Observational Assessment and Maternal Reports of Motivation in Children and Adolescents With Down Syndrome

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Abstract

Despite a lack of consistent empirical evidence, there has been an ongoing assumption that intellectual disability is associated with reduced levels of motivation. The participants in this study were 33 children with Down syndrome ages 10–15 years and 33 typically developing 3–8-year-old children. Motivation was measured through observational assessments of curiosity, preference for challenge, and persistence, as well as maternal reports. There were no significant group differences on motivation tasks, but mothers of children with Down syndrome rated their children significantly lower on motivation than did parents of typically developing children. There were some intriguing group differences in the pattern of correlations among observations and parent reports. The findings challenge long-held views that individuals with intellectual disability are invariably deficient in motivation.

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Studies of motivation in children with intellectual disability who are in their middle years of childhood or adolescence are almost nonexistent; nevertheless, there has been an ongoing assumption that intellectual disability is associated with reduced levels of motivation (Bennett-Gates & Zigler, 1999; Merighi, Edison, & Zigler, 1990; Switzky, 1997). Motivation is recognized as an essential element of learning both for typically developing children (Broussard & Garrison, 2004; Wentzel & Wigfield, 1998) and for those with intellectual disability (Gilmore & Cuskelly, 2009; Hauser-Cram, Krauss, Warfield, & Steele, 1997; Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001). Given the inherent difficulties that children with intellectual disability have with learning, motivational deficits are likely to have a substantial impact on functioning across a number of spheres of life. Hauser-Cram et al. (2001) found that motivation was an important predictor of cognitive and functional skills in young children with intellectual disability, and Gilmore and Cuskelly (2009) demonstrated the importance of early childhood motivation for later academic success in adolescents with Down syndrome.

Although there are a number of paradigms available for understanding the construct of motivation, there is general agreement that motivation is essential for initiating, directing, and sustaining goal-directed behavior (Morgan, Harmon, & Maslin-Cole, 1990; Pintrich & Shunk, 2002; Stipek, 1997). One of the most influential paradigms for investigating motivation in younger children is that of mastery motivation, which

conceptualizes motivation as a striving for competence (Yarrow et al., 1983). Mastery motivation is most commonly operationalized as persistence with optimally challenging tasks and positive affect following success (Morgan et al., 1990), although the latter has been used less often than the former due to measurement difficulties. Preference for challenge has also been considered to be an indicator of mastery motivation (Dweck, 1991; Gilmore & Cuskelly, 2009).

Research with infants and young children using the procedures developed by Morgan, Busch-Rossnagel, Maslin-Cole, and Harmon (1992) has identified few differences in motivation for children with intellectual disability compared with those of the same mental age who are developing typically. Most empirical work has been undertaken with young children with Down syndrome. Gilmore, Cuskelly, and Hayes (2003) found no differences on measures of task persistence between children with Down syndrome (*M* chronological age [CA] = 63.8 months) and a typically developing group (*M* CA = 30.81 months) matched for mental age (MA). Using the same approach, but with younger children, Glenn, Dayus, Cunningham, and Horgan (2001) found no differences between children with Down syndrome and typically developing children at MAs of 18 and 24 months. Similar results have been found at MAs of 34 months (Landry, Miller-Loncar, & Swank, 1998), 17 months (Ruskin, Mundy, Kasari, & Sigman, 1994), and 6 months (MacTurk, Morgan, & Jennings, 1995).

It has been suggested, however, that motivational deficits may increase with age (Harter, 1977; Hupp, 1995; Niccols, Atkinson, & Pepler, 2003). In a frequently cited study, Harter and Zigler (1974) found that older children and adolescents with intellectual disability from non-organic etiologies (n = 66; CA range = 7.8–16.9 years) were less motivated than typically developing children of the same MA (n = 37). Approximately half of the children with intellectual disability were living with their families, whereas the remainder were institutionalized. On a number of the measures used in this study, the group of children who were institutionalized displayed lower motivation than those who were living with their family.

In contrast to the results from experimental tasks, comparisons of parent reports of child motivation have generally identified significant differences, with parents of children with intellectual disability reporting lower motivation in their children than parents of children who are developing typically (Gilmore et al., 2003; Glenn et al., 2001; Ruskin et al., 1994). Zigler, Bennett-Gates, Hodapp, and Henrich (2002) found lower scores on all subscales of an instrument developed to measure personality-motivation factors when comparing teacher reports of adolescents with intellectual disability (*M* CA = 14.5) with MA-matched children who were developing typically (*M* CA = 7.9). It is likely, however, that parents and teachers rated children with intellectual disability against their same-age peers, whereas the findings from experimental tasks were derived from comparisons based on MA, a factor that could account for the different findings.

When children with intellectual disability enter formal schooling, they inevitably encounter multiple and ongoing experiences of failure. It would not be surprising if unsuccessful learning experiences, discouraging responses from others, negative self-evaluations, and social exclusion undermined mastery motivation in school-aged children and adolescents with intellectual disability. Given the very limited research with older children and adolescents, and the fact that the most frequently cited study (Harter & Zigler, 1974) was conducted more than 35 years ago, our purpose in the current study was to investigate motivation in a group of older children and adolescents with Down syndrome and a group of typically developing children of the same MA. Because of an accumulation of experiences of failure, we hypothesised that the group with Down syndrome would display lower levels of motivation than those who were developing typically.

Method

Participants

Children with Down syndrome ages 10 to 15 years (anticipated MA range = 3–8 years) were recruited from a variety of sources, including the local Down Syndrome Association, schools, and previous family contacts. A total of 38 families agreed to participate. Of these, 5 were excluded because their MAs, measured on the Stanford-Binet Scale, Fourth Edition (Thorndike, Hagan, & Sattler, 1986), fell below 36 months, leaving a sample of 33. We considered that the tasks required a minimum MA of 3 years.

The sample of children with Down syndrome ranged in age from 124 months (10 years,

4 months) to 184 months (15 years, 5 months), with a mean CA of 157.06 months (SD = 18.36). Of the 33 children, 16 were attending mainstream schools, with 12 in upper primary school and 4 at junior high school. One child was at a mainstream primary school for 3 days per week and a special school for 2 days, whereas the remaining 16 children attended a special school full time.

Typically developing 3- to 8-year-old children were recruited through child care centers, preschools, and schools. Of the 39 children whose parents gave consent, 6 obtained age-equivalent scores on the Peabody Picture Vocabulary Test–Third Edition (PPVT-III; Dunn & Dunn, 1997) that were more than 24 months above their CA, suggesting that they were exceptional and therefore inappropriate to be included in a typically developing sample. These 6 children were excluded, leaving a sample of 33 who ranged in ages from 36 to 95 months.

The two groups had reasonable matches both on MA–CA (Down syndrome MA M = 54.58 months, SD = 13.50; typically developing CA M = 60.18 months, SD = 16.00) and on PPVT-III age-equivalent scores (Down syndrome M = 56.93, SD = 18.26; typically developing M = 61.76, SD = 19.60). Independent t tests showed there was no MA (Down syndrome) and CA (comparison) difference and that the PPVT scores were not significantly different for the two groups.

Parental education was classified by three groups, according to their highest level of attainment: those who had completed some or all years of high school, those who had been awarded a postschool certificate or diploma (e.g., technical or trades), and those who had achieved a university/college degree. Using crosstabs with Fisher's exact test, there was no significant difference between groups on education for either mothers, $\chi^2(4, N = 66) = 5.38$, $p = .08$, or fathers, $\chi^2(4, N = 64) = 1.05$, $p = .68$. Employment was initially classified as belonging to one of nine categories, based on those used by the Australian Bureau of Statistics. No mother or father was in the highest or lowest category. The remaining seven categories were collapsed into three occupational groupings: professionals and associated professionals, tradespersons and advanced clerical workers, and intermediate and elementary clerical. There was no difference between groups for mothers, $\chi^2(4, N = 61) = 2.56$, $p = .29$, or fathers, $\chi^2(4, N = 66) = 2.44$, $p = .27$.

Measures: Motivation Tasks

Children completed a set of laboratory tasks designed to assess various aspects of motivation. Two tasks used by Harter and Zigler (1974) were replicated (curiosity and preference for challenge). In addition, two task measures of persistence, another core component of motivation according to more recent researchers (Morgan et al., 1990), were included.

Curiosity. The measure of curiosity used by Harter and Zigler (1974) comprises a set of 12 wooden, two-dimensional houses, each with two doors that open. One door is blank and one door has a picture on it. Children are told that behind the door with a picture is the very same picture, whereas behind the blank door there is a different picture they have not seen before. Following a demonstration, there is a sample trial on which children are invited to choose one of the doors and look at the picture behind it. Instructions are repeated on the first 3 of the 10 trials, and a score from 0 to 10 is calculated according to the number of blank doors opened. It is presumed that children's curiosity is reflected in their choice of blank doors, which conceal the novel pictures.

Preference for challenge. Following Harter and Zigler (1974), children's preference for challenging activities was measured with three sets of puzzles. Each set comprises three identical 15- or 16-piece wooden puzzles that are presented simultaneously with varying numbers of pieces removed. The first puzzle has only five pieces to be replaced and is classified as *easy*, the *medium* level of difficulty has 10 puzzle pieces removed, and the third puzzle (*difficult*) has all but two pieces missing. Children are told that they can choose just one of these puzzles to finish. After their choice is made, the other two puzzles are covered. There are three consecutive trials, each with a different set of three identical puzzles. The order of presentation of puzzles is randomized across participants. Preference for challenge is assessed by totaling the sum of a child's choices over the three trials (1 = *easy*, 2 = *medium*, 3= *difficult*) to produce a range of 3–9 points, with higher scores indicating greater preference for challenging tasks.

Persistence. Two persistence tasks, picture search and fishing, developed by Gilmore and Cuskelly (2009) were used. Both tasks meet the criteria of optimal challenge, as each child is able to achieve some success yet is unable to complete the entire task within the coding period.

In the picture-search task, children are presented with a laminated A3 sheet containing approximately 250 images of small, randomly arranged objects such as animals, figures, and vehicles. In this study, we copied the images, with permission, from pages 30–31 in Wick and Marzollo (1995). At the bottom of the sheet are pictures of seven single objects that the child is asked to find in the big picture. Five of the objects are present in the big picture, whereas two are not. Thus, task persistence is assessed on an *impossible* task in which only some components are achievable. The researcher helps the child to find the first object and to cover the target picture at the bottom of the page with a sticky square of paper to indicate that the search was successful. Persistence is calculated as the number of 15-s intervals in which the child remains task focused during the 10-min coding period (possible range of scores = 0–40). Using Morgan et al.'s (1992) procedures for similar tasks with younger children, a set of standard procedures was followed for prompts and terminations.

In the fishing game, children are presented with a bowl of 10 magnetic sea creatures, a bucket, and a magnetic fishing rod. Following demonstration by the researcher, children are asked to use the rod to fish out the creatures and put them into the bucket. The magnets are of varying strengths, so that some creatures are relatively easy to "catch", whereas others are difficult and a few are impossible. Coding for persistence follows the same rules as for the picture-search task, and the range of possible scores is 0–40.

Measures: Questionnaires

Dimensions of Mastery Questionnaire (DMQ-17). The DMQ-17 (Morgan, Leech, Barrett, Busch-Rossnagel, & Harmon, 2002) provides ratings of parental perceptions of children's motivation. Instrumental aspects of motivation are assessed on four scales: Object-Oriented Persistence (i.e., persistence with cognitive tasks), Gross Motor Persistence, Social Persistence With Adults, and Social Persistence With Children. There are two scales for assessing expressive aspects of motivation (Mastery Pleasure and Negative Reaction to Failure) as well as a scale to reflect ability (General Competence). The latter scale is not discussed because it is not a measure of motivation. The 45 DMQ items are rated on a 5-point scale ranging from 1 (*not at all typical*) to 5 (*very typical*). Negatively worded items are reversed so that high scores represent higher levels of each DMQ construct, and mean scores are calculated for each scale. For the current sample, the questionnaire had good internal consistency on most scales, with Cronbach's alphas of .94 (Motor Persistence), .89 (Object Persistence), .88 (Social Child), .85 (Pleasure), and .74 (Social Adult). Negative Reaction was not included in further analyses because the Cronbach's alpha was considered to be unsatisfactory at .65.

EZ-Personality Questionnaire (EZPQ). The EZPQ (Zigler et al., 2002) is 37-item scale that assesses personality-motivational constructs associated with intellectual disability. Items are scored on a 5-point scale, and negatively worded items are reversed so that higher scale scores reflect higher degrees of each measured construct. The EZPQ has seven subscales—Effectance Motivation, Obedience, Negative Reaction Tendency, Positive Reaction Tendency, Creativity Curiosity, Expectancy of Success, and Outer Directedness—for which mean scale scores are calculated. In the current study, alphas for two subscales were unacceptably low (Positive Reaction Tendency = .49; Outer Directedness = .58) and, consequently, these two subscales were not included in analyses. Cronbach's alphas for the other five subscales ranged from .77 to .82.

Procedure

Children attended the university laboratory where the Stanford Binet assessment was administered first for those with Down syndrome, followed by the PPVT-III. Typically developing children started with the PPVT-III. The motivation tasks were then completed in the following sequence: curiosity, preference for challenge, and the two persistence tasks, which were presented in counterbalanced order. While children were engaged with the researcher, parents (all mothers, with the exception of one typically developing child whose father accompanied her) completed the DMQ and the EZPQ in a separate room.

Results

Preliminary Analyses

Differences between children with Down syndrome who were attending special schools compared with those enrolled in mainstream schools were considered in preliminary analyses.

The two groups differed significantly with respect to MA (Mann-Whitney U = 68.00, $p = .014$). Children who attended special schools had lower MAs ($M = 48.94$ months, $SD = 7.41$) than those who were attending mainstream schools ($M = 59.88$ months, $SD = 15.86$). Using MA as a covariate, differences between the two schooling groups were examined for all other measures. There were no significant differences. MA was significantly correlated with preference for challenge only ($r = .51$, $p < .01$). Therefore, in all subsequent analyses, we considered children with Down syndrome as a single group.

Group Differences on Motivational Measures

There were no significant differences between children with Down syndrome and typically developing children on any of the motivation tasks (see Table 1). Mean values were similar for three of the four measures; however, picture-search persistence approached significance ($p = .07$, $d = .45$), with typically developing children scoring higher than those with Down syndrome. Although the two persistence measures were positively correlated (see below), both groups were significantly less persistent on the picture-search task than on the fishing task using a paired-samples t test: group with Down syndrome, $t(32) = -3.75$, $p < .001$; typically developing group, $t(32) = -2.70$, $p < .05$.

A multivariate analysis of variance (MANOVA) was conducted using the five subscales of the DMQ as the dependent measure. A significant group difference was found, $F(5, 60) = 6.64$, $p < .001$, partial $\eta^2 = .36$. Univariate analyses indicated that all subscales differed significantly between groups, with the exception of Mastery Pleasure (see Table 2). For the four subscales on which there were differences, typically developing children were rated more highly by their parents than were the children with Down syndrome.

A similar analysis was conducted using the five internally consistent subscales of the EZPQ. Again, the MANOVA identified significant group differences, $F(5, 58) = 9.52$, $p < .001$, partial $\eta^2 = .45$, and univariate analyses showed that all subscales differed significantly between the groups (see Table 2). Typically developing children were rated as more highly motivated and more obedient. They were reported to display greater creativity and curiosity and greater expectancy of success.

Correlations Among Measures

The two persistence tasks, fishing and picture search, were significantly correlated in both groups (Down syndrome $r = .38$, $p < .05$; typically developing $r = .42$, $p < .01$), but there were no other significant correlations among the motivation tasks. The questionnaire subscales that are most relevant to task persistence, DMQ Object Persistence and EZ Effectance Motivation, were significantly related in both groups (Down syndrome $r = .62$, $p < .001$; typically developing $r = .46$, $p < .01$).

The preference-for-challenge task was unrelated to parent ratings in the group with Down syndrome. For typically developing children, preference for challenge was significantly related to parent ratings on the DMQ Object and Gross

Table 1. Comparisons of Children With Down Syndrome and Typically Developing Children on Four Mastery Motivation Tasks

Measure	Possible score range	Down syndrome *M* (*SD*)	Typically developing *M* (*SD*)	*t*(64)	*p*	*d*	95% CI for difference between 2 group *M*s
Curiosity	0–10	4.91 (3.30)	5.45 (3.61)	−0.64	.52	.16	−2.25–1.15
Preference for challenge	3–9	5.45 (1.97)	5.54 (2.08)	−0.18	.86	.04	−1.09–0.90
Persistence: picture search	0–40	16.70 (11.74)	21.73 (10.38)	−1.84	.07	.45	−10.48–0.42
Persistence: fishing	0–40	25.06 (11.19)	27.06 (10.76)	−0.74	.46	.18	−7.40–3.40

Note. CI = confidence interval.

Table 2. Comparisons of Children With Down Syndrome and Typically Developing Children on the Dimensions of Mastery Questionnaire (DMQ) and the EZ-Personality Questionnaire (EZ)

Subscale	Down syndrome *M* (*SD*)	Typically developing *M* (*SD*)	*F*	Partial η^2
DMQ Object: Oriented Persistence	2.62 (0.92)	3.49 (0.46)	24.03***	.27
DMQ Gross Motor Persistence	3.02 (0.98)	3.75 (0.80)	11.16**	.15
DMQ Social Persistence With Adults	3.80 (0.69)	4.16 (0.53)	5.57*	.08
DMQ Social Persistence With Children	3.42 (0.92)	4.30 (0.64)	20.49***	.24
DMQ Mastery Pleasure	4.33 (0.63)	4.47 (0.48)	1.06	.02
EZ Effectance Motivation	3.04 (0.62)	3.83 (0.41)	36.77***	.37
EZ Obedience	3.34 (0.87)	3.90 (0.68)	8.33**	.12
EZ Negative Reaction Tendency	2.43 (0.72)	1.87 (0.68)	10.34**	.14
EZ Creativity and Curiosity	3.36 (0.83)	4.29 (0.65)	24.74***	.29
EZ Expectancy of Success	2.98 (0.71)	3.73 (0.52)	23.29***	.27

Note. Dimensions of Mastery Questionnaire (Morgan, Leech, Barrett, Busch-Rossnagel, & Harmon, 2002); EZ-Personality Questionnaire (Zigler et al., 2002). Degrees of freedom for DMQ = 1, 64; for EZ = 1, 62.
*$p < .05$. **$p < .01$. ***$p < .001$.

Motor Persistence subscales ($r = .41$, $p < .01$, and $r = .30$, $p < .05$, respectively) as well as ratings on the EZ Obedience and Expectancy of Success subscales ($r = .41$, $p < .01$, and $r = .37$, $p < .05$, respectively). For children with Down syndrome, there was a significant positive correlation of picture-search persistence with parent ratings on DMQ Object Persistence ($r = .48$, $p < .01$) and a negative correlation with DMQ Social Persistence With Adults ($r = -.53$, $p < .001$). In the typically developing group, both picture-search and fishing persistence were significantly related to EZ ratings of Obedience (rs = .43 and .42, respectively, $p < .01$). All correlations among tasks and parent ratings are shown in Tables 3 and 4.

Differences According to Age and Ability

For the children with Down syndrome, CA was unrelated to task measures. Both MA from the Stanford-Binet and the age-equivalent score from the PPVT III were significantly related to the task measuring preference for challenge for this group ($r = .51$, $p < .01$ and $r = .50$, $p < .01$, respectively).

For the typically developing children, there were significant correlations of CA and the three motivational tasks (picture persistence $r = .36$, $p < .05$; fishing persistence $r = .53$, $p < .01$; preference for challenge $r = .35$, $p < .05$). PPVT age-equivalent scores were significantly associated with fishing persistence, $r = .35$, $p < .05$.

Discussion

The findings from the current study challenge long-held views that individuals with intellectual disability are invariably deficient in motivation. Although research with infants and young children with Down syndrome has generally shown that they have similar levels of task motivation to typically developing groups of the same MA, it has often been assumed that motivational deficits become apparent at later ages (Harter, 1977; Hupp, 1995; Niccols et al., 2003). To our knowledge, though, the only empirical evidence for this assumption is Harter and Zigler's (1974) research from the 1970s. Contrary to our expectations that an accumulation of experiences of failure and negative evaluations would result in reduced levels of motivation in older children with Down syndrome, the findings did not generally support this hypothesis. There were no motivational differences between children with Down syndrome in special schools and those attending mainstream schools, although it might be assumed that failure and upward social comparisons would occur more often in the latter group. With the exception of one persistence task, children with Down syndrome and those who were developing typically performed similarly. Although persistence on the picture-search task failed to reach statistical significance, the effect size was moderate and it is possible that a

Table 3. Pearson Correlations (One-Tailed) of Mastery Motivation Tasks, Dimensions of Mastery Questionnaire Scales (DMQ), and EZ-Personality Questionnaire Scales (EZ) for Children With Down Syndrome

Variable	CUR	PC	PS	FI	OP	GM	SPA	SPC	MP	EM	OB	NR	CC	ES
Task: Curiosity (CUR)	—													
Task: Preference for Challenge (PC)	.18	—												
Task: Picture Search Persistence (PS)	.18	−.14	—											
Task: Fishing Persistence (FI)	.27	.02	.38*	—										
DMQ Object Persistence (OP)	.04	−.08	.48**	.29	—									
DMQ Gross Motor Persistence (GM)	.08	−.13	.00	.11	.53***	—								
DMQ Social Persistence: Adults (SPA)	−.12	.08	−.53***	−.11	−.05	.28	—							
DMQ Social Persistence: Child (SPC)	.21	−.04	−.17	.08	.32*	.53***	.45**	—						
DMQ Mastery Pleasure (MP)	−.09	−.07	−.09	−.21	.11	.13	.34*	.36*	—					
EZ Effectance Motivation (EM)	−.12	.11	.27	−.07	.62***	.36*	−.08	.18	.06	—				
EZ Obedience (OB)	.02	.02	.29	.05	.30*	−.00	−.23	.04	−.26	.45**	—			
EZ Negative Reaction (NR)	−.19	−.03	.07	−.03	−.26	−.56***	−.47**	−.59***	−.44**	−.26	−.01	—		
EZ Creativity Curiosity (CC)	−.06	.23	−.05	.06	.22	.26	.27	.32*	.27	.29	.08	−.42**	—	
EZ Expectancy of Success (ES)	.01	.19	.38*	.02	.60***	.46**	−.00	.33*	.27	.60***	.34*	−.40*	.47**	—

Note. Dimensions of Mastery Questionnaire (Morgan, Leech, Barrett, Busch-Rossnagel, & Harmon, 2002); EZ-Personality Questionnaire (Zigler et al., 2002).
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4. Pearson Correlations (One-Tailed) of Mastery Motivation Tasks, Dimensions of Mastery Questionnaire Scales (DMQ), and EZ-Personality Questionnaire Scales (EZ) for Typically Developing Children

Variable	CUR	PC	PS	FI	OP	GM	SPA	SPC	MP	EM	OB	NR	CC	ES
Task: Curiosity (CUR)	—													
Task: Preference for Challenge (PC)	.14	—												
Task: Picture Search Persistence (PS)	−.04	−.02	—											
Task: Fishing Persistence (FI)	.13	.12	.42**	—										
DMQ Object Persistence (OP)	.18	.41**	−.18	.23	—									
DMQ Gross Motor Persistence (GM)	−.11	.30*	.07	.17	.42**	—								
DMQ Social Persistence Adults (SPA)	−.06	.21	.04	.01	.38*	.42**	—							
DMQ Social Persistence Child (SPC)	−.37*	.27	.12	.23	.37*	.50**	.59***	—						
DMQ Mastery Pleasure (MP)	.09	.25	.07	.02	.32*	.05	.60***	.40*	—					
EZ Effectance Motivation (EM)	.15	.23	.17	.28	.46**	.06	.25	.24	.56***	—				
EZ Obedience (OB)	.08	.41**	.43**	.42**	.32*	.14	.09	.15	.23	.61***	—			
EZ Negative Reaction (NR)	.14	−.28	−.14	−.19	−.06	−.52***	−.36*	−.60***	−.18	−.10	−.10	—		
EZ Creativity Curiosity (CC)	−.34*	.09	−.14	−.13	.42**	.35*	.45**	.56***	.52***	.26	.01	−.02	—	
EZ Expectancy of Success (ES)	−.05	.37*	.05	.21	.41**	.40*	.40*	.60***	.46**	.29	.21	−.49**	.43**	—

Note. Dimensions of Mastery Questionnaire (Morgan, Leech, Barrett, Busch-Rossnagel, & Harmon, 2002); EZ-Personality Questionnaire (Zigler et al., 2002).
*$p < .05$. **$p < .01$. ***$p < .001$.

significant group difference may have been detected in a larger sample.

Given the academic challenges that children with Down syndrome face at school, it is somewhat surprising that they are not less motivated than typically developing children. Perhaps at the MAs included in this study, children with Down syndrome were relatively unaware of failure and social comparisons. Harter (1987) suggested that this capacity becomes available at around 7–8 years of age. Although more recent formulations of social comparison have indicated that it is a more complex construct that originally proposed (Suls, Martin, & Wheeler, 2002), Glenn and Cunningham (2001) found that social comparison appeared not to be used by adolescents with Down syndrome who had a verbal MA less that 6–7 years. The children who participated in Harter and Zigler's (1974) research were cognitively more mature than the children who participated in this study, although not all in the Harter and Zigler study had an MA above 7 years.

There are several other reasons for the differences between the results of the current study and those reported by Harter and Zigler (1974). The life circumstances of children with an intellectual disability are now quite different from those of children in the early 1970s. Most children now live at home with their families, many attend mainstream schools with their age peers, most have experienced early intervention from a young age, and expectations and life opportunities have changed dramatically. Harter and Zigler (1974) postulated that environmental factors were responsible for the motivational differences they found between the children who were institutionalized and those who were living with their families. The changes in life circumstances for people with intellectual disability identified above have been accompanied by substantial changes in their achievements across a range of domains of life, including school, employment, and independent living.

Another important difference between our study and the work of Harter and Zigler is the fact that their sample comprised children with intellectual disability from nonorganic etiologies. Compared with those whose disability is related to organic causes, children with familial intellectual disability tend to live in lower socioeconomic areas where there are fewer resources and supports for learning (Holburn, Perkins, & Vietz, 2001). It is possible that mastery motivation is lower in these populations, not as a result of intellectual disability per se, but as a consequence of features of the contexts in which development occurs.

Consistent with many previous studies in which parents have reported on their children's motivation, mothers of those with Down syndrome rated their children as lower in motivation than did parents of children who were developing typically. The exception was mastery pleasure, on which the two groups were similar. It is possible that parental ratings, being derived from observations of children across time and within numerous contexts, are more reflective of children's level of motivation than are laboratory tasks. Another credible explanation is that mothers of children with Down syndrome were rating them against expectations for 10–15 year olds, thus basing their judgments on comparisons with the child's same-CA peers, rather than those of the same MA, as occurred for task measures in this study.

An intriguing finding was the different pattern of correlations between task and parent measures in the two groups. Parent-rated persistence was related to persistence with the picture search for children with Down syndrome but to preference for challenging puzzles for typically developing children. Persistence has been shown to be an important predictor of success for children with Down syndrome (Gilmore & Cuskelly, 2009), and it is possible that for parents of children with Down syndrome it has higher valence than other aspects of mastery motivation such as preference for challenge.

Interestingly, parent ratings of child obedience were relevant for persistence and preference for challenge only in the typically developing group. Typically developing children who are more obedient (i.e., they listen to rules, accept limits, do what they are told) may be more compliant and studious children who persist longer and prefer to work with challenging activities, whereas obedience in children with Down syndrome may be reflecting other characteristics, such as dependence on, or a desire to please, adults. The age difference between the two groups may also be relevant to this discrepant finding. Obedience in adolescents and preadolescents may not have the same meaning and correlates as obedience in much younger children. This anomaly illustrates the difficulties of comparing two groups who not only differ on age but who also encounter different experiences and expectations. It is also possible, of course, that

correlations of two variables were due to an unknown third factor in one or both of the groups.

Motivation is considered to be a multidimensional construct, and in the current study, we considered three ways in which children display their striving for mastery and competence: their curiosity for novel stimuli, their preference for challenge, and their persistence with challenging tasks. Measures of these three components were not interrelated in either of the groups, a finding that is probably not surprising. Although each of the components can be seen as important in the quest for mastery, it is unlikely that all individuals express their motivation in all of these ways. The two persistence tasks were significantly correlated, but, judging by the higher levels of persistence on the fishing game, it seems that this task is more intrinsically engaging than the picture search. The latter may have been reminiscent of academic activities (pencil and paper, seated at a desk), in contrast to the more play-like characteristics of the fishing task.

For children with Down syndrome, mother-reported interest in social engagement with adults was negatively associated with performance on the picture-search task. Previous research has shown that, when presented with challenging activities, young children with Down syndrome are more likely than typically developing children to seek help and to initiate social interactions with adults (Kasari & Freeman, 2001; Pitcairn & Wishart, 1994). It is possible that older children and adolescents with Down syndrome who are highly oriented to adults have developed a dependence on them for assistance and, in the absence of adult support, are not likely to persist with a challenging task (see Zigler et al., 2002).

Given the multidimensional nature of the construct of motivation, the challenge for researchers is to develop robust measures of observable behaviors that reflect these various components and that are applicable to both typical and atypical populations. Parental reports of motivation are likely to be contaminated by age-based expectations, and they fail to show the predictive relationships with later achievement that have been demonstrated for task measures of persistence (Gilmore & Cuskelly, 2009).

The results of the present study have important implications for those who work with children with Down syndrome and possibly other populations with intellectual disability. If low motivation is presumed to characterize Down syndrome, or intellectual disability more generally, it is likely that parents, teachers, and practitioners will behave in more directive ways that increase children's dependence on adult direction. Indeed, parents of children with Down syndrome have often been described as more directive than parents of typically developing children (Glenn et al., 2001; Roach, Stevenson Barratt, Miller, & Leavitt, 1998), and children with Down syndrome appear to be more affected by maternal directiveness. In a study of young children with Down syndrome and a typically developing comparison group, Gilmore, Cuskelly, Jobling, and Hayes (2009) reported that maternal directiveness was associated with lower levels of task persistence but only for the children with Down syndrome. The finding in the current study that social engagement with adults was negatively related to task persistence suggests that outer-directedness may undermine the ability of children with Down syndrome to work independently. This orientation toward adult interaction may be a product of the attempt to avoid challenge but may also reflect learned behaviors.

If children are to develop some autonomy in learning, it is essential that they are offered opportunities to work independently. As Goodman and Linn (2003) have argued, however, characteristics that are inherently associated with intellectual disability, such as slowness and apparent aimlessness, may be misinterpreted as signs of low motivation, with insufficient time consequently being allowed for children to master learning tasks autonomously. Without appropriate opportunities and encouragement of autonomy, children's inherent motivation for mastery is likely to be undermined, with negative consequences for cognitive, academic, social, and emotional competence (Cuskelly, Zhang, & Gilmore, 1998; Gilmore & Cuskelly, 2009).

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