2019; Liao et al., 2016; McWilliam, 2010; Sameroff & Fiese, 2000). Key features distinguishing the strategies to enhance mastery motivation from other strategies to enhance developmental abilities are mastery motivation's focus on moderately challenging tasks and its inclusion of multiple mastery aspects and domains (Barrett & Morgan, 2018). In the following section, we describe the importance of focusing on mastery motivation in everyday activities.

Guralnick (2019) discussed the importance of mastery motivation in children's development of competence. To achieve a goal, the developmental resources must be integrated by five organizational processes for each child, motivation being one of these five organizational processes (Guralnick, 2019), and in the next two sections, we describe the importance of mastery motivation not only in the first 5 years of life, but for children's later development and the constructs interrelationship with executive function.

Child development and school performance. Mastery motivation is important, in part, because it is a predictor of various skills across developmental domains and in school performance in young children with and without developmental delay. Five-month-old at-risk infants' motivated behaviors predicted children's intelligent quotient (IQ) at 3 ½ years (Yarrow et al., 1975). Preschoolers' mastery motivation, using the DMQ, predicted math achievement, reading achievement, and social skills in grades 1 and 2 (Józsa & Barrett, 2018), and toddlers' persistence on a challenging task predicted academic language and math skills in kindergarten (Mokrova et al., 2013). Józsa and Molnár (2013) found that Hungarian preschoolers' mastery motivation, using the DMQ, predicted academic performance in school better than IQ or tests of basic skills.

In addition, for children with developmental delay, early childhood persistence, using moderately challenging tasks was positively predictive of trajectories of cognitive and adaptive competencies from 3 to 10 years in children with global delays (Hauser-Cram et al., 2001), and task persistence of preschoolers with Down syndrome predicted academic competencies from 5 to 13 years (Gilmore & Cuskelly, 2009). The motivation of toddlers with delays on

moderately challenging tasks mediated the relationship between maternal teaching behavior and children's cognitive, fine motor, and gross motor abilities 6 months later (Wang et al., 2019). Furthermore, the association between mastery motivation at five and adaptive functioning at 23 years of age has been demonstrated by a longitudinal study of individuals with Down syndrome (Gilmore & Cuskelly, 2017).

Mastery motivation relationship to executive function. Executive function is often referred to as an “umbrella term” because it encompasses multiple functions of the brain related to cognitive constructs such as self-regulation and mastery motivation (Amukune & Józsa, 2021; Burnett et al., 2018; Isquith et al., 2005; Keilty et al., 2015; Ten Eycke & Dewey, 2016). In one model, Zelazo (2015) discussed the relationship between executive function skills (cognitive flexibility, working memory, and inhibitory control) and goal-directed attention and behavior (often associated with mastery motivation) that produce effective learning and adaptation. When discussing mastery motivation, Keilty et al. (2015) pointed out the relationship between persistence at cognitive and social tasks as it relates to goal-directed behavior that is more likely to occur when the child has developed the EF skills of working memory, inhibition, and cognitive shifting.

The DMQ 18 measures mastery motivation, a child's persistence in trying to solve challenging tasks and exhibit mastery pleasure starting as young as 6 months of age and continuing through young adulthood. Thus, exhibiting emotional pleasure and/or negative behavior through frustration is related to emotional regulation, a component of executive function. Early experiences can affect neurobiological emotion regulatory systems through the influence on higher and lower brain regions (Barrett et al., 2013). Multiple and rapid changes in brain development occur in infancy and early childhood that provide the foundational framework for behavioral development across developmental domains and executive function. Science in the past 20 years has opened insight into the plasticity of early brain development which is why it is important to nurture, scaffold, and build on skills in both mastery motivation and executive function.

Mastery motivation measured by structured mastery tasks at 3 years was found to predict executive function at 23 years for children with delays (Hauser-Cram et al., 2014). Most other previous studies also demonstrate a concurrent association between mastery motivation and executive functions for kindergarten or school-age children with typical development (Brock et al., 2009; Mizuno et al., 2011). Researchers have found a relationship between emotional control and

sensitive parenting that can impact a child's mastery drive. Therefore, mastery motivation can be targeted for early intervention services in order to enhance executive function and ameliorate or buffer learning difficulties and promote competence at school-age (Blasco et al., 2017). By incorporating measurement of mastery motivation and ensuring plans for motivation enhancement during daily routines, young children are more likely to be prepared for successful outcomes in their future.

Importance of mastery motivation in everyday activities for intervention

There are several reasons why it is important to focus on mastery motivation in everyday activities as a target in ECI services. Firstly, higher levels of mastery motivation, through focused exploration in early life, will increase interactions with the environment, and repetitive practice leads to better developmental competencies for toddlers (Seifer & Vaughn, 1995; Yarrow et al., 1975). For those with neurological impairment or developmental disabilities, neuroplasticity provides the potential for change, yet thousands of repetitive practices are needed to ensure that the changes are permanent (Lang et al., 2009). Thus, motivation is one of the important moderators of neuroplasticity (Cramer et al., 2011). Secondly, as mentioned before, mastery motivation is a positive predictor of later competencies and school performance for children with delays, so focusing on mastery motivation in daily activities in intervention services will increase the effectiveness of ECI services. Thirdly, persistence and pleasure indicators of mastery motivation are both similar to the participation concept, involvement in daily life, of the International Classification of Functioning, Disability, and Health (ICF) framework (World Health Organization, 2001). Also, child participation has been proposed as a "right" for children based on the United Nation's Convention on the Rights of the Child, the United Nation's Convention on the Rights of Persons with Disabilities, and the People with Disabilities Rights Protection Act in Taiwan (Liao & Wu, 2017), so it is important to focus on mastery motivation in daily life for early childhood intervention.

Motivation-enhancing strategies in early childhood intervention

From previous literature and the authors' experiences, we propose the 5-Step Enhancing Mastery Motivation model (5-SEMM) (Figure 1) based on the collaborative problem solving process (problem identification, problem explanation, goal identification, and intervention) (Bjorck-Akesson, 2018;

Greene et al., 2003; Liao et al., 2018; Liao et al., 2017; Liao et al., 2021) and motivation enhancement strategies (Barrett & Morgan, 2018; Liao et al., 2020).



Figure 1. The 5-Step Enhancing Mastery Motivation (5-SEMM) Model

Note: IFSP = Individualized Family Support Plans; IEP = Individualized Educational Plans.

Adapted from "Using DMQ 18 in Early Intervention and with School Children Who Have Special Needs " by G. A. Morgan, H-F Liao, and K. Józsa (Eds.), *Assessing mastery motivation in children using the Dimensions of Mastery Questionnaire (DMQ)* (p.194), 2020, Gödöllő: Szent István University. Copyright 2020 by Szent István University. Adapted with permission.

The 5-SEMM model emphasizes children's and families' participation in intervention programs based on family-centered approaches (Espe-Sherwindt, 2008) and the Developmental Systems Approach (DSA) (Guralnick, 2019). The family-centered approach includes three key elements: (1) an emphasis on strengths, not deficits; (2) promoting family choice and control over desired resources; and (3) the development of a collaborative relationship between parents and professionals (Espe-Sherwindt, 2008). Based on DSA, Guralnick (2019, p. 236) proposed that four-step sequence of activities that were designed to optimize family patterns of interaction, as follows: 1) to assess three levels of the DSA (child, family patterns of interaction, and family resources); 2) to identify stressors and the planning process; 3) to provide comprehensive services and support; and 4) to evaluate outcomes. As we mentioned before, mastery motivation is a multifaceted concept that is context-specific and domain-specific,

and to enhance mastery motivation should focus on moderately challenging tasks (Barrett & Morgan, 2018).

The five steps of the 5-SEMM are:

1. Practitioners collaborate with the caregiver to identify and assess the problem of mastery motivation.
2. Practitioners discuss the problem explanation with the caregiver.
3. The caregiver select the goals to be pursued.
4. Motivation-enhancing strategies are proposed and executed by practitioners using collaborative consultation with caregiver.
5. Practitioners and caregiver/child perform the outcome evaluation together.

During the problem identification process (Step 1), practitioners work with caregivers to identify important concrete problems of the child's mastery motivation behaviors in everyday life. Multiple assessments with caregivers can be used to achieve a concrete motivation-related problem description that answers the 4W1H questions: who (characteristics of the child), what (domains and dimensions of motivation behaviors), when (which routine), where (which context), and how (severity of problems). There are normative values of DMQ 18 come from the preliminary preschool norms of typically developing samples rated by parents. The means and standard deviations of the norm of 5 scales of DMQ 18 are used to decide four DMQ score categories ("typical", "possibly atypical", "clearly atypical", and "very atypical") (Morgan et al., 2020). As we mentioned before, mastery motivation might differ across different contexts and domains (Barrett & Morgan, 1995; Józsa, Kis et al., 2017; Wang & Barrett, 2013). Understanding the contexts and domains that children show better motivation could help for the following four steps of the 5-SEMM.

During the step to identify reasons causing motivation problems (Step 2) and planning process to set goals (Step 3), practitioners and caregivers evaluate both child and environmental factors and use a shared decision-making procedure to identify possible barriers and facilitators for that motivation problem. Specifically, child level assessment includes children's five organizing processes of the DSA, one of which is mastery motivation, as well as competencies, developmental abilities and health conditions. Each child's mastery motivation could be measured by the DMQ 18, behavior observations and/or mastery tasks depending on the availability of time and facilities. From the results of the DMQ 18, the strength and weakness of different motivation domains and dimensions of each child are identified.

While assessing the environmental factors, either focus on five components of family patterns of interaction and two components of family resources of the DSA (personal characteristics of caregivers and material resources) (Guralnick, 2019), or five Chapters of the environmental factors of the International Classification of Functioning, Disability and Health (ICF) (Kang et al., 2017), or the four systems (microsystem, mesosystem, exosystem, macrosystem) of the ecological systems theory (Bronfenbrenner, 1989) etc. Among components of family patterns of interaction, caregiver-child interaction is closely associated with mastery motivation. There are numbers of measures to assess quality of caregiver-child interaction for young children, such as Nursing Child Assessment Teaching Scale, Maternal Behavior Rating Scale, parent-child early relationship assessment (Tryphonopoulos et al., 2016). From the results of multilevel evaluation, the facilitators and barriers of environmental and child factors are identified.

If specific mastery motivation goals are selected by caregivers, practitioners will work in partnership with caregivers to agree on family-identified, “desired-to-change” goals and realistic strategies in daily life. For each desired-to-change mastery motivation-related goal, IFSP goals could be either child-level or family-level or both depending on the family’s priorities. If a child-level mastery motivation goal is chosen by parents, then practitioners could set a SMART goal. SMART stands for: Specific; Measurable; Attainable; Routine-based, realistic or relevant; and Time-bound (Jung, 2007).

During the recommendations for motivation-enhancing strategies (Step 4), practitioners provide collaborative consultation with parents to execute motivation-enhancing procedures in daily life (Dunst et al., 2007; Friedman et al., 2012; Kemp & Turnbull, 2014), especially finding the moderately challenging level of the selected goal tasks and interests of each child (Wang et al., 2013) and embedding motivation goals in daily routines (McWilliams, 2010). For children’s instruction, practitioners and parents could use the motivation-focused methods of the one-step-ahead (Heckhausen, 1987), responsive teaching strategies (Mahoney & MacDonald, 2007), and pivotal response treatment (Koegel & Koegel, 2012). For example, practitioners and caregivers should not only look at children’s abilities, but importantly also observe a child’s persistence and affective expressions in a variety of tasks and settings during daily routines when he or she is trying to do something challenging. Adults then set up the tasks and environments to make them interesting and moderately challenging for that

individual child, with the adult then encouraging the child's persistence even when mastery attempts are unsuccessful.

The emphasis on moderately challenging tasks echoes the concepts of the "match" and the "zone of proximal development", which should provide the highest degree of motivation. The match is the optimal level of incongruity between the organism's current level and environmental demands (Busch-Rossnagel & Morgan, 2013), while the zone of proximal development is the distance between a child's current developmental/motivational level and the potential level of development/motivation with environmental facilitators (Busch-Rossnagel et al., 1995).

Finally, in Step 5, outcomes are evaluated. At the fifth step of shared outcome evaluation, practitioners should invite the caregivers to evaluate the achievement of outcome goals together, child-level or family-level goals related to mastery motivation. It is very easy to decide whether goals are achieved or not if goals are set using SMART strategies. Practitioners could also discuss with caregivers any issues related to outcomes, especially the quality of mastery motivation behaviors. To evaluate the effectiveness of the ECI service on children's mastery motivation using DMQ 18, practitioners could check to see if the pre-to-post-difference scores are equal to or higher than the minimum actually detectable change given the measurement error of the instrument (MDC) scores of the DMQ 18. The MDCs of scales of the DMQ 18 Preschool version are 0.91, 1.03, 0.83, 0.82, and 0.96 for COP, GMP, SPA, SPC, and MP respectively (Liao et al., 2020).

The steps may at times be bidirectional. For example, after practitioners consult collaboratively with caregivers and gain more information about the presenting concerns (Step 4), they may then modify the goals (Step 3). Using Jung-Jung's example, during collaborative consultation (Step 4), practitioners find that the goal of persistence of using straw to drink water by himself during mealtime has less progress due to the child's drink preference and inadequate of oral-motor coordination skills. In addition, the child likes to drink juice and milk. During snack time, the child can use straw to drink juice better. Therefore, the motivational goal is change from "persistence of using straw to drink water" to "persistence of using straw to drink favorite juice".

As mentioned before, persistence and pleasure, two indicators of mastery motivation, are related to the participation construct in the ICF framework. Some items of the Children's Engagement Questionnaire that measures children's

participation in daily life were modified from the DMQ (McWilliam, 1991); therefore, to implement participation-based ECI to enhance children's motivation to engage in activities and to obtain better ECI outcomes, we might need to utilize the strengths and overcome challenges at the child, family, professional, community and national levels (Liao & Wu, 2017). The procedures of this participation-based ECI model are similar to the 5-SEMM model. However, the scope may be wider and cover more participation activities from the ICF (World Health Organization, 2001), such as watching to engage in purposeful sensory experiences, speaking, walking, toileting, interpersonal interaction, and engagement in play, etc. (Pan et al., 2019). A key component of this process is to understand contextual and personal factors and how they may enhance or constrain participation (Boavida et al., 2016; McWilliam, 2010).

Children's participation or motivated engagement in meaningful life activities should be an essential intervention goal to meet the challenges of healthy growth and development and to provide opportunities to help ensure that young children with impairments reach their full potential across their lifespan (Imms et al., 2016).

Conclusion

Mastery motivation, including social mastery motivation is a key construct in early childhood (Guralnick, 2019; Józsa & Barrett, 2018, Keilty, et al., 2015). Young children with developed motivation are more likely to engage persistently in daily activities that support higher activation of cognitive and executive function abilities and have parents motivated to scaffold and build on their experiences. Thus, for children with developmental delays or disabilities, mastery motivation serves as a protective factor in guiding them to achieve more satisfactory and functional outcomes. That may be the reasons to explain why mastery motivation predicts later various function and school performance better than IQ (Józsa & Molnár, 2013). However, in our studies, parents of children with developmental delay rated their children with lower motivation despite no significant group difference in task motivation using individualized moderating challenging methods (Gilmore & Cuskelly, 2011; Hauser-Cram, 1996; Majnemer et al., 2010; Salavati et al., 2018; Wang et al., 2013). This may be due to the traditionally therapeutic model that emphasizes deficits rather than strengths. If parents and service providers address strengths, mastery motivation could be seen as a

protective factor for children who are at risk or have developmental delay. Indeed, in a study of 85 young children (ages 3 to 5), Ramakrishnan and Masten (2020) found that higher mastery motivation was associated with better social and emotional regulation in children who were homeless. Thus, mastery motivation should be intentionally assessed and targeted for ECI in order to promote optimal educational and social outcomes from early childhood and across a lifetime. It is critical for early interventionists to collaborate with caregivers to understand and observe children's motivation behaviors and arrange tasks and environment in daily life to enhance the children's mastery motivation. The 5-SEMM model that focusing on mastery motivation is one of family-centered ECI approaches. ECI practitioners apply the 5-SEMM model by collaborating with caregivers to identify motivation-related strengths and concerns, set motivation-related goals, implement motivation-enhancing strategies during natural opportunities in daily routines, and evaluate outcome. Although further research and clinical practice using the mastery motivation measures and strategies based on the 5-SEMM model for ECI is desirable, it is clear that enhancing mastery motivation in daily activities is important for effective ECI services.

Declaration of conflicting interests

The authors declare no conflict of interest. The authors alone are responsible for the content and writing of the paper.

Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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References

- Amukune, S., & Józsa, K. (2021). The Childhood Executive Functioning Inventory (CHEXI): Psychometric properties and association with academic achievement in Kenyan first graders. *Journal of Psychological and Educational Research*, 29(1), 154-176.
- Barrett, K. C., & Morgan, G. A. (1995). Continuities and discontinuities in mastery motivation in infancy and toddlerhood: A conceptualization and review. In R. H. MacTurk & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations, and applications* (pp. 67-93). Ablex.
- Barrett, K. C., & Morgan, G. A. (2018). Mastery motivation: Retrospect, present, and future directions. In A. Elliot (Ed.), *Advances in motivation science* (Vol. 5, pp. 2-39). Elsevier.
- Barrett, K. C., Fox, N. A., Morgan, G. A., Fidler, D. A., & Daunhauer, L. A. (Eds.) (2013). *Handbook of self-regulatory processes in development: New directions and international perspectives*. Taylor & Francis.
- Barrett, K. C., Józsa, K., & Morgan, G. A. (2017). New computer-based mastery motivation and executive function tasks for school readiness and school success in 3 to 8 year-old children. *Hungarian Educational Research Journal*, 7(2), 86-105.
- Bjorck-Akesson, E. (2018). The ICF-CY and collaborative problem solving in inclusive early childhood education and care. In S. Castro, & O. Palikara (Eds.), *An emerging approach for education and care: Implementing a worldwide classification of functioning and disability* (pp. 85-111). Routledge.
- Blasco, P. M. (2008). Social mastery motivation: Scaffolding opportunities for young children. In C. A. Peterson, L. Fox & P. M. Blasco (Eds.), *Early intervention for infants and toddlers and their families: Practices and outcomes. Monographs of Young Exceptional Children* (Serial No. 10, pp. 93-104). Division for Early Childhood of the Council for Exceptional Children.

- Blasco, P. M., Guy, S., Saxton, S. N., & Duvall, S. W. (2017). Are we missing a vulnerable population in early intervention? *Infants & Young Children*, 30(3), 190-203.
- Boavida, T., Aguiar, C., McWilliam, R. A., & Correia, N. (2016). Effects of an in-service training program using the routines-based interview. *Topics in Early Childhood Special Education*, 36(2), 67-77.
- Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviors, and engagement in kindergarten. *Early Childhood Research Quarterly*, 24(3), 337-349.
- Bronfenbrenner, U. (1989). Ecological system theory. *Annals of Child Development*, 6, 187-249.
- Burnett, A. C., Anderson, P. J., Lee, K. J., Roberts, G., Doyle, L. W., Cheong, J. L., & Victorian Infant Collaborative Study Group. (2018). Trends in executive functioning in extremely preterm children across 3 birth eras. *Pediatrics*, 141(1), e20171958. <https://doi.org/10.1542/peds.2017-1958>.
- Busch-Rossnagel, N. A., & Morgan, G. A. (2013). Introduction to the mastery motivation and self-regulation section. In K. C. Barrett, N. A. Fox, G. A. Morgan, D. J. Fidler, & L. A. Daunhauer (Eds.), *Handbook on self-regulatory processes in development: New directions and international perspectives* (pp. 247-264). Routledge/Taylor & Francis.
- Busch-Rossnagel, N. A., Knauf-Jensen, D. E., & DesRosiers, F. S. (1995). Mothers and others: The role of the socializing environment in the development of mastery motivation. In R. B. MacTurk, & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations, and applications* (pp. 117-145). Ablex.
- Cramer, S. C., Sur, M., Dobkin, B. H., O'Brien, C., Sanger, T. D., Trojanowski, J. Q., Rumsey, J. M., Hicks, R., Cameron, J., Chen, D., Chen, W. G., Cohen, L. G., deCharms, C., Duffy, C. J., Eden, G. F., Fetz, E. E., Filart, R., Freund, M., Grant, S. J.,..... Vinogradov, S. (2011). Harnessing neuroplasticity for clinical applications. *Brain*, 134(6), 1591-1609.
- Division for Early Childhood (2014). *DEC recommended practices in early intervention/early childhood special education 2014*. <http://www.dec-sped.org/recommendedpractices>.
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2007). Meta-analysis of family-centered help giving practices research. *Mental Retardation and*

- Developmental Disabilities Research Reviews*, 13(4), 370-378.
- Espe-Sherwindt, M. (2008). Family-centered practice: Collaboration, competency and evidence. *Support for Learning*, 23(3), 136-143.
- Friedman, M., Woods, J., & Salisbury, C. (2012). Caregiver coaching strategies for early intervention providers: Moving toward operational definitions. *Infants & Young Children*, 25(1), 62-82.
- Fung, W.-K., & Chung, K.-H. (2019). The roles of social mastery motivation and parental response in preschoolers' vocabulary knowledge and self-regulation. *Early Child Development and Care*, 191(1), 21-35.
- Gilmore, L., Cuskelly, M., & Hayes, A. (2003). A comparative study of mastery motivation in young children with Down's syndrome: Similar outcomes, different processes? *Journal of Intellectual Disability in Research*. 47, 181-190. <https://doi.org/10.1046/j.1365-2788.2003.00460.x>.
- Gilmore, L., & Cuskelly, M. (2009). A longitudinal study of motivation and competence in children with Down syndrome: Early childhood to early adolescence. *Journal of Intellectual Disability Research*, 53, 484-492.
- Gilmore, L., & Cuskelly, M. (2011). Observational assessment and maternal reports of motivation in children and adolescents with Down syndrome. *American Association on Intellectual and Developmental Disabilities*, 116(2), 153-164. <https://doi.org/10.1352/1944-7558-116.2.153>.
- Gilmore, L., & Cuskelly, M. (2017). Association of child and adolescent master motivation and self-regulation with adult outcomes: A longitudinal study of individuals with Down syndrome. *American Journal on Intellectual and Developmental Disabilities*, 122(3), 235-246. <https://doi.org/10.1352/1944-7558-122.3.235>.
- Gilmore, L., Cuskelly, M., Jobling, A., & Hayes, A. (2009). Maternal support for autonomy: Relationships with persistence for children with down syndrome and typically developing children. *Research in Developmental Disabilities*, 30(5), 1023-1033. <https://doi.org/10.1016/j.ridd.2009.02.005>.
- Glenn, S., Dayus, B., Cunningham, C., & Horgan, M. (2001). Mastery motivation in children with down syndrome. *Downs Syndrome in Research and Practice*, 7(2), 52-59. <https://doi.org/10.3104/reports.114>.
- Greene, R. W., Ablon, J. S., & Goring, J. C. (2003). A transactional model of oppositional behavior: Underpinnings of the collaborative problem solving approach. *Journal of Psychosomatic Research*, 55(1), 67-75.
- Guralnick, M. J. (2019). *The developmental systems approach*. Brookes.

- Harter, S. (1978). Effective motivation reconsidered toward a developmental model. *Human Development*, 21, 34-64. <https://doi.org/10.1159/000271574>
- Hauser-Cram, P. (1996). Mastery motivation in toddlers with developmental disabilities. *Child Development*, 67(1), 236-248.
- Hauser-Cram, P., Warfield, M. E., Shonkoff, J. P., Krauss, M. W., Sayer, A., & Upshur, C. C. (2001). Children with disabilities: A longitudinal study of child development and parent well-being. *Monographs of the Society for Research in Child Development*, 66, 1-126.
- Hauser-Cram, P., Woodman, A. C., & Heyman, M. (2014). Early mastery motivation as a predictor of executive function in young adults with developmental disabilities. *Journal of the American Association on Intellectual and Developmental Disabilities*, 119(6), 536-551.
- Heckhausen, J. (1987). Balancing for weakness and challenging developmental potential: A longitudinal study of mother-infant dyads in apprenticeship interactions. *Developmental Psychology*, 23(6), 762-770.
- Hwang, A. W., Wang, J., Józsa, K., Wang, P. J., Liao, H. F., & Morgan, G. A. (2017). Cross cultural invariance and comparisons of Hungarian-, Chinese-, and English-speaking preschool children leading to the revised Dimensions of Mastery Questionnaire (DMQ 18). *Hungarian Educational Research Journal*, 7(2), 32-47. <https://doi.org/10.14413/HERJ/7/2/3>
- Imms, C., Adair, B., Keen, D., Ullenhag, A., Rosenbaum, P., & Granlund, M. (2016). 'Participation': A systematic review of language, definitions, and constructs used in intervention research with children with disabilities. *Developmental Medicine & Child Neurology*, 58(1), 29-38.
- Isquith, P. K., Crawford, J. S., Espy, K. A., & Gioia, G. A. (2005). Assessment of executive function in preschool-aged children. *Mental Retardation and Developmental Disabilities Research Reviews*, 11(3), 209-215.
- Józsa, K., & Barrett, K. C. (2018). Affective and social mastery motivation in preschool as predictors of early school success: A longitudinal study. *Early Childhood Research Quarterly*, 45(4), 81-92.
- Józsa, K., & Molnár, E. D. (2013). The relationship between mastery motivation, self-regulated learning and school success: A Hungarian and European perspective. In K. C. Barrett, N. A. Fox, G. A. Morgan, D. J. Fidler, & L. A. Daunhauer (Eds.), *Handbook on self-regulatory processes in development: New directions and international perspectives* (pp. 265-304). Psychology Press.
- Józsa, K., & Morgan, G. A. (2015). An improved measure of mastery motivation:

- Reliability and validity of the Dimensions of Mastery Questionnaire (DMQ 18) for preschool children. *Hungarian Educational Research Journal*, 5(4), 87-103. doi: 10.14413/HERJ2015.04.08
- Józsa, K., Barrett, K. C., & Morgan, G. A. (2017). Game-like tablet assessment of approaches to learning: Assessing mastery motivation and executive functions. *Electronic Journal of Research in Educational Psychology*, 15(3), 665-695.
- Józsa, K., Barrett, K. C., Józsa, G., Kis, N., & Morgan, G. A. (2017). Development and initial evaluation of an individualized moderately challenging computer-tablet mastery motivation measure for 3-8 year-olds. *Hungarian Educational Research Journal*, 7(2), 106-126.
- Józsa, K., Kis, N., & Huang, S. Y. (2017). Mastery motivation in school subjects in Hungary and Taiwan. *Hungarian Educational Research Journal*, 7(2), 158-177. <https://doi.org/10.14413/HERJ/7/2/10>
- Józsa, K., Wang, J., Barrett, K. C., & Morgan, G. A. (2014). Age and cultural differences in mastery motivation in American, Chinese, and Hungarian school-age children. *Child Development Research*, 1-16. Article ID 803061. <https://doi.org/10.1155/2014/803061>
- Jung, L. A. (2007). Writing SMART objectives and strategies that fit the routine. *Teaching Exceptional Children*, 39(4), 54-59.
- Kang, L. J., Hsieh, M. C., Liao, H. F., & Hwang, A. W. (2017). Environmental barriers to participation of preschool children with and without physical disabilities. *International Journal of Environmental Research and Public Health*, 14(5), 518. <https://doi.org/10.3390/ijerph14050518>
- Keilty, B., Blasco, P. M., & Acar, S. (2015). Re-conceptualizing developmental areas of assessment for screening, eligibility determination and program planning in early intervention. *Journal of Intellectual Disability-Diagnosis and Treatment*, 3(4), 218-229.
- Kemp, P., & Turnbull, A. P. (2014). Coaching with parents in early intervention: An interdisciplinary research synthesis. *Infants & Young Children*, 27(4), 305-324. <https://doi.org/10.1097/ITYC.0000000000000018>.
- Kim, J. M., & Mahoney, G. (2004). The effects of mother's style of interaction on children's engagement: Implications for using responsive interventions with parents. *Topics in Early Childhood Special Education*, 24(1), 31-38. <https://doi.org/10.1177/02711214040240010301>.
- Koegel, R. L., & Koegel, L. K. (2012). *The PRT pocket guide: Pivotal response treatment for autism spectrum disorders*. Paul H Brookes.

- Lang, C. E., Macdonald, J. R., Reisman, D. S., Boyd, L., Jacobson Kimberley, T., Schindler-Ivens, S. M., Hornby, T. G., Ross, S. A., & Scheets, P. L. (2009). Observation of amounts of movement practice provided during stroke rehabilitation. *Archives of Physical Medicine & Rehabilitation*, 90(10), 1692-1698. <https://doi.org/10.1016/j.apmr.2009.04.005>
- Liao, H.-F., & Wu, P.-F. (2017). Early childhood inclusion in Taiwan. *Infants & Young Children*, 30(4), 320-324.
- Liao, H.-F., Hwang, A.-W., Kang, L.-J., Liao, Y.-T., Granlund, M., & Simeonsson, R. J. (2018). The development of the FUNDES-Child and its implications for the education of Taiwanese children. In S. Castro, & O. Palikara, (Eds.), *An Emerging approach for education and care: Implementing a world-wide classification of functioning and disability* (pp. 85-111). Routledge.
- Liao, H.-F., Lin, H.-F., Yang, M.-H., Su, H.-C., Lin, M.-Y., Chen, S.-L. Hwang, A.-W., Liu, W.-Y., Ko, Y.-T., Chen, C.-F., Hsieh, Y.-H., Lin, H.-C., Liang, C.-C., & Kuo, H.-T. (2016). The handbook of community-based childhood early intervention - development and content. *Formosan Journal of Medicine*, 20(4), 344-354 (in Chinese with English abstract).
- Liao, H.-F., Liu, W.-Y., & Pan, Y.-L. (2017). How to provide family-centered early intervention in a medical system. In S. H. Sun (Ed.), *Family-centered early intervention* (pp. 17-73). Taiwan Association of Child Development and Early Intervention (in Chinese)
- Liao, H.-F., Pan, Y.-L., Tseng, S.-H., Wang, P.-J., Lu, L., Sun, S.-H., Su, F.-L., & Cho, P. (2021). Effectiveness of family-centered early childhood intervention - Application of the ICF-based collaborative problem solving model. *Formosan Journal of Physical Therapy*, 46(4) (in press, in Chinese with English abstract).
- Liao, H.-F., Wang, P.-J., Huang, S.-Y., Ramakrishnan, J., & Hwang A.-W. (2020). Using DMQ18 in early intervention and with school children who have special needs. In G. A. Morgan, H.-F. Liao, & K. Józsa (Eds.), *Assessing mastery motivation in children using the Dimensions of Mastery Questionnaire (DMQ)* (pp.187-224). Szent István University.
- Mahoney, G., & MacDonald, J. (2007). *Autism and developmental delays in young children: The responsive teaching curriculum for parents and professionals*. PRO-ED.
- Majnemer, A., Shevell, M., Law, M., Poulin, C., & Rosenbaum, P. (2010). Level of motivation in mastering challenging tasks in children with cerebral palsy.

- Developmental Medicine and Child Neurology*, 52(12), 1120-1126.
<https://doi.org/10.1111/j.1469-8749.2010.03732.x>.
- McWilliam, R. A. (1991). Children's engagement questionnaire-CEQ. Frank Porter Graham Child Development Center, University of North Carolina, Chapel Hill, NC.
- McWilliam, R. A. (2010). *Routines-based early intervention: Supporting young children and their families*. Paul H. Brooks Publishing Co. Inc.
- Meyns, P., Roman de Mettelinge, T., van der Spank, J., Coussens, M., & Van Waelvelde, H. (2018). Motivation in pediatric motor rehabilitation: A systematic search of the literature using the self-determination theory as a conceptual framework. *Developmental Neurorehabilitation*, 21(6), 371-390.
<https://doi.org/10.1080/17518423.2017.1295286>
- Miller, L., Ziviani, J., Ware, R. S., & Boyd, R. N. (2014). Mastery motivation in children with congenital hemiplegia: individual and environmental associations. *Developmental Medicine and Child Neurology*, 56(3), 267-274.
<https://doi.org/10.1111/dmcn.12356>.
- Miller, L., Ziviani, J., Ware, R. S., & Boyd, R. N. (2016). Does context matter? Mastery motivation and therapy engagement of children with cerebral palsy. *Physical & Occupational Therapy in Pediatrics*, 36(2), 155-170.
- Mizuno, K., Tanaka, M., Fukuda, S., Imai-Matsumura, K., & Watanabe, Y. (2011). Relationship between cognitive function and prevalence of decrease in intrinsic academic motivation in adolescents. *Behavior Brain Function*, 7(1), 4-14.
<https://doi.org/10.1186/1744-9081-7-4>.
- Mokrova, I. L., O'Brien, M., Calkins, S. D., Leerkes, E. M., & Marcovitch, S. (2013). The role of persistence at preschool age in academic skills at kindergarten. *European Journal of Psychology of Education*, 28(4), 1495-1503.
<https://doi.org/10.1007/s10212-013-0177-2>.
- Morgan, G. A., Busch-Rossnagel, N. A., Maslin-Cole, C. A., & Harmon, R. J. (1992). *Mastery motivation tasks: Manual for 15- to 36-month-old children*. Fordham University Psychology Department.
- Morgan, G. A., Harmon, R. J., & Maslin-Cole, C. A. (1990). Mastery motivation: Definition and measurement. *Early Education and Development*, 1(5), 318-339.
https://doi.org/10.1207/s15566935eed0105_1.
- Morgan, G. A., Józsa, K., & Liao, H. -F. (2017). Introduction to the HERJ Special Issue on mastery motivation. *Hungarian Educational Research Journal*, 7(2), 8-17.

- Morgan, G. A., Liao, H.-F., & Józsa, K. (Eds.) (2020). *Assessing mastery motivation in children using the Dimensions of Mastery Questionnaire (DMQ)*. Szent Istvan University.
- Odom, S. L., Favazza, P. C., Brown, W. H., & Horn, E. M. (2000). Approaches to understanding the ecology of early environments for children with disabilities. In T. Thompson, D. Felce, & F. Symons (Eds.), *Behavioral observation: Technology and applications in developmental disabilities* (pp. 193-214). Brookes.
- Pan, Y.-L., Hwang, A.-W., Simeonsson, R. J., Lu, L., & Liao, H.-F. (2019). Utility of the early delay and disabilities code set for exploring the linkage between ICF-CY and assessment reports for children with developmental delay. *Infants and Young Child*, 32(3), 215-227.
- Ramakrishnan, J. L., & Masten, A. S. (2020). Mastery motivation and school readiness among young children experiencing homelessness. *American Journal of Orthopsychiatry*, 90(2), 223-235.
- Salavati, M., Vameghi, R., Hosseini, S. A., Saeedi, A., & Gharib, M. (2018). Comparing levels of mastery motivation in children with cerebral palsy (CP) and typically developing children. *Medical Archives*, 72(1), 41-45. <https://doi.org/10.5455/medarh.2018.72.41-45>.
- Sameroff, A. J., & Fiese, B. H. (2000). Transactional regulation: The developmental ecology of early intervention. In J. P. Shonkoff & S. J. Meisel (Eds.), *Handbook of early childhood intervention* (pp. 135-159). Cambridge University Press.
- Seifer, R., & Vaughn, B. E. (1995). Mastery motivation within a general organizational model of competence. In R. H. MacTurk, & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations and applications* (pp. 95-115). Ablex.
- Shonkoff, J. P., & Phillips, D. A. (Eds.) (2000). *From neurons to neighborhoods: The science of early childhood development*. National Academy Press. <http://www.nap.edu/catalog/9824.html>.
- Ten Eycke, K. D., & Dewey, D. (2016). Parent-report and performance-based measures of executive function assess different constructs. *Child Neuropsychology*, 22(8), 889-906.
- Tryphonopoulos, P. D., Letourneau, N., & DiTommaso, E. (2016). Caregiver-infant interaction quality: A review of observational assessment tools. *Comprehensive Child and Adolescent Nursing*, 39(2), 107-138.
- Turner, L. A., & Burke, J. (2003). A model of mastery motivation for at-risk

- preschoolers. *Journal of Educational Psychology*, 95(3), 495-505.
<https://doi.org/10.1037/0022-0663.95.3.495>
- Wang, J., & Barrett, K. C. (2013). Mastery motivation and self-regulation during early childhood. In K. C. Barrett, N. A. Fox, G. A. Morgan, D. J. Fidler, & L. A. Daunhauer (Eds.), *Handbook on self-regulatory processes in development: New directions and international perspectives* (pp. 337-380). Psychology Press.
- Wang, P.-J., Chen, L.-C., Liao, H.-F., Tu, Y.-K., Lu, L., & Morgan, G. A. (2019). Is mastery motivation a mediator of relations between maternal teaching behavior and developmental abilities in children with global developmental delay? *Physical & Occupational Therapy in Pediatrics*, 39(3), 292-309.
<https://doi.org/10.1080/01942638.2018.1505800>.
- Wang, P.-J., Liao, H.-F., & Morgan, G. A. (2016). Assessing mastery motivation in a young child with global developmental delay. *International Journal of Physical Medicine and Rehabilitation*, 4(6), 1103.
- Wang, P.-J., Liao, H.-F., & Morgan, G. A. (2017). The revised individualized moderately challenging mastery tasks for 15- to 48-month-old children. *Hungarian Educational Research Journal*, 7(2), 71-88.
- Wang, P.-J., Liao, H.-F., Kang, L.-J., Chen, L.-C., Hwang, A.-W., Lu, L.,...& Morgan, G. A. (2019). Child and family factors predicting participation attendance in different daily activities for toddlers experiencing global developmental delay. *Disability and Rehabilitation*, 43(13), 1849-1860.
<https://doi.org/10.1080/09638288.2019.1678685>
- Wang, P.-J., Morgan, G. A., Hwang, A.-W., & Liao, H.-F. (2013). Individualized behavioral assessments and maternal ratings of mastery motivation in mental-age matched toddlers with and without motor delays. *Physical Therapy*, 93(1), 79-87. <https://doi.org/10.2522/ptj.20120068>.
- Wang, P.-J., Morgan, G. A., Hwang, A.-W., Chen, L.-C., & Liao, H.-F. (2014). Do maternal interactive behaviors correlate with developmental outcomes and mastery motivation in toddlers with and without motor delay? *Physical Therapy*, 94(12), 1744-1754. <https://doi.org/10.2522/ptj.20130560>.
- Wang, P.-J., Morgan, G. A., Liao, H.-F., Chen, L.-C., Hwang, A.-W., & Lu, L. (2016). Reliability and validity of the revised individualized structured mastery tasks in children with developmental delay. *International Journal of Physical Medicine & Rehabilitation*, 4(6), 374-380.
- White, R. W. (1959). Motivation reconsidered: The concept of competence.

- Psychological Review*, 66, 297–333. <https://doi.org/10.1037/h0040934>
- World Health Organization (Ed.) (2001). *International Classification of Functioning, Disability and Health: ICF*. World Health Organization.
- Yarrow, L. J., Klein, R. P., Lomonaco, S., & Morgan, G. A. (1975). Cognitive and motivational development in early childhood. In B. Z. Friedlander, G. M. Sterritt, & G. E. Kirk (Eds.), *Exceptional infant, assessment and intervention* (pp. 491-502). Bruner/Mazel.
- Young, J. M., & Hauser-Cram, P. (2006). Mother-child interaction as a predictor of mastery motivation in children with disabilities born preterm. *Journal of Early Intervention*, 28(4), 252-263.
- Zelazo, P. D. (2015). Executive function: Reflection, iterative reprocessing, complexity, and the developing brain. *Developmental Review*, 38, 55-68. <https://doi.org/10.1016/j.dr.2015.07.001>

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