COGNITIVE SELF-REGULATION IN YOUTH WITH AND WITHOUT LEARNING DISABILITIES: ACADEMIC SELF-EFFICACY, THEORIES OF INTELLIGENCE, LEARNING VS. PERFORMANCE GOAL PREFERENCES, AND EFFORT ATTRIBUTIONS

GRAYSON L. BAIRD AND WALTER D. SCOTT
University of Wyoming

ERIC DEARING
Boston College

SARAH K. HAMILL
University of Wyoming

This study examined whether youth with learning disabilities reported more maladaptive cognitive self-regulatory characteristics known to influence learning motivation and performance. Specifically, 1,518 sixth- through twelfth-graders from two separate rural school districts with and without learning disabilities completed measures of academic self-efficacy, theories of intelligence, academic goal preferences, and attributions for exerting effort in academic contexts. We found that students with a learning disability were more likely to possess low academic self-efficacy, to believe that intelligence was fixed and nonmalleable, to prefer performance over learning goals, and to interpret the exertion of effort as meaning they possessed limited levels of ability. Theories of intelligence and academic self-efficacy were also found to influence goal preferences and ability attributions. Finally, mediational findings provided strong support for the notion that differences in goal preferences and effort attributions between youth with and without LD were largely due to the fact that youth with LD possessed greater entity views of intelligence and lower academic self-efficacy. Our findings add to existing studies that support Dweck's (1999) model and suggest that interventions for learning disabilities ought to target a broader range of cognitive self-regulatory processes.

Correspondence concerning this article should be addressed to Walter D. Scott, University of Wyoming, Department of Psychology, 1000 E. University Ave., Laramie, WY 82071. E-mail: wscott@uwyo.edu.
Although the history of personality science reveals a diversity of theories about what motivates human behavior, contemporary personality and social psychology scientists are in agreement about the role of basic cognitive mechanisms in people's self-motivational efforts (Bandura, 1986, 1997; Cervone & Scott, 1995; Karoly, 1993; Mischel, Cantor, & Feldman, 1996; Ryan & Deci, 2000). People reflect on their abilities, think about desired and undesired future states, and evaluate their performances; each of these various cognitive processes enable people to motivate and regulate themselves (Bandura, 1997; Caprara & Cervone, 2000). Clinical scientists have discovered that these basic cognitive self-regulatory processes can inform our understanding of a number of serious clinical problems (Ahrens, 1991; Ahrens, Zeiss, & Kanfer, 1988; Strauman & Merrill, 2004; Wallace & Alden, 1997). However, in comparison, there has been less application of these basic cognitive self-regulatory processes to the understanding of youth with learning disabilities. The present paper attempts to examine whether youth with learning disabilities are characterized by cognitive self-regulatory processes known to contribute to maladaptive self-regulatory efforts in learning.

Youth with learning disabilities (LD) are well-acquainted with academic difficulty and failure. It is hardly surprising then that when encountering academic challenge, students with LD exhibit a wide range of maladaptive behaviors related to helplessness, including diminished persistence, lower academic expectations, and negative affect (Valâs, 2001). Cognitive deficits or dysfunctions underlying learning disabilities are certainly likely to contribute to these maladaptive responses to challenge. However, even children of similar ability levels vary in how well they adapt to challenging academic tasks (Bandura, 1997). The intent of the present study is to examine the possibility that youth with LD possess specific cognitive self-regulatory characteristics that may further contribute to their learning difficulties.

COGNITIVE SELF-REGULATION PROCESSES

ACADEMIC SELF-EFFICACY

In learning situations, one critical determinant of cognitive self-regulatory success is academic self-efficacy, which refers to judgments about how well one is able to execute a specific academic behavior in a given context (Bandura, 1993; Schunk & Zimmerman, 1997; Zimmerman, 2000). Compared to students who doubt their
academic abilities, students who believe in their ability to learn are more persistent, less anxious, experience more enjoyment, have greater intrinsic interest, set more challenging learning goals, use more effective cognitive strategies, and ultimately perform better in learning situations (Bouffard-Bouchard, Parent, & Larivee, 1991; Collins, 1982; Schunk, 1984, 1989; see Bandura, 1997). Moreover, these findings hold even when researchers control for differences in actual academic ability. For instance, Collins (1982) had children of three different ability levels attempt to solve difficult math problems. Within each level of ability, children who possessed higher self-efficacy were more interested in and more persistent with the math task and ultimately performed better.

The critical role of academic self-efficacy in successful performance has also been demonstrated with children of exceptionally low academic ability. In a series of studies with children possessing extreme deficits in math and language, Schunk (1989) found that academic self-efficacy was a better predictor than skill level not only for use of effective cognitive strategies but also for persistence in challenging learning tasks. Moreover, his research also found academic self-efficacy to contribute to performances above and beyond academic skills, which has been found by other studies as well (Hackett, 1985; Pajares & Kranzler, 1995; Randhawa, Beamer, & Lundberg, 1993).

Given a likely history of poor academic performance, one can easily imagine why students with LD might have lower academic self-efficacy. Surprisingly, however, the empirical findings have been less clear. Although a number of studies have compared students with and without LD on self-efficacy measures, the findings are not consistent. Some have reported that students with LD possessed lower academic self-efficacy (Baum & Owen, 1988; Gresham, Evans, & Elliott, 1988; Hampton, 1998). Others have found no differences (Graham, Schwartz, & MacArthur, 1993; Pintrich, Anderman, & Klobucar, 1994). A few have even reported that students with LD possess over-inflated estimates of their academic abilities (Graham & Harris, 1989; Graham et al., 1993; Klassen, 2002).

The failure to find a consistent pattern in the relationship between academic self-efficacy and learning disabilities may be due to one of any number of problems with this literature, including insufficient power, impure and confounded LD groups, and poor operationalizations of the self-efficacy construct (Klassen, 2002). In regard to the latter issue, Bandura (1997) has emphasized that self-efficacy beliefs refer to context-specific evaluations of perceived abilities. Yet a
number of studies investigating differences between students with and without LD have assessed more generalized academic efficacy without specifying more particular tasks and domains of functioning (Baum & Owen, 1988; Gresham et al., 1988; Hampton, 1998; Saracoglu, Minden, & Wilchesky, 1989; see Klassen, 2002).

**DWECK’S MOTIVATIONAL MODEL OF ACHIEVEMENT**

There remains yet another issue with this literature. Self-efficacy is not a single-factor theory (Bandura, 1997; Cervone & Scott, 1995). Within social-cognitive theory, self-efficacy perceptions are viewed as operating within a larger self-system, in which they interact with other beliefs and knowledge representations to influence motivation and performance. One particularly important belief may be *implicit theories of intelligence* (Dweck, 1999). In addition to having thoughts about how well one is able to perform a given task, people possess different ideas about smartness and abilities related to academic success. Some people, called *entity theorists*, believe that being smart is something you are born with, a finite quality that people either have or don’t have. Other people, called *incremental theorists*, believe that smartness is something you can acquire through effort and learning—a malleable quality that one can develop.

According to Dweck’s theory, these different ability conceptions—entity versus incremental—are predicted to be associated with different learning goals and, as a result, different motivational patterns in challenging learning situations (see Table 1). Specifically, entity theorists are hypothesized to prefer *performance goals*, which are aims that focus on obtaining positive and avoiding negative judgments of one’s abilities. As a result of adopting performance goals, entity theorists are, in turn, predicted to be more prone to a *helpless learning response* when they doubt their ability or receive negative performance feedback (see Table 2). In short, because entity theorists believe smartness is an unchangeable quality, the circumstance of not performing well or doubting ability is damning, and translates into perceiving that an upper limit of ability level has been reached (e.g., “I must not be smart enough to understand this difficult problem”). As a result, youth who are entity theorists are more likely to display a maladaptive response to challenge: they avoid challenge, experience more negative affect, make more negative attributions about their abilities (e.g., “I must be stupid”) and the exertion of
TABLE 1. Overview of Dweck's Model (Dweck & Leggett, 1988)

<table>
<thead>
<tr>
<th>Theory of Intelligence</th>
<th>Goal Preference</th>
<th>Perceived Ability</th>
<th>Response Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity</td>
<td>Performance</td>
<td>High</td>
<td>Mastery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Helpless</td>
</tr>
<tr>
<td>Incremental</td>
<td>Learning</td>
<td>High or Low</td>
<td>Mastery</td>
</tr>
</tbody>
</table>

effort (e.g., “if you have to try hard, then you must not be smart”), have lower expectations for the future, and perform worse.

In contrast, Dweck (1999) argues that the impact of low self-efficacy is not as detrimental for incremental theorists. Believing that intelligence is a skill that can be increased through effort and practice, incremental theorists are more likely to pursue learning goals, which are aims to develop skills and increase competencies. As a result of adopting learning goals, even when doubting their ability, incremental theorists are predicted to exhibit a mastery learning response (see Table 2). In short, because incremental theorists view smartness or ability as a malleable quality, they believe that through continued effort they can acquire more ability (e.g., I just need to stick with this and I’ll get better). Therefore, they are more likely to exhibit an adaptive response to challenge: they seek out challenge, experience more positive affect, make more adaptive attributions for poor performance (e.g., “I just need to continue trying and I’ll get better”), believe in the efficacy and necessity of effort, have higher expectations for the future, and perform better.

EVIDENCE FOR DWECK’S MOTIVATIONAL MODEL OF ACHIEVEMENT

Empirically, there is support for Dweck’s (1999) theory. In both experimental and longitudinal research, incremental and entity theories of intelligence have been linked to learning and performance goals, respectively (Bempechat, London, & Dweck, 1991; Blackwell, Trzesniewski, & Dweck, 2007). Further, several studies have found that, under conditions of challenge, learning and performance goals lead to their predicted mastery and helpless learning responses
TABLE 2. Helpless and Mastery Learning Approaches as Described by Dweck (1999)

<table>
<thead>
<tr>
<th></th>
<th>Helpless Response</th>
<th>Mastery Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitions</td>
<td>Loss of belief in efficacy of effort, low ability attributions.</td>
<td>Continued belief in efficacy of effort; effort self-instructions instead of low ability attributions.</td>
</tr>
<tr>
<td>Meaning of Effort</td>
<td>Defensive withdrawal of effort; effort confirms low ability.</td>
<td>Effort level is consistent with task requirements and goal.</td>
</tr>
<tr>
<td>Attention</td>
<td>Divided between goal (worry about outcome) and task (strategy formulation and execution).</td>
<td>Undivided; intensified attention to task that directly serves goal.</td>
</tr>
<tr>
<td>Affect</td>
<td>Negative affect interferes with concentration or can prompt withdrawal.</td>
<td>Affect channeled into task.</td>
</tr>
<tr>
<td>Challenge Seeking</td>
<td>Avoid challenging tasks.</td>
<td>Seek out challenge.</td>
</tr>
<tr>
<td>Performance after obstacles</td>
<td>Deterioration of performance.</td>
<td>Effective, and persistent striving under failure.</td>
</tr>
</tbody>
</table>

(Blackwell et al., 2007; Elliot & Dweck, 1988; Erdley, Cain, Loomis, Dumas-Hines, & Dweck, 1997; Smiley & Dweck, 1994). For instance, Elliot and Dweck (1988) experimentally manipulated learning versus performance goals and found that when children were told that they were not performing well, performance goals led to helpless learning responses whereas learning goals continued to lead to mastery learning responses. In terms of theories of intelligence influencing attributions, Hong, Chiu, Dweck, Lin, and Wan (1999) found that incremental theorists were more likely to explain having difficulty with a task as due to insufficient effort. In addition, incremental theorists were also more likely to take remedial action to correct their unsatisfactory performance and effort attributions were found to mediate this effect. Conversely, the research found that entity theorists were more likely to attribute task difficulty to lack of ability, something that cannot be increased and were less likely to take remedial action in the face of failure (see also Blackwell et al., 2007).

In a recent longitudinal study with junior high youth, Blackwell et al. (2007) found that theories of intelligence predicted math achievement two years later after controlling for initial math ability. Moreover, they found evidence that goal orientation (learning vs. perfor-
mance), beliefs about the efficacy of effort, and ability attributions mediated the effect of intelligence conceptions on achievement. Finally, Cain and Dweck (1995) found that entity and incremental theories of ability led to helpless and mastery-oriented learning responses, respectively.

COGNITIVE SELF-REGULATION IN YOUTH WITH LD

Given the likelihood that academic self-efficacy and Dweck's motivation constructs (e.g., theories of intelligence, goal orientation, ability attributions, etc.) contribute to adaptive and maladaptive learning motivation and performance, it is also critical to investigate these processes in youth with LD. One can easily imagine why youth with LD might have low academic self-efficacy. Typically, a history of poor academic performance has preceded a student's LD diagnosis and past performance is a major determinant of self-efficacy judgments (Bandura, 1997). However, examining academic self-efficacy in isolation is not sufficient. For instance, if one views intelligence as a skill that can be improved, one might possess low academic self-efficacy in the present but still remain motivated to pursue challenging learning goals and desire to improve one's present abilities (e.g., I may not be able to solve this math problem right now, but if I try hard I can get smart at math). Therefore, a comprehensive investigation of cognitive self-regulation would examine academic self-efficacy in concert with theories of intelligence, goal preferences, and effort attributions.

In regard to theories of intelligence, it is possible that some children with LD may interpret the label, learning disability, as synonymous with having limited intelligent potential. Youth with LD are almost always aware that they have been identified as learning disabled. This diagnosis might well lead to the perception that their disability imposes a fixed limit on their intelligence and ability. Although LD researchers and even some clinicians and school personnel may realize that this diagnosis can result from a specific processing deficit and that youth with LD may be otherwise gifted (Newman & Sternberg, 2002), it is less likely that students with LD adopt such an informed view of their disability.

If youth with LD do endorse entity views of intelligence, then Dweck's model would predict that they would also prefer performance over learning goals. This also seems likely for youth with LD, who may strongly want to avoid bringing attention to their
disability or "looking dumb." Lastly, if youth with LD are more likely than other youth to endorse entity theories of intelligence, then Dweck's model would also predict that these youth would be more likely to interpret exerting effort as evidence that they possess limited ability.

PRESENT STUDY

Youth with learning disabilities may experience motivational and performance problems beyond what may be attributed to their disabilities, per se, if these youth possess low academic self-efficacy, subscribe to an entity view of intelligence, prefer performance goals, and make attributions tied to ability rather than effort. In the present study, therefore, we examined whether youth with LD exhibit this maladaptive cognitive self-regulatory pattern. In so doing, we attempted to avoid some of the common limitations apparent in the literature on self-efficacy among youth with LD by providing a well-powered, contextualized assessment of academic self-efficacy and its relation to other cognitive self-regulatory processes—theories of intelligence, goal preferences, and effort attributions—that may alter the ultimate impact of low efficacy beliefs on learning motivation and academic performance. Furthermore, this study will provide an additional empirical test of some of the key predictions of Dweck's model. Specifically, we hypothesized that entity theories of intelligence would predict a preference for performance goals and a tendency to attribute the exertion of effort as evidence of limited intellectual ability.

METHOD

PARTICIPANTS

Participants were 1,518 sixth- through twelfth-graders (686 males, 635 females; 197 did not report gender) from two separate rural school districts. The participants' ages ranged from 10 to 19 years of age ($M = 14.4$) with over 96% of the participants being Caucasian. Of these youth, 107 were identified as LD (were receiving special education services for learning disabilities) and 1,411 were identified as nonLD (were not receiving special education services for learning disabilities). In both school districts, a discrepancy model was employed for determining the presence of a learning disability
and who should receive special education services for learning disabilities. Specifically, those students who exhibited an unexpected discrepancy between intellectual ability and present achievement were so identified and therefore received services. Passive parental and active participant consent was obtained for all participants. Over 90% of all eligible LD and nonLD participants completed survey measures.

MEASURES

Youth with and without LD were given a questionnaire containing each of the measures to complete in classroom settings. In each class, the student’s teacher/aid, a research assistant, or both were available to answer any questions students had about the questionnaire. Students took approximately 15 minutes to complete the entire questionnaire packet.

Academic Self-Efficacy Questionnaire or ASEQ (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999). We used the academic self-efficacy subscale from the multidimensional self-efficacy questionnaire developed by Bandura and colleagues (Bandura et al., 1999). Each of the 15 ASEQ items asked participants how well they could perform different academic tasks, such as learning various subjects and self-regulating school work (e.g., planning, organizing, meeting deadlines). Participants responded on a 1-7 Likert scale (1 = very well, 3 = pretty well, 5 = not too well, 7 = not well at all). A reverse scoring procedure was used so that higher scores represented higher levels of academic self-efficacy. The ASEQ has demonstrated acceptable levels of internal consistency, test–retest reliability, and validity (Bandura et al., 1999; Scott et al., 2008). In the present study, the Cronbach alpha was .84.

Implicit Theories of Intelligence Scale for Children-Self Form or ITI (Dweck, 1999). Three items were used to assess student’s theory of intelligence. For each item, students were asked to rate on a 6-point Likert scale (1 = strongly agree, 3 = mostly agree, 4 = mostly disagree, 6 = strongly disagree) if they believed their intelligence was fixed or malleable. For instance, one of the items stated “you have a certain amount of intelligence, and you really can’t do much to change it.” High scores on the ITI indicated a higher endorsement of an incremental theory of intelligence. The scale has been found to be both valid and reliable (see Dweck, Chiu, & Hong, 1995; Erdley &
TABLE 3. Descriptive Statistics for Predictors, Covariates, and Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender is Male</td>
<td>12.77 (3.77)</td>
<td>52.1</td>
</tr>
<tr>
<td>High School Student</td>
<td>54.30 (10.27)</td>
<td>55.7</td>
</tr>
<tr>
<td>Presence of Learning Disability</td>
<td>11.15 (2.88)</td>
<td>7.1</td>
</tr>
<tr>
<td>Theories of Intelligence</td>
<td>12.77 (3.77)</td>
<td>74.3</td>
</tr>
<tr>
<td>Academic Self-Efficacy</td>
<td>54.30 (10.27)</td>
<td>%</td>
</tr>
<tr>
<td>Effort Attribution</td>
<td>3.77 (1.24)</td>
<td></td>
</tr>
<tr>
<td>Learning vs. Performance Goal Preference (Quantitative)</td>
<td>11.15 (2.88)</td>
<td></td>
</tr>
<tr>
<td>Learning vs. Performance Goal Preference (Dichotomous: Performance Goal)</td>
<td>74.3</td>
<td></td>
</tr>
</tbody>
</table>

Dweck, 1993; Erdley et al., 1997). In the present study, the Cronbach alpha was .85.

*Learning vs. Performance Goal Preference Scale* (Dweck, 1999). Four items were used to assess goal preferences (learning versus performance goals). The first three items constituted a goal preference scale. For each of these items, students indicated the extent to which they would prefer to do well at a task versus learn from a task. Specifically, students were asked to rate if they strongly agreed or disagreed with such statements as “Although I hate to admit it, I sometimes would rather do well in a class than learn a lot.” For this scale, participants responded on a 1-6 Likert scale (1 = STRONGLY AGREE, 6 = STRONGLY DISAGREE). Higher scores represented more of a preference for learning goals. In the present study, the Cronbach alpha for this 3-item scale was .46. In addition to these items, goal preference was also assessed with a single item with a dichotomous response. Specifically, students were asked “if I had to choose between getting a good grade and being challenged in class, I would choose . . .” and had to circle one of two alternatives: “a good grade” or “being challenged.” Despite being a single-item scale, this measure has been found to distinguish entity and incremental intelligence theorists (Dweck, 1999). The cronbach alpha when all four goal preference items were combined was .58.

*Effort Attribution Scale.* Two items were used to assess attributions for exerting either easy or hard levels of effort at a task (Dweck & Leggett, 1988). The first item stated “If you have to work hard at
TABLE 4. Relations Among LD and Cognitive Self-Regulatory Variables

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Presence of Learning Disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Academic Self-Efficacy</td>
<td>-.12**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Incremental Theories of Intelligence</td>
<td>-.13**</td>
<td>.20**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Learning Goal Preference</td>
<td>-.08**</td>
<td>.30**</td>
<td>.31**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Adaptive Effort Attributions</td>
<td>-.16**</td>
<td>.21**</td>
<td>.42**</td>
<td>.32**</td>
<td></td>
</tr>
</tbody>
</table>

Note. **p < .01 (2-tailed).

some problems, you probably are not very good at them.” The second item stated “You only know you are good at something when it comes easy to you.” For each item, students responded on a 1 to 6 Likert scale (1 = strongly agree, 6 = strongly disagree). Higher scores indicated more adaptive effort attributions. The cronbach alpha for this scale was .63.

RESULTS

Percentages/means and standard deviations for all variables are presented in Table 3. Table 4 provides correlations between all major variables, including learning disability status, academic self-efficacy, theories of intelligence, learning vs. performance goal preferences, and effort attributions. In short, the presence of a learning disability was associated with lower academic self-efficacy, less of an incremental view of intelligence, lower preference for learning goals, and less adaptive attributions for exerting effort in learning tasks. Possessing a high level of academic self-efficacy was associated with adopting more incremental views of intelligence, preferring learning goals, and making more adaptive attributions for exerting effort in learning tasks. Finally, having an incremental view of intelligence was associated with preferring learning goals and making more adaptive attributions for exerting effort in learning tasks.

STATISTICAL ANALYSES

Two modeling approaches were used to further examine associations between learning disability statuses, theories of intelligence,
academic self-efficacy, goal orientation, and effort attributions. For quantitative outcome variables, we used Ordinary Least-Squares (OLS) regression to examine associations. For dichotomous outcome variables, we used maximum-likelihood logit estimation. In both OLS and logit models, we used the Huber-White-sandwich method to adjust standard errors for cluster-correlated data, because students were nested within schools (Rogers, 1993; Williams, 2000).

To examine the potential mediating effects of theories of intelligence for associations between learning disabled status and effort attributions as well as the potential mediating effects of both theories of intelligence and academic self-efficacy for associations between learning disability status and goal preferences, we used the Sobel test (Sobel, 1982) for the products of the coefficients comprising these hypothesized indirect effects. Testing the product of the coefficients comprising the indirect effect is the best practice for examining mediation, and in large samples (i.e., $N > 400$) hypothesis tests are correctly calculated using standard errors as proposed by Sobel (for a review of this methodology, see Dearing & Hamilton, 2006; for advice on applying this method to estimates from logistic regression, see MacKinnon, Yoon, Lockwood, & Taylor, 2005).

In addition, all of our models were estimated after using multiple imputation for missing values. Although there was very little missing data in this study (e.g., 100% of participants had complete data on learning disabled status, 98% of participants had complete data on goal preferences and theories of intelligence, and more than 96% of participants had complete data on academic self-efficacy), multiple imputation for missing values is considered best practice compared with other strategies such as listwise deletion, averaging available items, or single imputation (Schafer & Graham, 2002; Widaman, 2006). Multiple imputation replaces missing data with values computed from multivariate analyses of participants’ non-missing data on other variables plus random variation. For the present study, we used multiple imputation by chained equations (i.e., MICE; Royston, 2004) to: (a) generate five complete data sets that combined observed and imputed values, (b) estimate our models using these five complete data sets, and (c) combine estimates according to “Rubin’s rules” (Rubin, 1987).
<table>
<thead>
<tr>
<th>Predictor</th>
<th>Theories of Intelligence</th>
<th>Academic Self-Efficacy</th>
<th>Effort Attribution</th>
<th>Learning vs. Performance Goal Preference (Quantitative)</th>
<th>Learning vs. Performance Goal Preference (Dichotomous)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$</td>
<td>$SE$</td>
<td>$b$</td>
<td>$SE$</td>
<td>$b$</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>-1.74***</td>
<td>.45</td>
<td>-5.35***</td>
<td>.67</td>
<td>-.73***</td>
</tr>
<tr>
<td>Gender</td>
<td>-.19</td>
<td>.26</td>
<td>-.27</td>
<td>.37</td>
<td>-.04</td>
</tr>
<tr>
<td>Middle or High School</td>
<td>.36</td>
<td>.50</td>
<td>-1.90*</td>
<td>.78</td>
<td>.17***</td>
</tr>
</tbody>
</table>

Note. *$p < .05$; **$p < .01$; ***$p < .001$. 
LEARNING DISABILITY AS A PREDICTOR OF ACADEMIC SELF-EFFICACY, THEORIES OF INTELLIGENCE, LEARNING VS. PERFORMANCE GOAL PREFERENCES, AND EFFORT ATTRIBUTIONS

As a first step in our analyses, we estimated OLS and logit models to examine learning disability status as a predictor of students' academic self-efficacy, theories of intelligence, learning vs. performance goal preferences, and effort attribution. In these models, we controlled for student gender and whether they were in middle school or high school. The results from these models are provided in Table 5.

Students with learning disabilities were significantly different from their peers without learning disabilities on each of the five outcome indicators. More specifically, compared with students who did not have a learning disability, students with a learning disability were more likely to have low academic self-efficacy, have a lower belief in incremental theory of intelligence, prefer more performance goals, and make more maladaptive effort attributions. Although the learning disability effect sizes for theories of intelligence and effort attribution were small (i.e., $d = .20$ and $r = .10$ for theories of intelligence; $d = .20$ and $r = .10$ for effort attribution), it was somewhat larger for the other two quantitative outcomes (i.e., $d = .41$ and $r = .20$ for academic self-efficacy; $d = .39$ and $r = .19$ for goal preference). Further, on the dichotomous goal preference outcome, students with learning disabilities were twice as likely to endorse performance-oriented goals compared with students without learning disabilities (i.e., $OR = .50$), indicating differences of substantial practical importance.

LEARNING DISABILITIES AND EFFORT ATTRIBUTIONS: THE MEDIATING EFFECTS OF THEORIES OF INTELLIGENCE

As a second step in our analyses, we examined the potential mediating effect of theories of intelligence for the association between learning disability status and effort attribution. To do so, we first simultaneously estimated learning disability status and theories of intelligence as predictors of effort attribution. The results from this OLS model are summarized in Figure 1 and in the top half of Table 6. Note that theories of intelligence was a statistically significant pre-
TABLE 6. Learning Disabled Status and Effort Attributions: The Partial Mediating Effect of Theories of Intelligence

<table>
<thead>
<tr>
<th>Direct Effects</th>
<th>Effort Attribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>-.50***</td>
</tr>
<tr>
<td>Gender</td>
<td>-.02</td>
</tr>
<tr>
<td>School (Middle or High School)</td>
<td>.12*</td>
</tr>
<tr>
<td>Theories of Intelligence</td>
<td>.13***</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td></td>
</tr>
<tr>
<td>Learning Disabled → Theories of Intelligence</td>
<td>3.59***</td>
</tr>
</tbody>
</table>

Note: *p < .05; ***p < .001

Theorists of effort attributions, with a medium effect size (i.e., $r = .25$). In addition, note that although learning disability status remained a significant predictor of effort attribution, the size of this association was approximately 32% smaller once theories of intelligence was included in the model (i.e., compare the coefficient of -.73 in Table 5 with the coefficient of -.50 in Table 6).

Thus, theories of intelligence appear to partially mediate the association between learning disability status and effort attributions. To determine if this partial mediation was statistically significant, we computed the Sobel test statistic for the product of the coefficients comprising the hypothesized pathway of mediation (see the bottom half of Table 6). That is, we examined the product of: (1) the association between learning disability status and theories of intelligence (i.e., -1.74 in Table 5) and (2) the association between theories of intelligence and effort attributions (i.e., .13 in Table 6). This product was statistically significant indicating that differences in effort attributions between learning disabled and students without learning disabilities was explained, at least in part, by the fact that LD youth were more likely than nonLD youth to possess entity rather than incremental theories of intelligence.¹

¹ It is worth noting that we also estimated the association between theories of intelligence and effort attributions without including learning disability status as a predictor. The size of the association between theories of intelligence and effort attributions, however, was affected very minimally by including learning disability status such that the coefficient was only .004 points larger when we did not include learning disability status as a predictor than when we did. This provides further support that the theories of intelligence variable was correctly specified as a mediator of the association between learning disability status and effort attributions.
FIGURE 1. Testing theories of intelligence as mediator of the relationship between learning disability status and effort attribution. The numbers in the figures are unstandardized betas and standard errors. All unstandardized betas are significant below the .001 level.

ACADEMIC SELF-EFFICACY AND THEORIES OF INTELLIGENCE AS PREDICTORS OF GOAL ORIENTATIONS

As a third step in our analyses, we estimated OLS and logit models to examine academic self-efficacy and theories of intelligence as predictors of youth learning vs. performance goal preferences. In these models, we also controlled for student gender and school level (i.e., middle school vs. high school). These results are displayed in Table 7.

For both the quantitative and the dichotomous goal preference outcomes, academic self-efficacy and theories of intelligence were significant predictors in the models. Youth with high levels of academic self-efficacy were more likely than their peers with low levels of academic self-efficacy to endorse learning-oriented goals. Similarly, youth with incremental theories of intelligence were more likely than their peers with entity theories of intelligence to endorse learning-oriented goals.

Beyond statistical significance, these associations appeared to be of considerable practical significance as well. Consider, for example, that youth with high levels of academic self-efficacy (i.e., one standard deviation above the mean) were 2.46 times as likely to endorse learning-oriented goals compared with youth with low levels of academic self-efficacy (i.e., one standard deviation below the mean).
TABLE 7. Theories of Intelligence and Academic Self-Efficacy as Predictors of Learning vs. Performance Goal Preference

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Learning vs. Performance Goal Preference (Quantitative)</th>
<th>Learning vs. Performance Goal Preference (Dichotomous)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
</tr>
<tr>
<td>Theories of Intelligence</td>
<td>.20***</td>
<td>.03</td>
</tr>
<tr>
<td>Academic Self-Efficacy</td>
<td>.07***</td>
<td>.01</td>
</tr>
<tr>
<td>Gender</td>
<td>-.27</td>
<td>.20</td>
</tr>
<tr>
<td>School (Middle or High School)</td>
<td>-.26</td>
<td>.18</td>
</tr>
</tbody>
</table>

Note. ***p < .001.

In addition, incremental theorists (i.e., students one standard deviation above the mean on theories of intelligence) were 1.92 times as likely to endorse learning-oriented goals compared with entity theorists (i.e., students one standard deviation below the mean on theories of intelligence).

LEARNING DISABILITIES AND LEARNING VS. PERFORMANCE GOAL PREFERENCES: THE MEDIATING EFFECTS OF ACADEMIC SELF-EFFICACY AND THEORIES OF INTELLIGENCE

Finally, as a fourth step in our analyses, we examined academic self-efficacy and theories of intelligence as potential mediators of the learning vs. performance goal preferences differences between youth with and without learning disabilities. To do so, we estimated first learning disability status, academic self-efficacy and theories of intelligence as predictors of the two goal preference outcomes. Then, we tested the product of the coefficients comprising the hypothesized pathways of mediation using the Sobel test. All of these results are displayed in Figure 2 and in Table 8, with the resulting Sobel test statistics in the bottom half of Table 8.

In Table 8, three results are noteworthy. First, note that the associations between learning disability status and the two goal orientation outcomes are substantially smaller than prior to controlling for the mediators of interest (see Table 7); in fact, learning disability status no longer significantly predicts the quantitative goal preference outcome once academic self-efficacy and theories of intelligence are
FIGURE 2. Testing academic self-efficacy and theories of intelligence as mediators of the relationship between learning disability status and learning goal orientation. The numbers in the figures are unstandardized betas and standard errors. All unstandardized betas are significant below the .001 level.

included in the model. Second, note that the coefficients for both of the hypothesized mediators are statistically significant and similar in size to the models that did not include learning disability status as a predictor. Third, note that all four of the Sobel test statistics are statistically significant.

Taken together, these results indicate that academic self-efficacy and theories of intelligence mediated associations between learning disability status and goal orientations. For the quantitative goal preference outcome, there was evidence of complete mediation such that the two mediators explained entirely the goal preference differences between youth with and without LD; for the dichotomous outcome, there was evidence of partial mediation such that the two mediators explained a large portion, but not all, of the goal preference differences between learning disabled youth and their classmates. In other words, these results are consistent with the hypothesis that youth with LD have more performance-oriented goals relative to their peers, in large part, because youth with LD have
lower levels of academic self-efficacy and more entity-based theories of intelligence.  

DISCUSSION

This study’s findings indicate that youth with a learning disability possess a distinctive cognitive self-regulatory pattern, one that has been associated with such maladaptive approaches to learning as avoiding challenges, experiencing negative affect, exhibiting poor persistence and task abandonment, and showing a deterioration in performance following failure (Bandura, 1997; Dweck, 1999). Specifically, we found that youth with a learning disability were more likely to possess low academic self-efficacy, to believe that intelligence was fixed and nonmalleable as opposed to incremental and changeable, to prefer performance over learning goals, and to interpret the exertion of effort as meaning they possessed limited levels of ability. This study is the first to examine each of these important

2. Our results proved robust across alternative model specification, including models for which we omitted gender and year in school from the analyses. Results from all alternative specifications are available from the authors upon request.
cognitive self-regulatory processes in concert in a single study of youth with and without LD.

Our finding that youth with learning disabilities possessed low academic self-efficacy may help to clarify a literature of mixed findings. Many of the previous studies reporting null findings in LD and nonLD populations on academic self-efficacy suffered from very low levels of statistical power (e.g., Graham & Harris, 1989; Pintrich et al., 1994). Our study represents a well-powered analysis of LD and nonLD differences in academic self-efficacy judgments. Indeed, it would be surprising if youth with LD did not possess lower self-efficacy given their tendency to underperform academically. In this respect, one might argue that if youth with LD did not possess lower self-efficacy when compared to their normally achieving peers, then their self-efficacy judgments would represent overestimations of their actual abilities (Klassen, 2002). In this study, we were not able to determine whether the lower efficacy judgments for youth with LD were miscalibrated, that is whether they represented over- or under-estimations of their actual abilities. However, we do wish to point out that a large literature—both correlational and experimental—has demonstrated that low efficacy judgments result in a host of maladaptive motivational and performance responses in learning contexts, even when controlling for individual differences in ability (see Bandura, 1997; Bouffard-Bouchard et al., 1991; Cervone, 1989; Cervone & Peake, 1986; Peake & Cervone, 1989; Schunk, 1984).

We also found that youth with LD endorsed more entity views of intelligence. That is, they were more likely to view their intelligence as fixed and not changeable, either through effort or practice. This makes the lower self-efficacy finding for youth with LD a larger concern. If youth with LD doubt their current academic abilities (possess low self-efficacy), and view those abilities as inherently unalterable, then the prospects for improving academic performance appear especially dim. In contrast, if youth viewed themselves as highly capable of performing academic tasks, then an entity theory of intelligence would be less damaging on motivation and performance. Our finding that youth with LD possessed more entity theories of intelligence in combination with low academic self-efficacy indicates a cognitive self-regulatory pattern that is thought to be particularly maladaptive to mastering academic tasks (see Elliot & Dweck, 1988; Dweck & Leggett, 1988).
We also found further evidence of a maladaptive cognitive self-regulatory pattern in youth with LD. Specifically, they were also more likely to prefer performance goals over learning goals. That is, they more strongly desired obtaining a positive judgment of their abilities than gaining an opportunity to learn or to further develop abilities. Both correlational and experimental studies have documented the deleterious impact of possessing such performance goals among the general population (Dweck, 1999). In addition, youth with LD were more likely to interpret the exertion of effort as meaning that they possessed low levels of ability. In other words, the meaning of exerting effort in an academic setting is more threatening to youth with LD, implying that they possess low ability levels. Obviously, mastering academic challenge demands the exertion of effort. Viewing such exertion as meaning that one is stupid or possesses low levels of ability is clearly counterproductive to learning.

Our mediational findings provided strong support for the notion that the maladaptive cognitive self-regulatory pattern observed in youth with LD is due to the fact that they possess more entity views of intelligence and lower academic self-efficacy. When these latter two variables were statistically controlled, there was virtually no or significantly less association between LD status and such outcomes as goal orientation and effort attributions. Although the above scenario portrays a pessimistic view of motivational processes in youth with LD, we believe they also point to a potential remedy. Specifically, our findings suggest that if youth with LD were to endorse an incremental theory of intelligence, then they would be more likely to pursue learning goals and less likely to interpret the exertion of effort as evidence of limited ability. As a result of such cognitive changes, these youth ought to show more optimal motivation and performance for academic tasks (Blackwell et al., 2007; Elliot & Dweck, 1988; also see Dweck & Leggett, 1988). Recently, Blackwell et al. (2007) reported an intervention study in which some junior high students were taught to subscribe to more incremental views of intelligence; as a result of this intervention, these students evidenced increased motivation in a math class and did not show the normative decline in math performance at this grade level that was observed in a control group.

Our findings then have important implications for developing interventions and programs to raise academic motivation and performance in LD student populations. Several studies have reported
on interventions that are designed to raise student’s self-efficacy for academic performances (Garcia & de Caso, 2006; Schunk, 1995). And as we described above, a recent intervention study targeted theories of intelligence (Blackwell et al., 2007). However, none of these interventions targeted each of the cognitive self-regulatory processes shown in this study to characterize youth with LD. In addition to targeting academic self-efficacy, we recommend that such interventions also attempt to alter views of intelligence, goal preferences, and ability attributions. Based on our findings, it is possible that changes in efficacy and theories of intelligence alone would promote positive changes in goal orientation and effort attributions. Specifically, if youth with LD viewed their intelligence as an ability that could be improved through effort and practice, and had more confidence in their ability to learn, they would then see academic challenges as opportunities for such practice and skill improvement and would not have negative cognitions (e.g., I must be dumb) when exerting effort.

Finally, in addition to informing our understanding of the motivational processes that characterize youth with learning disabilities, our study also provides evidence that both supports and suggests an extension of Dweck’s model. Dweck (1999) has argued, and found evidence to support, that theories of intelligence influence goal orientations, and that goal orientations influence mastery and helpless oriented learning responses (Blackwell et al., 2007; Elliot & Dweck, 1988; Erdley et al., 1997; Smiley & Dweck, 1994). Our study provides additional empirical evidence supporting Dweck’s motivational achievement model. In addition, however, we also found that self-efficacy judgments predicted goal orientation. Specifically, youth with low academic self-efficacy were more apt to endorse a performance-oriented goal. This latter finding, if replicated, would suggest an amendment to Dweck’s model: goal orientations are influenced independently by both theories of intelligence and efficacy judgments.

There were several limitations in this study. First, given the cross-sectional design, we are obviously limited in the statements we can make about any causal relationships between these cognitive self-regulatory processes in our LD student sample. Future longitudinal and experimental studies investigating these links in youth with LD would provide firmer evidence of such relationships. Second, we did not investigate the motivational impact of these cognitive self-regulatory processes on performance. Although these effects
have been relatively well-established in other studies, future studies ought to examine the motivational impact of such cognitive self-regulatory processes on academic performance in LD student populations.

Third, we found marginally acceptable internal reliabilities (i.e., approximately .60) for two of our scales, specifically the learning vs. performance goal orientation scale (Dweck, 1999) and the effort attribution scale (Dweck & Leggett, 1988). Dweck (1999) has commented that the goal orientation measure we used shows higher correlations with theories of intelligence when participants are provided an actual task to perform. As we did not give participants an actual task, this may be one reason why we obtained lower levels of internal reliability. In addition, both scales contain very few items (i.e., 2-4 items). Regardless of the cause of the marginal reliability findings in our study, given that they were low, one must exercise some caution in interpreting our findings as we cannot be certain that our two measures represent valid assessments of goal orientation and effort attributions, respectively.

Finally, we limited the measurement of goal orientation to the assessment of performance versus learning goals. Although this classical goal dichotomy is predictive concerning achievement outcomes, other goal dimensions may interact with performance/learning goal orientations to predict adaptive/maladaptive responses. For instance, approach-oriented performance goals have been found to enhance grade performance, whereas avoidance-oriented performance goals diminish both intrinsic motivation and grade performance (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Clearly, goal orientation is not a one-dimensional concept and future studies concerning implicit theories of intelligence and goal orientation should examine the impact of performance versus learning goal orientations in the context of alternative goal orientations (Anderman, Austin, & Johnson, 2002).

However, our study provides the first investigation that has examined this combination of important cognitive self-regulatory processes in an LD population. When compared to nonLD youth, youth with LD possess a distinctive and maladaptive cognitive self-regulatory profile—low academic self-efficacy, more entity theories of intelligence, less of a preference for incremental goals, and a tendency to interpret the exertion of effort as meaning they possess limited ability. This particular profile has been associated with a helpless approach to challenging learning contexts, one that
is likely to further contribute to the academic difficulties of youth with LD. We hope this initial study stimulates further investigation into the role that these cognitive self-regulatory processes play in the learning difficulties of LD student populations, and if further supported, leads to intervention efforts that target them more comprehensively.

REFERENCES


