Self-Regulation and Mastery Motivation in Individuals with Developmental Disabilities

Barriers, Supports, and Strategies

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INTRODUCTION

The development of the capacity for self-regulation represents an important achievement of childhood and is associated with social, behavioral, and academic competence (Bronson, 2001; Cleary & Zimmerman, 2004). Self-regulation evolves as individuals mature, with its final form integrating emotional, cognitive, and behavioral elements working together to achieve self-selected goals. This evolution is closely intertwined with the innate press to master the environment, labeled mastery motivation (Morgan, Harmon, & Maslin-Cole, 1990), as competence is the aim that underpins mastery motivation.

In typically developing children, effective self-regulation has shown concurrent and predictive associations with a wide range of positive outcomes including academic success, relationship satisfaction, and psychological well-being. Shoda, Mischel, and Peake (1990) found that children with better self-regulatory skills at age 4 had significantly better academic skills, embraced challenges, and were more personally effective at adolescence than children with poorer skills, and those advantages continued to be apparent even into adulthood (Mischel & Ayduk, 2002). Likewise, mastery motivation has been found to be predictive of later competence. Messer et al. (1986) found that mastery motivation was a better predictor of later competence than was performance on the Bayley Scales of Infant Development (Bayley, 1969), and Gilmore, Cuskelly, and Purdie (2003) found that maternal reports of mastery motivation at 2 years of age predicted cognitive and academic achievement at 8 years of age, although this association was only apparent for girls. Similar associations of self-regulation (e.g., Eisenhower, Baker, & Blacher, 2007) and mastery motivation (Gilmore & Cuskelly, 2009; Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001) with later outcomes have been reported for children with a developmental disability.

The definitional issues around self-regulation and mastery motivation have been discussed in earlier chapters in this book and so will only be considered briefly here. While there is some variation in the definitions of self-regulation, common elements can be identified and, in essence, it is understood to refer to the management of one’s emotional, cognitive, and behavioral responses in the service of attaining one’s goals. These broad aspects of self-regulation have been further broken down into a range of capabilities including: impulse control, emotional regulation, goal setting, self-regulated learning, delay of gratification, and persistence (Bieberich & Morgan, 2004; McDevitt & Ormrod, 2010), to list only some of the components and subcomponents of self-regulation. Self-regulation, however, cannot be understood to be any one of these individual components, but,
in its mature form at least, is the outcome of multiple processes operating in concert. A useful analogy was made by Lynn, Cuskelly, O’Callaghan, and Gray (2011): these components are like individual instruments contributing separate sounds to a piece of music while self-regulation is the orchestrated melody, creating something beyond the sum of its parts.

Mastery motivation, sometimes known as effectance motivation, is defined as the force that stimulates individuals to work independently in a focused and persistent way on developing skills or solving challenging problems in order to become more competent in their world (Morgan et al., 1990). The central aspect of mastery motivation is persistence in the face of challenge. A second element, pleasure during task-directed behavior, has also been identified as a defining aspect of mastery motivation (Morgan et al., 1990); however, measurement difficulties, as well as interpretative difficulties (Gilmore, Cuskelly, & Hayes, 2003a; Hauser-Cram, 1993), have meant that this aspect is less well established than persistence. Preference for challenge is also regarded by many researchers as an important dimension of mastery motivation (e.g., Gilmore & Cuskelly, 2011; Jennings, Connors, & Stegman, 1988). The object-oriented aspects of this definition have had most salience with researchers (e.g., Hauser-Cram et al., 2001), although motor performance and social aspects have also been identified (e.g., Morgan, Leech, Barrett, Busch-Rossnagel, & Harmon, 2002).

There is general agreement that motivation is essential for initiating, directing, and sustaining goal-directed behavior—that is, engaging in self-regulated behavior (Pintrich & Schunk, 2002; Stipek, 1997); however, the link between mastery motivation and self-regulation has not been explored to any great extent. Although self-regulation and mastery motivation are separate constructs, there are clear links between them and they are likely to reciprocally influence one another. As noted earlier, persistence is one of the defining characteristics of mastery motivation and is also seen to be one of the constituents of self-regulation. Mastery motivation, the press to master one’s environment, provides some of the goals to which self-regulation will be applied, and Switzky (2001) has pointed out the difficulties in becoming self-regulated if motivation orientation is primarily extrinsic in nature. There is evidence that students who have a mastery goal are more likely to adopt self-regulatory strategies in order to achieve that goal than are students whose goals do not reflect a mastery orientation (see Pintrich & Blazevski, 2004). Clearly, self-regulatory skills are involved in mastery motivation; for example, one needs to be able to self-monitor progress (a self-regulatory skill) so that persistence is productive rather than perseverative or pointless. Even in young children, behaviors directed at achieving mastery require the inhibition of distracting influences. As individuals mature, mastery goals are likely to involve complex chains of behavior—these may require thinking ahead and planning a course of action as well as delaying gratification of smaller goals while working towards achieving the larger, more distant goal.

In contrast to the research conducted with typically developing groups, there is a very small body of research investigating self-regulation in atypical groups. The work that has been conducted has generally been somewhat piecemeal and there is no systematic body of research on which to draw. There is, however, some evidence that children with developmental disabilities have more difficulties with self-regulation than do typically developing children, and this research is reviewed in the following section of the chapter. As discussed there, the evidence regarding mastery motivation in those with a developmental disability is more equivocal, with some studies finding no differences while others report children who are developing atypically to be more disadvantaged.

It is not our intention to provide a great deal of detail about the self-regulatory difficulties experienced by individuals with a developmental disability, as other chapters of this handbook provide comprehensive coverage with respect to four specific groups (Down syndrome, autism spectrum disorder, attention-deficit and hyperactivity disorder (ADHD). Rather, our focus will be to suggest some hypotheses about the contributors to these difficulties and to consider the strategies and supports that may address these.
THE DEVELOPMENT OF SELF-REGULATION AND DIFFICULTIES EXPERIENCED BY INDIVIDUALS WITH DEVELOPMENTAL DISABILITY

While the self-regulation paradigm has been relatively under-utilized in research on intellectual and developmental disability, two streams of research have contributed to our understanding of this capacity in individuals with disability. These two streams have focused on self-management and self-determination. Self-management comprises a critical subcomponent of self-regulation and is focused on the skills of self-monitoring, self-evaluation, and self-reinforcement. The self-management literature does not generally take a developmental perspective, however, and so, while important to this discussion, is insufficient for a complete understanding of self-regulation. Self-determination, by way of contrast, addresses a somewhat greater arena, to which self-regulation is a contributor (see, for example, Clark, Olympia, Jensen, Heathfield, & Jenson, 2004). Self-determination can be understood to comprise a range of components that not only include self-regulatory skills such as goal setting, but also extend to aspects such as self-advocacy (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000b) and that enable individuals with intellectual disability to live a life that reflects their own priorities and preferences. Self-determination is the ultimate goal of much of the intervention focused research in intellectual and developmental disability. It requires both a level of skill and an environment conducive to autonomous behavior and includes freedom, authority, responsibility, and support (Coyle, 2007).

Deficits in self-regulation are associated with a wide range of developmental disabilities including Down syndrome (Cuskelly, Einam, & Jobling, 2001; Cuskelly, Zhang, & Hayes, 2003), intellectual disability from other causes (Vieillevoye & Nader-Grosbois, 2008), and autism (Gomez & Baird, 2005; Robinson, Goddard, Dritschel, Wisley, & Howlin, 2009). These difficulties are not explicable only as a consequence of intellectual disability. Robinson et al. found that the elements of planning, inhibition of prepotent responses, and self-monitoring (all components of self-regulation) were difficult for children with autism but were independent of intellectual ability. Children with attention deficit and hyperactivity disorder (ADHD) and no concomitant intellectual disability have also been found to exhibit difficulties with self-regulation (Carroll et al., 2006b).

Self-regulation is a complex, multifaceted suite of integrated abilities, and is also developmental in nature. There is a discernible sequence with high-level skills being built on a foundation of more basic skills acquired earlier in life. Despite this sequential aspect, the various elements are in reciprocal relationships and there are a great many overlapping elements. Self-regulation of physiological/biological functions would seem to be the bedrock of successful self-regulation, with emotional regulation being the next task in the sequence, followed by cognitive and behavioral control.

PHYSIOLOGICAL ASPECTS

There is clear evidence that self-regulation in infancy has a neurobiological component, and that this very early influence may make a substantial contribution to later skill development, including emotional regulation (Rothbart & Rueda, 2005) and effortful control (a term that incorporates attention regulation and inhibitory control) (Rothbart, Sheese, & Posner, 2007). Geva and Feldman (2008) proposed a model that connects brain stem dysfunction to later self-regulatory difficulties. They hypothesized that initial brain stem dysfunction has an effect on later brain development (limbic system and connections to the prefrontal loci; see also Omar, Warren, Ron, Lees, Rosser, & Kartsounis, 2007), which, in turn, leads to difficulties with the biological self-control functions such as sleeping and self-soothing. There are numerous studies indicating that children with developmental disabilities are vulnerable to the behavioral disturbances associated with biological system malfunction (e.g., Pelc, Cheron, Boyd, & Dan, 2008; Williams, Sears, & Allard, 2004).

In Greenspan’s (1996) formulation of the early stages of emotional self-regulation, he postulated that the initial basis of emotional self-regulation lay in the infant’s capacity to manage internal and
external stimulation in order to arrive at some kind of physiological homeostasis, a developmental task of the first three months of life. Physiological reactivity may continue to play a part in regulatory difficulties beyond the infant period, both directly, by contributing to difficulty in controlling emotional responses to frustrating situations (DeGangi, DiPietro, Greenspan, & Porges, 1991), and indirectly, through disrupted parent–child interactions (Geva & Feldman, 2008). Feldman (2009), in her longitudinal study of children born prematurely, found a consistency in the developmental trajectories of children with respect to self-regulation, with associations between the early physiological measures and later attentional processes, and measures of self-regulation (delay of gratification) at 5 years of age.

EMOTIONAL SELF-REGULATION

Emotional self-regulation refers to the capacity to monitor, evaluate, and adjust one’s emotional response in ways that are conducive to attaining one’s goals (Thompson, 1994), although Cole, Martin, and Dennis (2004) point out that there are two aspects of emotion that need to be considered in this context: emotion as regulated and emotion as regulating. In this discussion, it is the former that is of interest. The toddler period (typically, approximately 18 months to 3 years) is the period when children are faced with the developmental tasks of establishing control of their emotions (Edwards & Liu, 2002), which provides the basis for progress in other developmental areas (Graziano, Keane, & Calkins, 2010). Emotional regulation comprises a number of subskills including the recognition, monitoring, and expression of emotion.

Children with ADHD (Buitelaar, Van der Wees, Swabb-Barneveld, & Van der Gaag, 1999; Carroll et al., 2006b), autism spectrum disorder (Celani, Battacchi, & Arcidiacono, 1999), intellectual disability of unknown etiology (Kasari, Freeman & Hughes, 2001; Plesa-Skwerer, Faja, Schofield, Verbalis, & Tager-Flusberg, 2006), Down syndrome (Wishart, Cebula, Willis, & Pitcairn, 2007), and Williams syndrome (Karmiloff-Smith et al., 2004; Plesa-Skwerer et al., 2006) have all been found to have difficulty recognizing emotions. Controlling expression of emotion is also an area of difficulty for some groups. For example, children with autism spectrum disorder were judged to have more difficulty with this area than children developing typically (e.g., Ashburner, Ziviani, & Rodger, 2010; Konstantareas & Stewart, 2006) as were children with ADHD (Carroll, Houghton, Taylor, West, & List-Kerz, 2006c; Semrud-Clikeman, Walkowiak, Wilkinson, & Butcher, 2010). In a recent study, children with Down syndrome were found to express negative emotion for a longer period of time and with greater intensity than a typically developing comparison group (Jahromi, Gulsrud, & Kasari, 2008).

While emotional self-regulation is often discussed as separate from cognitive processes, these two domains are intimately connected, and may have shared neural mechanisms (Bell & Wolfe, 2004). Some aspects of emotional regulation reflect reactive propensities while others are voluntary (Eisenberg & Fabes, 2006) and thus require the recruitment of cognitive skills to understand the need for, and to select and employ, appropriate strategies. Children with intellectual disability, in particular, may have difficulty with this more effortful aspect of emotion regulation.

COGNITIVE SELF-REGULATION

Cognition is central to self-regulation; however, as with the other aspects of self-regulation, there are multiple interactive elements that contribute to effective cognitive control. Two of the most important are goal setting and planning. Goals provide the purpose for self-regulatory activity as well as the standard against which self-evaluation is conducted (Bandura, 1986; Carroll, Durkin, Hattie, & Houghton, 1997). The outcomes of self-evaluative activity influence expectancy of success (Bandura, 1991), and thus motivation and future goal pursuit. The establishment of future goals (those that are distant in time) are a facet of the developmental process and are generally seen to reflect, in part, the individual’s internalization of sociocultural norms (Miller & Brickman, 2004).
Kopp’s (1991) developmental progression of the establishment of self-control and Deci and Ryan’s (1985) model of self-determination both hypothesize that young children adopt the values and goals of their primary caregivers before developing the capacity to set their own standards of performance. The realization of future goals requires the development of a “path of subgoals” (Miller & Brickman, 2004, p. 16), with those who make plans being more successful in goal attainment than those who do not (Schunk, 1994).

The development of future goals would seem to be part of the experience of many individuals with an intellectual disability, possibly reflecting the internalization of social norms; for example, many individuals express the goal of marrying and of being employed (Cooney, Jahoda, Gumley, & Knott, 2006; Healy, McGuire, Evans, & Carley, 2009). It may be more difficult, however, for these individuals to develop the pathway of subgoals. Planning has been found to be difficult for many groups with a developmental disability, including those with fetal alcohol syndrome (Green et al., 2009), fragile X syndrome (Hooper et al., 2008), Down syndrome (Lanfranchi, Jerman, Dal Pont, Alberti, & Vianello, 2010), and those with autism (Robinson et al., 2009).

Other difficulties with respect to the cognitive elements of self-regulation for those with intellectual or developmental disability include the directing, maintaining, and monitoring of attention (e.g., Baker, Neece, Fenning, Crnic, & Blacher, 2010); the weighing up of alternative courses of action (Willner, Bailey, Parry, & Dymond, 2010); inhibition (e.g., Hooper et al., 2008); and cognitive flexibility (e.g., Lanfranchi et al., 2010).

**Behavioral Self-Regulation**

Behavioral self-regulation refers to the ability to behave in ways that assist in the achievement of one’s own goals. An example is delay of gratification, which requires one to forgo immediate rewards in order to gain more preferred but delayed rewards. Mischel and Baker (1975) developed a delay of gratification task to provide an experimental analogue of this common life demand. This experimental task has been used by Cuskelly and colleagues with children, adolescents, and adults with Down syndrome, with all groups exhibiting difficulty with delay of gratification. When compared with mental age (MA)-matched peers, children with Down syndrome do significantly worse (Cuskelly et al., 2001; 2003; Cuskelly & Stubbins, 2007).

Difficulty in containing aggressive impulses also represents a failure in behavioral self-regulation. Findings by Carroll, Hemingway, Bower, Ashman, Houghton, and Durkin (2006a) suggest that adolescents who display rapid cognitive tempo, poor mental inhibitory control, and high impulsivity are more likely to be early-onset offenders. While many individuals with a developmental disability will not exhibit this behavioral difficulty, those with intellectual disability and autism spectrum disorders have been found to display more aggression than their typically developing peers, with this often being a long-lived difficulty (see, for example, Totsika & Hastings, 2009).

Persistence is identified as an important facet of self-regulated behavior (see, for example, Bieberich & Morgan, 2004; Clark, Woodward, Horwood, & Moor, 2008), and is also central to definitions of mastery motivation; mastery motivation has even been used, on occasion, as a general indicator of self-regulation (e.g., Hauser-Cram et al., 2001). Motivations other than mastery also provide the impetus for the use of self-regulatory strategies and may be recruited to assist with self-regulation, but the following discussion is focused on mastery motivation in individuals with developmental disability.

**Mastery Motivation in Individuals with Developmental Disability**

Those studies that have used parental report about mastery motivation have generally reported motivational weaknesses in those with a developmental disability. Studies of children with cerebral palsy (Majnemer, Shevell, Law, Poulin, & Rosenbaum, 2010), Down syndrome (Gilmore et al., 2003a; Gilmore & Cuskelly, 2011), developmental disability from a range of causes (Morgan, Wang,
Liao, & Xu, this volume), and autism (Morgan, Wang, & Nelson, 2010) have all found significant differences in comparison to children who are developing typically. It seems plausible that parents use a chronological age standard in their assessments of their child’s motivation, rather than an MA match, this latter generally being used when experimental tasks are employed. It is also very possible that parents and others rarely see mastery-oriented behaviors from their children with disability as these children are rarely in situations that are optimally challenging—that is, that are within the individual’s capabilities but are difficult enough to provoke some persistent effort.

Experimental and observational data of mastery motivation presents a different picture from that based on parental report, at least for some groups. Experimental tasks using the mastery motivation paradigm require that the child be faced with a task where some success is possible, but where complete success requires persistent, goal-oriented problem solving (Morgan, Busch-Rossnagel, Maslin-Cole, & Harmon, 1992). Observational studies usually use free play situations to observe children’s persistent, goal-oriented engagement with toys.

In one of the earliest studies of mastery motivation in individuals with intellectual disability, Harter and Zigler (1974) found differences between those with intellectual disability and typically developing children on measures designed to reflect curiosity, competence motivation, and preference for challenge, with those with intellectual disability demonstrating less motivated behavior. In a partial replication of this study, Gilmore and Cuskelly (2011) found no differences between children with Down syndrome and typically developing children matched for MA (although there was a trend towards significance on one measure of persistence, an aspect of mastery motivation not assessed by Harter & Zigler). One plausible explanation for this difference in results lies with the groups used in the studies. Harter and Zigler included only children whose intellectual disability was not (at that time) attributable to a known organic cause, while the children in the Gilmore and Cuskelly study all had Down syndrome. It is possible that there are differences between etiological groups with respect to mastery motivation; however, other recent studies with diverse groups with a developmental delay also have not found differences between these children and those who are typically developing and matched for MA. In a longitudinal study, Blair, Greenberg, and Crnic (2001) found that children with mild intellectual disability were not different from MA-matched typically developing children on measures of task orientation (operationalized as persistent goal-directed behavior), and Hauser-Cram (1996) also found no differences between children with developmental delay with no known cause and comparison children.

Another likely explanation for the difference between the Harter and Zigler (1974) and Gilmore and Cuskelly (2011) studies is the change in life circumstances of individuals with a disability that has occurred for those living in Western societies over the period separating the two studies, with parents and others being more effective in supporting this aspect of their child’s development than was the case in the past. This interpretation is supported by the contrast in findings with respect to mastery motivation in children with motor impairment. In 1988, Jennings et al. found that children with a physical impairment had reduced mastery motivation in contrast to typically developing children as they were less persistent and less likely to choose challenging activities; however, in 1996, Hauser-Cram did not find any decrement in performance on mastery behaviors of a group of children with motor impairment.

Phenotypic characteristics may be an important influence on mastery motivation, both directly, through some aspect of the genotype, and in the interactions of the phenotypic characteristics and the environment. Fidler (2006a) raised this possibility and provided the example of children with Williams syndrome, who generally have a strong interest and relative strength in language. Fidler suggested that individuals with this syndrome may have an in-built orientation to language associated with the syndrome itself, which means that acquiring new vocabulary and producing speech (i.e., mastering this area of development) is inherently rewarding. Contrariwise, it may be that a strong orientation to social contact and the secondary rewards that accrue to verbal interaction may be the primary motive in the continuing development of verbal skills in this group. These motivational pressures may work together, of course, and are not mutually exclusive.
Down syndrome is one condition about which a hypothesis of reduced motivation for learning (and thus mastery) has been posited. Based on their observations of young children, Wishart (1996) and Fidler (2005) have argued that children with Down syndrome have an orientation to avoid challenging situations. Wishart (2001) reported that, when faced with “hard” tasks, children with Down syndrome tend to engage in avoidant behavior, often using social gambits as a distracter, and to become increasingly reluctant to take the initiative. Gilmore, Cuskelly, and Hayes (2003b) also reported more avoidant behavior in children with Down syndrome on a novel task; however, examination of the data showed that this behavior was confined to a small group of children and was not applicable to all members of the group. Children with Down syndrome have been found to elicit help more frequently than children with developmental disability (mixed etiologies) and MA-matched typically developing children (Fidler, Hepburn, Mankin, & Rogers, 2005; Kasari & Freeman, 2001). Of course, seeking help when it is necessary is an appropriate response, and might even be understood as a self-regulatory strategy; in this instance, the suggestion is that it occurs prematurely—that is, help is sought before the child has actually attempted the task and established that assistance is required. Fidler (2006b) has suggested that an orientation to avoid challenge, coupled with a relative strength in social skills, may lead to reduced learning in these individuals.

In recent studies where tasks have been individualized to optimize challenge following procedures developed by Morgan et al. (1992), Gilmore et al. (2003a) and Glenn, Dayus, Cunningham, and Horgan (2001) found no differences in mastery motivation between young children with Down syndrome and MA-matched typically developing children. Kasari and Freeman (2001) reported no differences on preference for challenge between children with Down syndrome and typically developing children; however, children with intellectual disability from other causes were less likely to seek challenge. The differences between these studies and those reported by Wishart (1996) and Fidler et al. (2005) are puzzling. The most plausible explanation lies with the nature of the task—it seems as though mastery behaviors are likely to be most evident in situations where there is a good fit between the skill level of the child with Down syndrome and the task confronting him/her. Tasks that are not optimally challenging are likely to be associated with help seeking (those that are too difficult) or attempts at social engagement (those that are too easy).

The studies discussed in the preceding paragraph have all been with relatively young children with Down syndrome. It is possible, even likely, that, as children with an intellectual disability age, mastery motivation will reduce as a consequence of repeated failure (Harter & Zigler, 1974). Similar to self-regulation, mastery motivation is understood to be a developmental phenomenon that changes with maturity and in response to experience (Harter, 1992). Precisely how it changes with time is not well understood, although there are clear parallels with some aspects of the construct of intrinsic motivation. The term “intrinsic motivation” is somewhat ambiguous, however; as noted by Switzky (2001), it is used in two conceptually distinct ways. In some conceptualizations, intrinsic motivation refers to a desire to learn and understand for its own sake, rather than for external reward. It is associated with a preference for challenging activities, making it a similar construct to mastery or effectance motivation. In other conceptualizations, intrinsic motivation relates to specific properties of a task that make it inherently interesting to the individual. This latter may lead to competence (e.g., as play assists with skill development), but competence is not the reason the individual chooses to engage in the activity.

Intrinsic motivation is central to Deci and Ryan’s (1985) Self-Determination Theory and their original conceptualization had striving for competence as its essential feature. This was contrasted with extrinsic motivation, where the impetus was outside the individual and may have included either the desire to gain something (e.g., parental approval) or to avoid something (e.g., parental disapproval). In later refinements, they described a continuum of extrinsic motivation that moved from motivation as an entirely extrinsic source to one that is virtually indistinguishable from intrinsic motivation, labeled integrated regulation (Deci & Ryan, 2000). Integrated motivation is very similar to intrinsic motivation as it is autonomous and congruent with the individual’s values; however, Deci and Ryan distinguish it from intrinsic motivation as its focus is instrumental rather than entirely...
concerned with the behavior itself. Engaging in a behavior that will lead to some self-selected goal, rather than for the purpose only of achieving competence, would be regarded as integrated motivation.

Switzky (2006) has argued that individuals have a propensity to be more intrinsically or extrinsically motivated and that this orientation can be determined. According to Switzky’s research, intrinsic motivation increases with chronological age, mental age, intellectual ability, and social class, and individuals with intellectual disability are, as a group, less intrinsically motivated than typically developing individuals. Switzky’s work suggests that children who are intrinsically motivated are more likely to set higher goals than are those who are extrinsically motivated but also have self-reinforcement schedules that are leaner. The imposition of external controls will interfere with their self-regulatory system (Deci, 2004), indicating the close interconnection between self-regulation and mastery motivation.

SELF-REGULATION AND MASTERY MOTIVATION IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITY

Motivational processes and self-regulation are intertwined (Shonkoff & Phillips, 2000), and, for some researchers, mastery/effectance motivation is identified directly as an aspect of self-regulation (Hauser-Cram et al., 2001). In what seems to be the only study to examine links between self-regulation and mastery motivation in children with intellectual disability, we asked parents of typically developing children \( (n = 33) \) and parents of a child with Down syndrome \( (n = 33) \) to complete a measure of self-regulation, the Self-Control Rating Scale (SCRS; Kendall & Wilcox, 1979), as well as two measures of mastery motivation: the Dimensions of Mastery Questionnaire (DMQ-17; Morgan et al., 2002) and the EZ-Personality Questionnaire (EZPQ; Zigler, Bennett-Gates, Hodapp, & Henrich, 2002). The DMQ has been described earlier in this section (see Morgan et al., this volume) and is an instrument focused on mastery motivation across a number of areas. The subscale labeled “object persistence” most clearly represents the dimension of mastery motivation; that is, persistence with challenging tasks. The EZPQ is a measure of personality and motivation specifically designed for individuals with intellectual disability. One of the subscales focuses on effectance motivation and uses this label. We also administered behavioral measures of persistence, preference for challenge, and curiosity as indicators of children’s mastery motivation. The tasks were the same as those reported in Gilmore and Cuskelly (2011).

We found significant, moderate to strong, positive correlations between the measure of self-regulation (the SCRS) and the DMQ measure of mastery motivation (object persistence subscale) \( (r = 0.44, p = 0.007 \) and \( r = 0.55, p = 0.001 \) for the typically developing children and the children with Down syndrome, respectively). Likewise, self-regulation was correlated with the EZ effectance motivation subscale \( (r = 0.59, p <0.001 \) and \( r = 0.70, p <0.001 \) for the typically developing children and children with Down syndrome, respectively). There were positive associations between the SCRS and the behavioral measures of mastery motivation, although they differed for the two groups. For the typically developing children, there was a significant association with preference for challenge \( (r = 0.36, p = 0.049) \) and, for the Down syndrome group, the significant correlation was with persistence \( (r = 0.48, p = 0.004) \). Parental reported self-regulation was positively correlated with MA for the individuals with Down syndrome only \( (r = 0.39, p = 0.025) \).

Low expectation of success contributes to low levels of persistence in both typically developing children (Bandura, 1997) and those with intellectual disability (Weisz, 1999). Beliefs about success (expectancy of success) will influence individual’s judgment about what is within grasp and therefore whether persistence is worthwhile. In our research described earlier, parental reports of expectancy of success and effectance motivation were not significantly correlated for typically developing children, but were significant for children with Down syndrome \( (r = 0.60, p <0.001) \). Expectancy of success was also significantly correlated with the SCRS for those with Down syndrome \( (r = 0.37, \)
p = 0.018), but not for those developing typically. When associations with behavior were examined, expectancy of success was positively correlated with persistence for the children with Down syndrome and with preference for challenge for the typically developing children. The Down syndrome group was substantially older (mean age = 13 years) than the MA-matched typically developing group (mean age = 5 years) and so had much more experience on which to develop their view of the likelihood of experiencing success as a result of their efforts.

HYPOTHESES REGARDING THE DIFFICULTIES IN SELF-REGULATION EXPERIENCED BY THOSE WITH DEVELOPMENTAL DISABILITY

While the presence of intellectual disability may be sufficient to cause problems with self-regulation, it is possible that there are other barriers to its development, such as remediable skill deficits or life experiences that have either failed to provide appropriate stimulus for the development of the necessary skills or have undermined the use of these skills. Identification of these barriers is the first step in developing interventions that effectively assist those with intellectual disability to develop the suite of skills that comprise self-regulation.

NEUROBIOLOGICAL DIFFERENCES

One plausible hypothesis for the difficulties children with atypical development have with self-regulation lies in the structural differences in brain development of these children. For example, a number of conditions associated with developmental disability have shown to have some abnormality in brain stem development (e.g., Down syndrome: Kittler et al., 2009; autism: Jou, Minshew, Melhem, Keshavan, & Hardan, 2009), and these differences may interfere with the usual developmental processes that culminate in mature self-regulation. It is possible that these make a direct contribution to self-regulatory difficulties through, for example, attentional problems, but it is also possible that indirect influences are at play. The physiological irregularity associated with many developmental disabilities may affect maternal interactions, and thus the ability of the mother–child dyad to develop the coregulation necessary to later self-regulation (Feldman, 2009).

Temperament is generally recognized as representing biological, inherited predispositions (Plomin, Owen, & McGuffin, 1994); however, there is also evidence that these predispositions are influenced by central nervous system abnormalities (Calkins & Fox, 1994). Temperament may have an influence on children’s ability to use self-regulatory skills, particularly in situations where they are frustrated. Two particular aspects of temperament have been identified as likely to be important to self-regulation—effortful control (Rothbart & Bates, 2006) and emotional reactivity (Rueda, Posner, & Rothbart, 2005). The construct of effortful control has not been used very often in research with children with developmental disabilities; however, children with autism have been shown to do more poorly on this dimension of temperament than typically developing children (Konstantareas & Stewart, 2006). The data with respect to emotional reactivity suggest that this temperamental characteristic may differ across etiologies. Children with Down syndrome appear to have a somewhat dampened affect (e.g., Moore, Oates, Goodwin, & Hobson, 2008), while children with autism and ADHD are more likely to be more reactive than are typically developing children (Carroll et al., 2006b; Myles et al., 2004).

COGNITIVE SKILLS

Language (specifically, self-talk) is given a key role in most major theories of self-regulation, and Morin and Jayson (2007) provide a review of the empirical evidence for the connection. Whitman (1990) hypothesized that it was the linguistic deficiencies experienced by those with intellectual disability that were the basis for their difficulty in self-regulation. The evidence is not unequivocal; however, some support exists for this relationship in those developing typically (e.g., Chui &
Time-processing ability is an important component of many of the behaviors that contribute to self-regulation (Carroll et al., 2006a; Janeslått, Granlund, Kottorp, & Almpvist, 2010). Barkley (1997) found that children with ADHD experienced the passage of time as a slower process than comparison, typically developing children. Janeslått et al. showed a developmental pattern of time perception in children who were developing typically, with children with a range of developmental disabilities lagging behind in their development, although it is possible that this was due to differences in MA. Difficulties with time processing may be compounded by the way these difficulties are responded to by others in the environment. Clements and Zarkowska (2000) reported that caregivers of individuals with a developmental disability who exhibited difficulties understanding time often dealt with this by not telling the individual about upcoming events until almost immediately before they occurred, and this was particularly likely if the event held either positive or negative connotations for the individuals.

Associated with difficulties in processing time is the requirement of a future time perspective for many of the self-regulatory behaviors. For example, in a review, Bembenutty and Karabenick (2004) show a clear link between future time perspective and ability to delay gratification and a range of other self-regulatory behaviors. Many individuals with developmental disabilities have difficulty with at least some of the aspects of understanding the future and the relationship between current circumstances/behavior and future goals, and also have difficulty with delay of gratification tasks (Cuskelly et al., 2001). Doubts about ability to attain goals will undermine capacity to develop future goals (Miller & Brickman, 2004). Simons, Vansteenkiste, Lens, and Lacante (2004) provided evidence that motivation and persistence as well as achievement are positively influenced by a future time perspective.

One way of sustaining motivation in tasks that do not immediately engage is to recognize their value in the contribution they make to other, more distant goals. Finding the connection between a long-term goal and current activities/tasks is central to motivation for tasks with long-term benefits (Csikszentmihalyi & Schneider, 2000; Kauffman & Husman, 2004); and this aspect of motivation reflects the integrated motivation described by Deci and Ryan (2000). Miller and Brickman (2004) suggested, on the basis of Csikszentmihalyi and Nakamura’s (1989) finding that optimally challenging academic tasks were not intrinsically motivating, that challenges need to have personal value or relevance beyond the moment and therefore need to be tied to future goals, something that may be difficult for individuals with an intellectual disability without, at least initially, some external support.

There is a wide range of strategies that individuals use to assist them in regulating their emotions and behaviors. Individuals with intellectual disability appear to have poorer access to these strategies. Poorer access may arise because they do not know (have not learned) the strategies, they do not recognize the situation calls for the use of the strategies, or they cannot manage their efforts effectively. For example, Jahromi et al. (2008) found that children with Down syndrome had fewer self-soothing strategies than typically developing children and Willner et al. (2010) found that individuals with intellectual disability did not have the skills to consider two pieces of information simultaneously when engaged in a version of a delay of gratification task; Glenn and Cunningham (2000) reported that only a small proportion of children with Down syndrome used self-talk (aloud) for self-direction; and Jobling and Cuskelly (2006) reported that adolescents with Down syndrome did not choose a healthy meal when asked to do so, even though they were able to identify the foods that constituted a healthy diet.

As children grow older and move into more complex social situations, the motivation to master tasks will compete with other motivations; for example, to avoid failure, compete with others, or win a prize. These competing motivations may become more salient and it may only be in particular circumstances that mastery motivation is the determinant of behavior. It is rare in life that one is constantly in “flow”—the experience associated with successfully coping with a challenging, goal-
directed activity (Csikszentmihalyi, 1990). Much of what is asked of us is not interesting, but many self-regulated individuals are able to optimize their motivation by developing challenges for themselves. As an example, a young person who stacks shelves at night to support him/herself through university might create speed challenges so that s/he must complete some repetitious task in a faster time than it was completed the previous night. In this way, tasks that hold no intrinsic interest can be altered to stimulate the motivation to competence. Such cognitive tricks can help maintain interest in a mundane job, but the understanding of the usefulness of engaging in this behavior may not be apparent to individuals with an intellectual disability.

**Motivational Deficits**

Motivation and self-regulation are inextricably intertwined and so motivational deficits will decrease the use of self-regulation (Zimmerman & Schunk, 2008) while difficulties with self-regulation will lead to difficulties managing motivation (Sansone, 2009). As the discussion here has made clear, the more current research on mastery behaviors has not identified a deficit in children with Down syndrome in contrast to those who are typically developing when they are matched for MA. As Fidler’s (2006a) proposal regarding phenotypic differences with respect to motivation has suggested, however, children with Down syndrome cannot be regarded as a proxy for all children with a developmental disability. There may be other groups for whom mastery motivation is more disrupted. Further, there have been no recent investigations of mastery behavior where a chronological age (CA) match has been used, but it seems likely that children with developmental disability will not exhibit mastery motivation at the same level as CA peers. While MA matches are important for understanding the developmental consequences of intellectual and developmental disability, they may not be the most appropriate for understanding how these disabilities impact the everyday experiences and behaviors of these children, nor of their families and teachers.

Mastery motivation is not the only motivation system operating and influencing behavior. Zigler et al. (2002) have reported significant differences on a range of motivational indices, including a stronger propensity in those with intellectual disability to look to others for guidance. Beliefs about personal agency, capacity, and expectancy of success all come into play and these may be undermined as children with developmental disabilities accrue experience (e.g., Switzky, 2001; Zigler et al., 2002). Many studies that have examined motivation from these different perspectives have concluded that those with intellectual disability are vulnerable to developing motivational orientations and beliefs that are not supportive of effective development of competence (e.g., Switzky, 2006; Zigler et al., 2002).

**Experiential Differences**

Parental, and particularly maternal, support for autonomy has been identified as crucial to the development of many desirable child outcomes including self-regulation (Grolnick & Ryan, 1989; Wong, 2008). Mothers who provide opportunities for autonomous decision making and action, in the context of appropriate structure and support, have children who are more capable across a range of self-regulatory demands (see Mauro & Harris, 2000; Purdie, Carroll, & Roche, 2004), including emotional regulation (Grolnick, McMenamy, & Kurowski, 2006). This link is also evident for children born very prematurely or with very low birth weight. Clark et al. (2008) found that maternal sensitive support and lack of intrusiveness at 2 years of age predicted self-regulatory capacity at 4 years in these children. There appear to be no studies that have examined the role support for autonomy might play in self-regulation in children who have a developmental disability.

Parenting is also important for the development of mastery behaviors. In typically developing children, maternal support for autonomy has been shown to predict mastery motivation (Moorman & Pomerantz, 2008). Gilmore, Cuskelley, Jobling, and Hayes (2009) found that maternal support for autonomy was associated with higher levels of persistent behavior in 4- to 6-year-old children with
Down syndrome. Kelley, Brownell, and Campbell (2000) also found that children with Down syndrome whose mothers were more supportive of autonomy when the children were 2 years old were less likely to avoid challenging activities at age 3 years. Hauser-Cram (1996) found that mothers who gave clear direction and verbal and nonverbal support to their children while teaching them a new task had children who were more persistent, irrespective of developmental status. Positive associations have also been found between autonomy-supportive classrooms and persistence in children with a range of developmental disabilities (Hauser-Cram, Bronson, & Upshur, 1993).

Children with intellectual or developmental disabilities are likely to be provided with fewer opportunities to learn effective self-regulation strategies as they often experience environments that fail to provide sufficient opportunities for the development of autonomy (Clark et al., 2004), and this lack of opportunity starts very early in life. In numerous studies, mothers of children with intellectual disability and other developmental disabilities have been shown to be more directive and less supportive of autonomy in their children than are mothers of typically developing children (Glenn et al., 2001; Rutgers et al., 2007; Woolfson & Grant, 2006). It is possible that, while directive behavior may be useful in meeting some developmental challenges, it may be detrimental to others, such as self-regulation. Lack of opportunities for autonomy may continue well into adulthood for individuals with an intellectual disability (see, for example, van Ingen, Moore, & Fuemmeler, 2008).

The schooling environment experienced by many children with intellectual disabilities is not conducive to the development of self-regulatory skills, as the emphasis is on external control to a large extent (Clark et al., 2004) and teachers of children with special educational needs have been found to be more directive than responsive in their interactions with their pupils (Ockjean & Hupp, 2005). In addition, the opportunity to explicitly develop skills is not taken. For example, Wehmeyer, Agran, and Hughes (2000a) found that, although teachers of children with intellectual disability acknowledged the importance of problem solving as an important skill for learning, they, in fact, engaged their pupils in the process of learning problem solving significantly less often than teachers working with children who were developing typically. The reason for failing to teach these skills was a belief that the children with intellectual disability would not benefit from such instruction.

STRATEGIES AND SUPPORTS FOR THE DEVELOPMENT OF SELF-REGULATION AND MASTERY MOTIVATION

We have posited a number of hypotheses regarding the difficulties children with developmental disabilities display in situations calling for self-regulated behavior. Some of these hypotheses deal with the basic building blocks of self-regulated behavior (e.g., physiological functioning and attentional processes), while others deal with the more multicomponent, integrated behaviors and their contributing influences. In this section, we turn the focus to the evidence and possibilities for supporting the development of self-regulation and maintaining an orientation to mastery in those with intellectual/developmental disabilities. While there are a number of likely contributors to difficulties in self-regulation, only those open to change will provide useful avenues for intervention. This section, therefore, focuses on four issues: support for autonomy; appropriate match between child skills and environmental demands; explicit teaching of skills; and the development and maintenance of motivation, including mastery motivation.

SUPPORT FOR AUTONOMY

Based on Strayhorn’s (2002) argument about the necessity to provide repeated and prolonged teaching experiences of self-regulation and Kopp’s (1991) discussion about parental roles in the acquisition of this skill, it is evident that the day-to-day (proximal) experiences of children—the parenting and teaching environments to which they are exposed—will provide the most useful place to locate the major intervention effort. With maturity, individuals will leave school (and perhaps the
family home) and so the focus of efforts to support self-regulation will need to move to these other service environments.

The importance of parental support of autonomy in daily interactions with their children has been established; however, it is clear that parents of a child with a disability are less supportive of autonomy than are parents of children without these difficulties. This lack of experience with autonomous behavior, an important precursor to, and element of, self-regulated behavior, may be a strong contributor to deficits observed in this group. Only one study was able to be identified that had examined the effectiveness of an intervention focused on increasing parental support for autonomy, and this study did find parents were more sensitive to their child’s needs following the intervention (Wang, 2008). Parents may have the skills required to effectively support autonomy in their child but may hold views about their child’s disability that deter them from adopting an autonomy supportive style of interaction. Landry et al. (2008) found that parents’ trust in organismic development was an important influence on their support for autonomy, and it is possible that parents who have a child with a disability are unconvinced that their child’s development will unfold naturally without substantial direction. It is crucial to build parental skills with respect to autonomy support, and/or to identify effective approaches to understand and address parental beliefs and values about supporting autonomy in their child with a disability.

Teachers and other service providers also appear to require skill development and/or assistance regarding the creation of environments conducive to interactions that provide opportunities for autonomous behavior from individuals with a developmental disability. Clark et al. (2004) provide a range of suggestions for autonomy-supportive classrooms, including a list of curriculum materials that have the development of self-regulatory skills as their focus.

**Appropriate Match between Child Skills and Environmental Demands**

Children with developmental disabilities rarely operate in environments that are well suited to their developmental level so the kinds of support that are available to children developing typically to assist them develop self-regulation and learning-oriented motivation will often be missing. This may be because parents and teachers have not adjusted their expectations appropriately. If demands are too high, individuals will have no recourse but to ask for assistance, a behavior that will likely build dependence if it is repeated a great deal (Egilson & Traustadottir, 2009); if demands are too easy, disengagement is likely to follow. A mismatch between supports and capabilities may interfere with children’s capacity to effectively use their motivation to become competent and thus move along the self-regulatory continuum towards more mature functioning (Grolnick et al., 2006).

**Explicit Teaching**

Successful direct teaching of the skills of self-regulation has been demonstrated in multiple studies. Individuals with intellectual disability have been successfully taught to set learning and/or social goals, develop a plan for achieving their goals, and to evaluate whether they have met their goal (Palmer, Wehmeyer, Gipson, & Agran, 2004; Wehmeyer et al., 2000b), and to improve their academic skills (Harris, Graham, & Mason, 2003; Konrad, Trelka, & Test, 2006). The majority of these studies have included only small numbers of participants, have been of short duration, and have not tested generalization to untaught situations. These limitations need to be addressed before there is likely to be widespread uptake of these approaches within schools and other service systems.

Effective self-regulation requires some capacity to solve problems (Miller & Brickman, 2004; Wehmeyer et al., 2000b). A number of studies have been conducted with adults with an intellectual disability and have shown convincingly that problem solving that is both flexible and generalizable to untaught situations can be taught to these individuals (see Agran, Blanchard, &
Successful problem-solving training has also recently been demonstrated with children with intellectual disability (Agran, Wehmeyer, Cavin, & Palmer, 2008). Interventions to increase the capacity of individuals with intellectual/developmental disability to delay gratification have been developed, although often under a different paradigm—that is, preference for, or tolerance of, reinforcer delay (see, for example, Fisher, Thompson, Hagopian, Bowman, & Krug, 2000). Benedick and Dixon (2009) showed that the provision of a rule assisted individuals with an intellectual disability and concurrent mental health condition, who were known for their impulsive behavior, to change their behavior to choose a larger delayed reinforcer over a smaller one available sooner. The authors suggested that their study provided evidence that the use of rules (and thus self-instruction) can enhance training for self-control in this group. Dixon, Rehfeldt, and Randich (2003) demonstrated that self-control training combined with a fading procedure can effectively be used to increase the time individuals with intellectual disability will wait for a reinforcer, even in the presence of an immediate smaller reinforcer.

**Motivational Maintenance/Enhancement**

The maintenance of mastery motivation as individuals with a developmental disability age and accumulate more experience of failure would seem to be critical, given its centrality to the development of competence. Appropriate persistence in the face of failure and a preference for challenging tasks are required if learning is to take place. These “personality traits” may be open to direct teaching, and are likely to be supported by a good match between demands and abilities, often not an easy judgment. Organizing tasks so that failure is always avoided, such as in errorless learning practices, is likely to undermine individuals’ capacities to deal with this inevitable aspect of life. Assisting individuals to recognize competence may also be helpful and will require the development of the skill to set standards and to self-evaluate against the standard (a self-regulatory activity).

**Conclusions**

As identified on this chapter, some of the strategies likely to prove helpful in developing capacity for self-regulation in those with intellectual/developmental disability are well established. Others are less so. Parental support for autonomy is one area where the evidence points to this being an important focus for intervention. At the present time, however, the barriers to autonomy support in parents of children with intellectual and developmental disabilities are not well understood. If interventions are developed without this understanding, they are unlikely to be successful in changing parents’ behavior. There are a number of potential explanations for the lack of autonomy support from these parents. It may be that parents develop other priorities when they learn of their child’s difficulties, such as compliance or the provision of a protective environment. It is possible that parents of a child with intellectual/developmental disability do value autonomy as highly as do parents of typically developing children, but that their capacity to act on that value is constrained by factors such as stress, limited resources, anxiety (Gurland & Grolnick, 2005), and difficult child behaviors (Joussemet, Landry, & Koestner, 2008).

Developing understanding of how mastery motivation develops (and thus its measurement in older groups), how it may be strengthened, how it combines with other motivations, and how it may be called on when required are all challenges facing the field. All these understandings include aspects of experience, those that are perhaps particular to or more intense for those with intellectual and developmental disabilities as well as how they interact with specific etiologies (Fidler, 2006a). The integration of optimal challenge in everyday experiences, plus interventions to assist parents and others to support the autonomy of individuals with an intellectual or developmental disability, require exploration as likely contributors to the development and maintenance of mastery motivation.
Greater understanding of the construct of mastery motivation is also required. While the components have been delineated, we have little understanding of the relative importance of these components for the development of self-regulation and of competence in individuals with a developmental disability. While behavioral measures of persistence have been found to be correlated both concurrently for young children (Gilmore et al., 2003a) and for those who are in early adolescence (Gilmore & Cuskelly, 2011), and over time (Gilmore & Cuskelly, 2009), there appear to be few substantiated associations between the other aspects of mastery motivation. Gilmore and Cuskelly (2011) found no association between measures of persistence, preference for challenge, and curiosity, either for children with Down syndrome or for those who were developing typically.

Gilmore et al. (2003a) proposed that different processes may be at play with respect to the development of mastery motivation in children with Down syndrome in contrast to those that were influential for children who were developing typically. This suggestion was based on the finding that persistence on two quite different tasks was correlated for children with Down syndrome but was not associated for an MA-matched typically developing group. This possibility has gained more support from the study reported by Gilmore et al. (2009), who found that maternal support for autonomy was significantly associated with task persistence for children with Down syndrome but not for typically developing children.

While most of the groups with a developmental disability that have been subject to investigation with respect to self-regulation have been found to have difficulties, the specific areas of difficulty and the source of these difficulties may very well differ along etiological lines. Clearly, experience is also a strong candidate as a contributor to self-regulatory difficulties, and these are likely to interact with other characteristics, such as temperament, in specific ways.

REFERENCES


