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Carol L. Tieso

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Patterns of Overexcitabilities in Identified Gifted Students and Their Parents

A Hierarchical Model

Carol L. Tieso

College of William & Mary

Abstract: The purpose of this study is to examine the underlying construct of overexcitabilities (OEs) and to identify individual- and family-level factors that may explain gifted students' patterns of OEs. Data are collected from a convenience sample of identified gifted students ($N = 143$) and their parents ($N = 161$) using a Likert-type questionnaire, the Overexcitabilities Questionnaire II, developed to measure levels of the five intensities of the OEs. Multivariate and univariate analyses of variance and hierarchical linear modeling are used to differentiate between gender and age groups and to explain between- and within-group variance on the five subscales of the OEs: Psychomotor, Intellectual, Imaginational, Sensual, and Emotional. Results suggest that there were significant differences between gender and age groups and that most of the variance among students on the OEs was explained by family membership. This study represents an important step in our understanding of affective characteristics of giftedness and creativity.

Putting the Research to Use: Dabrowski's overexcitabilities represent a multifaceted lens through which to view the intensities of gifted children. The challenge for researchers and practitioners is to examine these intensities and promote intervention strategies that will enhance students' positive characteristics while teaching them to compensate for the negative. To address this challenge, researchers should explore and explain these sensitivities to gifted students, their parents, and their teachers. Those in charge of identifying gifted, talented, and creative students should use the overexcitabilities as an additional tool in a multifaceted and inclusive model of identification. Furthermore, teachers must be aware that characteristics indicating a learning disability or behavioral disorder may be characteristics of giftedness manifested through these overexcitabilities. Finally, students and their parents should be assisted in understanding and celebrating students' unique sensitivities and intensities.

Keywords: *gifted students; affective needs; social and emotional development; Dabrowski's overexcitabilities*

Theories of giftedness and talent development are often based on a common set of behavioral and cognitive characteristics. Developmental psychologists and theorists have also identified biographical or background traits that distinguish gifted, talented, or creative individuals from others (e.g., keen observation, high alertness and attention, high motivation, emotional sensitivity, intense frustrations, curiosity, active imagination, proclivity toward risk taking, and high energy). But most inventories related to giftedness or creativity have one trait in common: intensity (Cox, 1926; Dauber & Benbow, 1990; Davis, 1992; Feldman & Goldsmith, 1986; Piiro, 1992; Silverman, 1997). Piechowski (1979) and Silverman (1993) suggested that intensity, so often a characteristic of gifted and creative individuals, may be explained in terms of overexcitabilities (OEs; i.e., greater capacities to respond to various stimuli). The literature on OEs has been based on theoretical musings

rather than empirical research. The little research reported thus far has been based on a semistructured interview protocol and has been anecdotal in nature. Furthermore, there have been few attempts to examine the underlying construct of OEs and establish the validity of the construct. Do the questions asked determine an underlying construct of OEs? Can these OEs be measured and scores obtained? Can these scores be used to examine differences between gender and age groups? This study examined the underlying construct of OEs as well as the validity of a new Likert-type instrument. Finally, the OEs suggested different profiles for males and females, parents and their children.

Author's Note: Please address correspondence to Carol L. Tieso, School of Education, College of William & Mary, 311 Jones Hall, P. O. Box 8795, Williamsburg, VA 23187-8795; e-mail: clties@wm.edu.

Developmental Potential (DP) and Psychic OEs

The concept of psychic OEs emanated from Dabrowski's (1964) original concept of development potential, based on his work with gifted individuals under conditions of extreme stress: the rise of Fascism in Germany and Eastern Europe. Dabrowski (1964) defined DP as a genetic endowment of traits that determine what level of moral development a person may reach under ideal circumstances. The defining characteristics of DP are five forms of OE or special talents and abilities. The five forms of psychic OE identified by Dabrowski (1964) were described as "types of increased psychic excitability" and specific types of nervous energy he witnessed in gifted and creative individuals. Piechowski (1979) suggested that Dabrowski's insight grew from his observations of nervousness expressed by children under tense situations in school. He noted that in the early part of the century, children had to stand up silently and respectfully when the teacher entered the classroom. But in that tense and silent atmosphere, some students squirmed restlessly in their seats, some were quiet but not paying attention, some sat upright and tense with their eyes closed, and a few looked alert and expectant:

Children that squirm in their seats release their tension psychomotorically; the daydreamers escape their tension into the world of fantasy or spontaneously create pictures and scenes as images of the sources of tension; the upright tensed children feel the tension emotionally; the alert ones get their minds going and are ready to put their wits to use. There are five modalities of expressing tension: psychomotor, sensual, imaginational, intellectual, and emotional. They are called forms of psychic overexcitability. (p. 28)

Piechowski (1979) described each type of OE as a mode of understanding and responding in the world. The psychomotor mode is one of movement, restlessness, action, and excess of energy. The sensual mode relies on sensory contact and a need for sensory stimulation, including sensuality. The intellectual mode is characterized by analysis, logic, questioning, the search for truth, and a need for continuous and intense intellectual stimulation. The imaginational mode combines vivid dreams, daydreams, fantasies, images, and strong visualizations of experience. The emotional mode is expressed in attachments and bonds with others and

feelings of empathy, loneliness, and the happiness and joy of love. Piechowski (1979) further described them as filters through which the outside world reaches the individual.

The term OE was chosen to suggest a special kind of responding, experiencing, and behaving (Piechowski & Colangelo, 1984). Only when the expressions of excitability are beyond and above what can be considered common or average do they make a significant contribution to developing one's potential and subsequently to the development and nurturance of giftedness or creativity. Piechowski (1986) hypothesized that these characteristics of OE may be more prevalent in gifted and creative individuals than in the general population.

OEs and Gifted Students

Gifted, talented, and creative individuals are known to be energetic, enthusiastic, task committed, endowed with vivid imaginations, and strongly sensual, but they are also known to be emotionally vulnerable (Hollingworth, 1942; Silverman, 1994). Some are known to be aggressive, others to be morally sensitive, possessing what Csikszentmihalyi (1996) calls "the complex personality". They may react strongly to aesthetic, intellectual, emotional, sexual, and other stimuli (Piechowski, 1999). Therefore, according to Piechowski (1999), "overexcitabilities feed, enrich, empower, and amplify talent" (p. 325), but they may also intensify emotional and intellectual insight, creating a tendency toward perfectionism, unrealistic expectations, and social and intellectual asynchrony. As reported below, research suggests there is overlap between expressions of OEs and characteristics of giftedness (Feldman & Goldsmith, 1986; Roeper, 1982).

Studies conducted using open-ended and semistructured interview protocols have suggested that OEs may be more prevalent among gifted, talented, or creative individuals, and profiles of OEs differ among various groups. Researchers have found differences in OEs among children and adolescents, with those identified as gifted scoring higher than the nongifted (Gallagher, 1986; Piechowski & Colangelo, 1984). Some OEs were found to be strongest in artists when compared to the academically gifted (Piechowski & Cunningham, 1985; Piechowski, Silverman, & Falk, 1985) and to have greater strength in more creative gifted adolescents than less creative ones (Schiever, 1985). Miller, Silverman, and Falk (1994) found gender differences such that females had significantly

higher emotional OE scores whereas males had higher intellectual OE scores. Ackerman (1997) studied 9th- and 10th-grade gifted students enrolled in two private Catholic schools and found that they were differentiated from their nongifted peers based on their higher psychomotor, intellectual, and emotional OE scores, with psychomotor providing the best predictor of giftedness. According to Piechowski (1999), these high psychomotor OE scores may cause a student to be identified as hyperactive or as having attention deficits. Piechowski and Colangelo (1984) found that gifted adolescents and adults were characterized by two nonintellective factors, imaginational and emotional OEs, and one intellectual factor, intellectual OE. It is interesting that they also found that the OEs were relatively stable throughout the lifespan.

The Present Study

Researchers in the field of gifted education disagree about the underlying construct of OEs and the proposition that gifted students demonstrate these OEs in greater intensity than other students. This study will attempt to discern if these OEs exist and are more intense in identified gifted students.

Several studies (Ackerman, 1997; Gallagher, 1986; Miller et al., 1994; Piechowski et al., 1985) have used OEs as a tool to identify gifted, talented, or creative students. These studies were limited in scope and had relatively small sample sizes. Additionally, little research has explored patterns of similarities and differences between males and females and between parents and children. Finally, most research that has been conducted on OEs used the original form of the OE Questionnaire (OEQ; Piechowski et al., 1985), which consisted of 21 open-ended interview questions. This study used the OEQII, a Likert-type questionnaire validated for school-age children and adults (Falk, Lind, Miller, Piechowski, & Silverman, 1999). This exploratory study becomes more critical in light of the fact that little empirical research has been conducted thus far on the construct of OEs or on this specific Likert-type instrument. The purpose of this study is twofold: to examine the nature and underlying construct of OEs and to estimate individual- and family-level factors that may contribute to the manifestation of the OEs in identified gifted students.

The literature discussed in the previous section led to several questions about the relative contributions of gender, parents' OE subscale scores, parent's highest

educational levels, and family income to individual gifted students' subscale scores on the OEs:

1. To what extent do students and their parents differ in mean OE scores?
2. To what extent do male and female gifted students differ in mean OE scores?
3. How much variation in students' OE scores is attributable to mother's or father's OE scores?
4. How much do family-level variables such as parents' OE scores, highest educational levels, and family income contribute to students' OE scores?

Method

Participants

A convenience sample of students participating in a Southeastern university's summer enrichment program and their parents were invited to participate in this study. In the summer program, students attended two enrichment sessions per morning (A and B), for a total of 3 weeks in a commuter setting. All of the participants were students enrolled in the local city and county school systems who had been identified for gifted and talented services within their own school districts. Students are identified for gifted and talented programs in the state through the use of a matrix that includes standardized test results, checklists of behavioral characteristics, and ratings of creative products. Teachers in the program were graduate students in gifted education fulfilling their 150-hr internship requirement. Program participants ($N = 143$) ranged in age from 5 to 15, with a median age of 10.15. Parents of participants ($N = 161$) ranged in age from 31 to 59, with a median age of 34.5. Some of the families participating in the study had more than one student enrolled in the program. The participants and their families are not typical of the demographic makeup of the state; they are reflective, however, of a fairly affluent university community.

Instrumentation

The OEQII (Falk et al., 1999) consists of 50 items designed to measure the five dimensions of OEs: Psychomotor, Intellectual, Imaginational, Sensual, and Emotional. The theoretical background of the OEQII is Dabrowski's (1964) theory of positive disintegration and the role OEs play in one's level of moral

development. The OEQII is an adaptation of the original OEQ, a 21-item, free-response instrument (Lysy & Piechowski, 1983) and was designed for analyzing group data and not for making diagnostic decisions about individuals. According to the authors, different methods for assessing OEs have been used in the past, including “open-ended responses to verbal stimuli (Dabrowski & Piechowski, 1977; Piechowski, 1975), assessment in autobiographical material, and an open-ended questionnaire” (Falk et al., 1999, p. 2). Means and standard deviations for the five subscales of OEs from the original pilot study of college students ages 15 to 62 ($N = 563$) were as follows: Psychomotor, $M = 3.35$, $SD = .79$; Sensual, $M = 3.28$, $SD = .87$; Imaginational, $M = 2.86$, $SD = .83$; Intellectual, $M = 3.50$, $SD = .79$; and Emotional, $M = 3.72$, $SD = .77$. The pilot study was repeated with an additional sample of 324 students, 49% of whom were 17 years old or younger.

Construct validity was established by administering the pilot instrument to a representative sample of 324 participants ages 15 to 62 (Falk & Lind, 1998). A principal components analysis yielded five clear and theory-based factors. This analysis was repeated with the additional sample ($N = 324$), and the results were replicated with minor item differences (Kort-Butler & Lind, 1998). Original alpha reliability estimates from the pilot sample were as follows: Psychomotor, $\alpha = .86$; Intellectual, $.89$; Sensual, $.89$; Emotional, $.84$; and Imaginational, $.85$.

Procedures

Prior to data collection, the researcher obtained signed informed consent and assent forms from parents and students respectively. The OEQII and demographic questionnaires were distributed to students by their Session A instructor. Students were asked to give the questionnaire to their parents for their perusal and permission and return them by the end of the following week.

Identical forms of the OEQII were completed by students and parents separately in their homes and returned to students' Session A instructor. Reading level was estimated at Grade 8, so for younger students, parents or teachers were asked to read the items to the children. Students and their parents were informed that all responses were confidential and would be used for research purposes only. Additionally, students and parents may have responded to the OEQII together, which may have influenced student responses. Finally, student and family demographic data were collected through a self-report questionnaire developed by the

researcher, which solicited information about gender, age, ethnicity, parents' highest educational levels, and family income. To encourage participation, students who returned completed consent forms and questionnaires were awarded a small prize.

Data Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences 11.0 for Windows. Multivariate analysis of variance (MANOVA), followed by a post hoc discriminant function analysis (DFA), was conducted to detect gender and age differences and address Research Questions 1 and 2. Hierarchical linear modeling (HLM) was used to address Research Questions 3 and 4 and to assess the contributions of individual- and family-level variables to students' OE scores.

For this study, data were collected at two levels: individual and family levels. It is inappropriate to analyze data using traditional methods of regression or ANOVA because of the violation of the independence assumption and the nested nature of the data. HLM was chosen as the data analytic technique because of the nonindependent, nested nature of the data: Students are nested within families. According to the literature, one of the best methods for analyzing nonindependent data is multilevel or hierarchical modeling (Duncan & Raudenbush, 1999; Kenny & Cook, 1999; Kreft & DeLeeuw, 1998; Maguire, 1999). Also, because of the relatively small sample size, the use of HLM allows the researcher to “borrow” power by using the results from the entire sample of parents rather than simply having an N of one or two parents per family. By using HLM with multilevel data (e.g., families and children, schools and individual students), the researcher can overcome the unit of analysis problem common to educational research studies and partition variance components into individual- and family-level components to suggest a richer analysis. An additional advantage of HLM is the provision for calculating the Intraclass Correlation (ICC), which allows the researcher to separate variation to within- and between-family components. HLM assumes that the error terms (r_i) are normally distributed and independent, with a mean of zero. Because currently there is no HLM analogue to the multivariate outcome, individual models were constructed for each of the five OEs separately.

Individual-Level Variable

At the individual level, gender represents the independent variable, and students' or parents' scores on

Table 1
Correlations Among the Five Subscales
of Overexcitabilities (OEs) as a Function
of Age Group

Measure	1	2	3	4	5
1. Psychomotor	—	.14	.21*	.25**	.33**
2. Sensual	.11	—	.36**	.38**	.50**
3. Imaginational	.13	.35**	—	.29**	.28**
4. Intellectual	.22**	.36**	.15	—	.36**
5. Emotional	.05	.59**	.31**	.17*	—

Note: Intercorrelations for student participants ($N = 143$) are presented above the diagonal, and intercorrelations for parent participants ($N = 161$) are presented below the diagonal.

** $p < 0.01$.

the OE subscales represent the dependent variables. The Null Model in HLM, or fully unconditional model, is similar to a simple ANOVA model.

The gender differential is a predictor variable representing whether the student or parent is a female (value = 1) or a male (value = 0). In the individual-level model (prior to adding family-level predictors to the model), this variable should be interpreted as a standard dummy variable as used in a traditional multiple regression analysis. Because this variable was entered uncentered, the calculated values for gender in the equation will represent the effect of being a female on students' OE scores. Thus, the coefficients for gender will be interpreted as the average gap between males and females or, in other words, the differentiating effect of gender on OE scores. For example, if the gender effect (slope) were significant and positive for Emotional OE, this would suggest that females tend to have higher scores on the Emotional OE than males.

Family-Level Variables

The independent variables were those measured at the family level: mothers' and fathers' mean OE subscale scores, mothers' and fathers' highest educational levels, and family income.

Parents' OE subscale scores. Parents' (mothers' and fathers' individually) scores on the OE subscales are continuous predictor variables that represent the extent to which the parents' mean OE scores, after controlling for other individual-level variables, contribute to students' mean OE scores. Thus, the coefficients for parents' mean OE scores will be interpreted

as the average gap between families, in other words, the differentiating effects of parents' mean OE scores on students' OE scores.

Parents' highest educational levels. Two categorical variables, fathers' and mothers' highest educational levels, are predictor variables that represent the effects of fathers' or mothers' highest level of educational attainment on students' overall mean OE scores after controlling for individual-level variables.

Family income. Family income is a categorical predictor variable that represents the effects of family income on students' overall mean OE scores after controlling for individual-level variables. Thus, the coefficients for family income will be interpreted as the average gap between family income levels, in other words, the differentiating effect of family income on students' mean OE scores. The advantage of using HLM, as opposed to ordinary least squares (OLS) techniques, is that the researcher can model family-level variables on the intercept (mean OE score) and the gender differential.

Results

Evidence of Validity and Reliability for This Study

Prior to conducting the MANOVA and HLM analyses, confirmatory factor analysis (CFA) was conducted and Cronbach's alpha reliability coefficient was calculated to further establish construct validity and reliability for this study. After data were collected for this study, additional analyses were conducted to verify the underlying construct validity and reliability of the results. Correlations were estimated for the five subscales of OEs. Correlations are summarized in Table 1.

A CFA was conducted on the authors' hypothesized factor structure. Two negatively worded items appeared to create confusion for the younger students and were deleted from the analysis. A third item loaded on more than one factor and was subsequently deleted. These items also demonstrated poor interitem correlations. A chi-square value was computed on the remaining 47 items and used to evaluate the goodness of fit for the five-factor solution. The χ^2 test statistic, 1,899.07 ($df = 1,130$), was significant at the $p < .001$ level. Browne and Cudeck (1993) suggested that

Table 2
OEQII Factors, Sample Questions, Number of Questions,
and Alpha Reliabilities of the OEQII Subscales

Factor	Sample Question	Number of Questions	Cronbach's Alpha for This Study
Psychomotor	I thrive on intense physical activity, e.g., fast games and sports.	10	.83
Intellectual	I love to solve problems and develop new concepts.	10	.87
Imaginational	My pretend world is very real to me.	9	.86
Sensual	I enjoy the sensations of colors, shapes, and designs.	9	.86
Emotional	My strong emotions move me to tears.	9	.80

Note: OEQII = Overexcitabilities Questionnaire II.

Table 3
Means and Standard Deviations for OE Subscales

Participants	Psychomotor	Intellectual	Imaginational	Sensual	Emotional
Students					
<i>M</i>	3.48	3.34	3.10	3.23	3.22
<i>SD</i>	.75	.77	.88	.83	.73
<i>n</i>	143	143	143	143	143
Parents					
<i>M</i>	3.25	3.71	2.14	3.39	3.46
<i>SD</i>	.77	.75	.66	.85	.74
<i>n</i>	161	161	161	161	161
Males					
<i>M</i>	3.47	3.66	2.55	3.05	3.02
<i>SD</i>	.80	.81	.86	.82	.64
<i>n</i>	132	132	132	132	132
Females					
<i>M</i>	3.27	3.43	2.62	3.51	3.60
<i>SD</i>	.74	.74	.94	.81	.73
<i>n</i>	171	171	171	171	171

Note: OE = overexcitability.

the model may be accepted by the χ^2 test statistic if a small enough sample is used, so additional goodness-of-fit indices were used to determine the fit of the items to their hypothesized factors. The root mean squared error of approximation (RMSEA), the Goodness of Fit Index (GFI), and the Comparative Fit Index (CFI) were analyzed. Moderate fit was indicated by RMSEA (.049), GFI (0.79), and CFI (0.85). Factor structures were analyzed separately for students and their parents and found to be similar. Alpha reliability estimates for this study and sample item stems are presented in Table 2.

Age and Gender Differences

Several analyses explored the differences in males' versus females' and students' versus parents' scores on the omnibus OEs and the five subscales of the OEQII: Psychomotor, Intellectual, Sensual, Emotional, and Imaginational. Means and standard deviations for

age and gender groups are summarized in Table 3.

To address Research Questions 1 and 2, MANOVAs were conducted to examine omnibus differences on the OEs. Total *N* of 304 was reduced to 274 by listwise deletion. There were no multivariate outliers. Results of evaluation of assumptions of normality, homogeneity of variance, and linearity were satisfactory. The researcher also performed a natural log transformation to alleviate skewness in the dependent variable, Imaginational. Analyses were conducted on both the untransformed and transformed variables with virtually no change of results. Therefore, the untransformed version was maintained to simplify interpretation.

To determine which of the OEs had the greatest discriminating power for gender and age groups, a post hoc DFA was performed. The dependent variables were classification as female or male, student or parent, and the independent variables were scores on the five OE subscales (Psychomotor, Sensual,

Table 4
Multivariate and Univariate Analyses of Variance for Overexcitabilities Subscales

Source	Multivariate		Univariate				
	<i>df</i>	<i>F</i> ^a	Psycho ^b	Intellect ^b	Imagin ^b	Sensual ^b	Emotional ^b
Gender (G)	1	21.18***	2.24*	6.41*	1.29	20.42***	48.31***
Age groups (A)	1	37.65***	1.36*	25.45***	86.79***	3.30	8.62**
G X A	1	3.97**	6.00*	0.32	1.91	0.33	4.22*
MSE			.59	.56	.59	.67	.46

Note: Multivariate *F* ratios were generated from Wilks's Lambda statistic. Univariate significance levels were adjusted for multiple comparisons: Bonferroni adjustment set at $p < .01$ for each dependent variable. MSE = Mean Square Error.

a. Multivariate *df* = 4, 269.

b. Univariate *df* = 1, 270.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Imaginational, Intellectual, and Emotional). Subsequent classificatory analyses were performed to ascertain whether group membership could be predicted based on the linear composite of OE scores.

Age. For the multivariate analysis, Wilks's criterion was chosen as the test statistic. The combined dependent variables were significantly related to age groups, $F(4, 273) = 37.65$, $p < .001$. There was a moderate association between the OE subscale scores and age groups, with a partial η^2 of .39.

Gender. For the multivariate analysis, Wilks's criterion was chosen as the test statistic. The combined dependent variables were significantly related to gender $F(4, 273) = 21.18$, $p < .001$. There was a moderate association between the OE subscale scores and gender, with a partial η^2 of .26.

Age and gender. Results from the MANOVA indicated a significant interaction between gender and age groups, $F(2, 266) = 3.97$, $p < .01$, with a partial η^2 of .06. Results of multivariate analyses of variance are summarized in Table 4.

A DFA was conducted as a post hoc and to determine which linear combination of OE scores contributed most to separating males from females and students from parents. Two meaningful discriminant functions represented the aggregate OE subscales, with $\chi^2 = 95.34$, $p < .001$. The first discriminant function maximally separated students from parents and explains 67% of the variance in scores. The loading matrix of correlations between predictors and discriminant functions suggested that the strongest predictors of age group membership were the Imaginational ($r = .916$) and Psychomotor ($r = .347$) OEs. The group means for adults were significantly lower than their children's on the Imaginational and

Psychomotor OEs, with females declining at a faster rate than males. The second discriminant function maximally separated males from females and explained an additional 32% of the variance in scores. The loading matrix of correlations between predictors and discriminant functions suggested that the strongest predictors of gender group membership were the Intellectual ($r = .651$) and Emotional ($r = -.395$) OEs. Male students had higher mean scores on the Intellectual OE than female students, whereas adult males had the highest Intellectual OE mean scores of any group. With respect to mean Emotional OE scores, student and adult males had relatively similar mean scores, whereas female adults had significantly higher mean scores than their daughters. Canonical coefficients and correlations for age and gender groups are summarized in Table 5.

HLM Null Models

To address Research Question 3, regarding how much variation in students' OE scores is attributable to mothers' or fathers' OE scores, HLM unconditional models were analyzed. Because there is no HLM analogue to the multivariate analysis, each model was run separately. In these models, similar to an ANOVA with no predictors, the researcher may partition variance into between- and within-family variance by calculating the ICC. The ICC measures the proportion of variance in the outcome (OE subscale scores) that is between families (Raudenbush & Bryk, 2002). With reference to the current investigation, each OE subscale score was specified as the outcome variable, and no predictors were included in each model. The ICCs for each OE subscale are summarized in Table 6.

Results of the HLM analyses indicated that mothers' or fathers' OE scores explained most of the overall

Table 5
Correlation of Predictor Variables With Discriminant Function: Gender and Age

Predictor Variable	Correlation With Discriminant Function		Standardized Discriminant Function Coefficients	
	Function 1 Age	Function 2 Gender	Function 1 Age	Function 2 Gender
Psychomotor	.347	-.232	.239	-.133
Sensual	-.239	.251	-.224	.355
Imaginational	.916	.361	.651	.441
Intellectual	-.171	-.803	-.190	-.398
Emotional	.339	.699	-.395	.575

Table 6
Intraclass Correlations for Individual OE Subscales

OE Subscale	Between-Family Variance (tau: τ_{00})	Within-Family Variance (sigma ² : σ^2)	χ^2
Psychomotor	.08	.92	55.35
Intellectual	.01	.99	44.99
Imaginational	.01	.99	48.06
Sensual	.22	.78	76.60*
Emotional	.08	.92	56.55

Note: OE = overexcitability.

* $p < .05$.

variance among students in their mean OE scores (78% to 99%). The vast majority of variance among students on the OE subscales can be explained by mothers' or fathers' OE scores, however it is instructive to further examine the residual variance and attempt to identify individual and group variables that explain the remaining between-group variance.

HLM Full Models

Contribution of family-level variables. To address Research Question 4, regarding how much family-level variables such as parents' OE scores, highest educational levels, and family income contribute to students' OE scores, full HLM models were analyzed. The researcher hypothesized that students' scores on the various OE subscales would be associated with both the individual-level variable (gender) and family-level variables (mothers' and fathers' OE scores and highest level of education and family income). Fathers' and mothers' OE scores had to be examined separately because of collinearity, so the results do not represent the effects of parents' OE subscale scores after controlling for gender effects, however the major effects remained the same. All variables have been standardized using z scores, with a mean of 0 and a standard deviation of 1.0; therefore, all reported coefficients are

represented in terms of effect sizes. Table 7 summarizes the gamma coefficients for the full models of each of the OEs. The gamma coefficients should be interpreted as additive effects, or slopes, as they would be in more traditional multiple regression models. Thus, significant values for gamma coefficients in this model are indicative of family-level factors that are related to differences in students' mean OE subscale scores after controlling for gender differences among individuals.

Coefficients for the fathers' OE scores indicated that the slopes of the fathers' OE scores were significant and negative in the case of the Imaginational OE ($t = -2.53$, $p < .05$). Coefficients for the mothers' OE scores indicated that the effect of the mothers' OE scores on the students' mean OE scores was significant for the Imaginational OE ($t = 2.77$, $p < .01$) and the Emotional OE ($t = 4.00$, $p < .001$). In each case, the coefficient indicated a positive and differentiating effect on students' mean OE scores for each subscale. Mothers' and fathers' highest educational levels did not have differentiating effects on students' OE scores.

Results from the HLM full model for each OE subscale indicated that when family income was added to the model as a family-level predictor, it had a significant differentiating effect on students' mean OE scores on the Imaginational ($t = 4.00$, $p < .001$) and Sensual ($t = 3.10$, $p < .01$) subscales. These results should be

Table 7
Full HLM Overexcitabilities Model

Random Effects	Gamma Coefficients for PSYCHO ^a	Gamma Coefficients for INTELL ^b	Gamma for INTELL ^b for IMAG ^c	Gamma Coefficients for SENSE ^d	Gamma Coefficients for EMOT ^e
Mean OE score	3.50***	3.33***	3.21***	3.32***	3.29***
Average gender effect	.076	-.116	.275	.461**	.413**
Average effect of father's OE score	.020	.064	-.299**	-.139	.054
Average effect of mother's OE score	.158	.101	.289**	.212	.328**
Average effect of father's highest educational level	-.031	.094	.011	.003	.007
Average effect of mother's highest educational level	-.076	-.009	-.103	-.009	.006
Average effect of family income	.042	-.022	.172***	.130**	.047

Note: All coefficients presented are standardized (effect sizes). For gender, 1 = female, 0 = male. OE = overexcitability.

a. Psychomotor OE.

b. Intellectual OE.

c. Imaginational OE.

d. Sensual OE

e. Emotional OE.

* $p < .05$. ** $p < .01$. *** $p < .001$.

interpreted cautiously, however, because of collinearity among the predictors. Family income was significantly correlated with both fathers' ($r = .45$, $p < .01$) and mothers' ($r = .55$, $p < .01$) highest educational level.

Discussion

The findings summarized in the previous section suggest that family membership contributes most of the variation in identified gifted students' OE scores. In examining the remaining between-group variance, fathers' Imaginational OE had a significant negative effect on students' Imaginational OE, whereas mothers' Imaginational and Emotional OE had significant positive effects on students' OE subscale scores. Family income had a significant differentiating effect on students' Imaginational and Sensual OE scores.

There were significant differences between males and females on the Sensual and Emotional OEs, with females scoring higher than males. Miller et al. (1994) found gender differences in which females had significantly higher Emotional OE scores and males had higher Intellectual OE scores. This is consistent with the work of Gilligan (1993), who suggested that females have different ways of knowing than males. It would be an interesting future study to compare Gilligan's characteristics with Dabrowski's theory of positive disintegration.

The significant interaction between gender and age groups, most evident in a significant difference between children and adults in mean Imaginational OE scores, suggests that adults tend to lose their sense of child-like wonder and vivid imaginations as they submit to the realities of adult responsibilities. It is most evident in females' mean Imaginational OE scores, which drop more precipitously than males'. Finally, although males' mean Emotional OE scores are similar between children and adults, adult females have the highest mean Emotional OE scores of any group.

Furthermore, high Psychomotor and Intellectual OE scores may make gifted students more susceptible to feelings of boredom with curriculum that is neither challenging nor appropriate. Instead of accepting the boredom and waiting for others to catch up, gifted students may create their own intellectual and physical stimulation, which may not correlate with that of the teacher.

The gifted students in this sample had the highest mean OE score on the Psychomotor OE, which is consistent with Ackerman's (1997) findings that Psychomotor OE may be the best predictor of giftedness among school-age children. Teachers and peers of students with high Psychomotor OE often struggle to react and respond appropriately to this heightened level of motion and energy. Additionally, gifted students in this sample demonstrated high Emotional

and Intellectual OE scores, which may make them more insightful and volatile in their relationships with peers and others; this tension may also result in a discrepancy between how they perceive themselves and how they wish to be perceived. These two factors may help explain the asynchrony that gifted children often manifest when comparing themselves to their nongifted peers and to their imagined ideal selves. This discrepancy may be caused, in part, by the chasm created between gifted students' perceptions of themselves and what they would like to be (Hollingworth, 1942; Silverman, 1993).

Finally, the presence of high Psychomotor and Emotional OEs in gifted students may also be problematic, as it may lead to diagnoses of ADHD and other behavior disorders. According to Leroux and Levitt-Perlman (2000), gifted students with ADHD demonstrate behaviors such as daydreaming, incessant talking, inability to sit still, and social immaturity, all potential characteristics of the various manifestations of OE. These behaviors may also be present in gifted students with high Psychomotor, Emotional, and Imaginational OEs. Although there is still only anecdotal evidence, high Psychomotor OE, in combination with other characteristics of giftedness, may suggest the presence of a learning disability or ADHD in gifted students. Baum and Owen (1988) found that gifted students with learning disabilities were typically the most disruptive students in their classes. Additionally, Eisenberg and Epstein (1981) found that gifted children with disabilities understand faster, ask more questions, hurry through math, and may be terribly disruptive. This evidence muddies the literature on gifted students with learning disabilities or ADHD because it becomes difficult to separate the characteristics of students with learning disabilities or ADHD from behaviors and characteristics often associated with gifted or creative children. According to Baum and Olenchak (2002), diagnoses of ADHD rely primarily on checklists of behaviors and characteristics, characteristics that may also be found on checklists of gifted children's strengths. They suggest that psychologists or educational specialists may mistake characteristics of giftedness with those of ADHD and vice versa. The presence of high Psychomotor and Emotional OEs in gifted children may be both a blessing and a curse, as it blurs the lines between characteristics of giftedness, OEs, and potential learning and behavior difficulties.

There is one major conceptual or theoretical issue, and several limitations of this study that suggest there is

much more research to be conducted. The conceptual issue is the reality that some researchers fail to acknowledge the existence of OEs or the prevalence of these among gifted students. Because research in this area has been limited to dissertation studies, some researchers still have concerns that, first, the OEs may not exist at all and, second, they may not be more prevalent in gifted populations than in others. Limitations are related to selection bias, including the relatively small sample size and the lack of random selection of students. Additionally, because students and their parents completed identical versions of the OEQII, they may have influenced each others' responses. Another limitation is the restricted range of responses because of the particular characteristics of the participants; the students were all identified as gifted using the same criteria, and they all reside in the same community. This may lead to statistical limitations that may restrict or mask possible statistical significance. A further limitation relates to the construct validity and overall reliability of the results obtained from the responses to the OEQII items; they may be underestimated because of the restricted range of responses from the identified gifted participants. Additionally, several of the items appear to address the needs of children rather than adults (e.g., "I believe that dolls, stuffed animals, or the characters in books are alive and have feelings"). A fine-tuning of the items in subsequent revisions may allow the results to be more valid for adult populations. Finally, there are no published empirical studies available that establish the convergent or divergent validity of the OEQII. The door to a substantial line of future research interests lay wide open.

Future Research

There is much more to learn about the OEs and whether a single affective instrument may be a true reflection of those characteristics. Future research should examine these patterns in gifted and nongifted populations. Additionally, other studies should use samples that include gifted students with identified learning and behavioral problems or ADHD to ascertain whether OEs are either partly responsible for or contribute to learning difficulties. Specifically, Psychomotor and Emotional OEs may be partly responsible for diagnoses of learning disabilities, ADHD, or behavioral disorders. Moon, Zentall, Grskovic, Hall, and Stormont-Spurgin (2001) found that gifted students with ADHD have difficulty

regulating their emotions, whereas other researchers have found that gifted students with learning disabilities were typically the most disruptive students in their classes. These behavioral differences must be examined in the context of asynchrony and OE if the field is to develop appropriate and successful strategies to help gifted students recognize and regulate their learning or behavioral difficulties. Despite these limitations and recommendations, there are important implications for the field of gifted and talented education.

Conclusion and Implications

Dabrowski's OEs (Dabrowski & Piechowski, 1977) represent a tantalizing lens through which to view the gifted child. The OEs should be used in conjunction with other, more traditional status information to provide additional insight into the particular reactions or behaviors demonstrated by gifted students. Additionally, educators of gifted children should be made aware of these characteristics and provide relevant information regarding Dabrowski's OEs to students and parents so that both can see that these characteristics are not atypical of gifted children. This may also prove to be an important piece of the affective puzzle, allowing gifted children to acknowledge and celebrate their distinctive characteristics and behaviors rather than shroud them in conformity. This is especially true of gifted females, who may be significantly nurtured by the recognition and acceptance that they view the world and moral development differently than males. By creating support groups of gifted females and immersing them in Gilligan's (1993) theory of moral development, their acceptance of their different paths may be realized. Finally, the OEs may represent a link between what we know about gifted children with learning disabilities or ADHD and how we may now intervene to help them compensate and celebrate their unique social, emotional, and intellectual intensities.

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Carol L. Tieso currently teaches courses in gifted education and serves as a researcher with the Center for Gifted Education. Prior to joining the faculty at the College of William and Mary, she served as program coordinator for gifted programs at the University of Alabama. She completed her doctoral work at the University of Connecticut and earned her PhD in educational psychology with an emphasis on gifted and talented education in June 2000. Her current research interests include examining the impact of flexible grouping and curriculum differentiation models on students' achievement and investigating patterns of Dabrowski's overexcitabilities in gifted, talented, and creative students. Her teaching interests focus on meeting the socioemotional needs of talented students and increasing the enrollment of culturally, linguistically diverse students in gifted programs.