The Relations Among Causality Orientations, Academic Experience, Academic Performance, and Academic Commitment

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The relations among causality orientations (autonomy and control), experience while studying, academic commitment, and academic performance were investigated. The role of gender in moderating such relations was examined. Participants were 161 (70 male, 91 female) talented high school students who completed the General Causality Orientations Scale (GCOS) and filled out the Experience Sampling Forms (ESF) for 1 week. Results showed that autonomy orientation was positively related to academic experience for all students. Control orientation was negatively related to academic experience among females. After controlling for aptitude, control orientation had a negative relation with academic performance and commitment.

Self-determination theory contends that autonomy and control orientations are important dimensions of psychological functioning (Deci, 1980; Deci & Ryan, 1985a, 1985b, 1987, 1991; Ryan & Connell, 1989). The theory suggests that the initiation and regulation of behavior can be experienced as either autonomous or controlled. Autonomous behavior is initiated and regulated by choices anchored in an awareness of personal needs and well-being. Individuals with a high-autonomy orientation organize their behaviors according to their own interests and goals. They experience themselves as the origin of their behavior (DeCharms, 1968). In contrast, controlled behavior is initiated and regulated by pressure from internal or external forces. Individuals with a high-control orientation organize their behavior based on perceived pressure and constraints. They feel that they are forced or compelled to act in certain ways. They do not experience a sense of choice and feel they have become pawns of their behavior (DeCharms, 1968). This study examines the relations among individual differences in autonomy and control orientations, academic experience, academic commitment, and academic performance. Moreover, the study also explores whether gender moderates such relations.

Autonomy and control orientations were first studied by Deci, Ryan, and colleagues (see Deci, 1980; Deci & Ryan, 1985a, 1985b) at the University of Rochester more than a decade ago. They believe that there are individual differences in people's understanding of how behavior is caused. The General Causality Orientations Scale (GCOS) was designed to measure these differences. Three causality orientations have been identified. The autonomy orientation "involves a high degree of experienced choice with respect to the initiation and regulation of one's own behavior" (Deci & Ryan, 1985b, p. 111). The control orientation "involves people's behavior being organized with respect to controls either in the environment or inside themselves" (Deci & Ryan, 1985b, p. 112). The impersonal orientation "involves people's experiencing their behavior as being beyond their intentional control" (Deci & Ryan, 1985b, p. 112). It has been suggested that individuals interpret events according to all three orientations, although the strength of each orientation may differ. The reliability and validity of the GCOS have been demonstrated in past research (e.g., Deci & Ryan, 1985a; Vallerand, Blais, Lacouture, & Deci,

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1987). Because the present study examines only the autonomy and control orientations, the impersonal orientation will not be discussed any further.

The GCOS was designed as a global measure of individual differences in the initiation and regulation of behavior. Subsequent to the development of the GCOS, other instruments also were designed to measure perceived causality in specific domains, such as academic achievement (Ryan & Connell, 1989; Vallerand, Blais, Briere, & Pelletier, 1989), interpersonal relationships (Blais, Vallerand, Pelletier, & Briere, 1995), prosocial behavior (Ryan & Connell, 1989), paid work (Deci, Connell, & Ryan, 1989), sports (Briere, Vallerand, Blais, & Pelletier, 1995; Pelletier et al., 1995), and gambling (Chantal, Vallerand, & Vallieres, 1994). Even though the development of these specific measures has been useful, Deci and Ryan (1987) maintain that it is still important to measure differences in general causality orientations because they are related to a number of different emotions, attitudes, and behaviors.

Past research reveals that autonomy is associated with variables that indicate positive experience, psychological well-being, persistence, and success in goal attainment. For instance, autonomy orientation is related to perceived interest and a lack of guilt and hostility in laboratory tasks (Deci & Ryan, 1985a). Cardiac patients with high autonomy tend to perceive surgery as a challenge rather than a threat (King, 1984). High-autonomy individuals are more likely than others to be consistent in their attitudes, traits, and behaviors (Koestner, Bernieri, & Zuckerman, 1992), to have a positive self-evaluation (Deci & Ryan, 1985a), and to involve themselves in activities related to self-chosen goals (Sheldon & Kasser, 1995). In social interaction, autonomous individuals tend to be more honest and disclose more personal information than less autonomous individuals (Hodgins, Koestner, & Duncan, 1996). High-autonomy individuals are persistent in both laboratory tasks (Koestner & Zuckerman, 1994) and academic work (Vallerand & Bissonnette, 1992). They are also more likely to succeed in dieting (Williams, Grow, Freedman, Ryan, & Deci, 1996) when compared to their low-autonomy counterparts.

Control orientation has been associated with variables that indicate negative emotions, a concern for external contingencies (e.g., rewards, pressure, social demands), a susceptibility to internally controlling thoughts (e.g., I should do this; I would feel worthless if I fail this task), and failure in goal attainment. For instance, control orientation is related to feelings of distress, guilt, and hostility in laboratory tasks (Ryan, 1982; Ryan, Connell, Plant, Robinson, & Evans, 1985). High-control people are more likely than others to exhibit the type A behavior pattern—a focus on pressure, tension, and aggressive achievement (Deci & Ryan, 1985a). They

are high on public self-consciousness (Deci & Ryan, 1985a) and self-monitoring (Zuckerman, Gioioso, & Tellini, 1988). Control orientation is associated with a preference for extrinsic rewards. Individuals high on control prefer image-based as opposed to quality-based advertisements; image-based advertisements emphasize the extrinsic rewards of using a product (Zuckerman et al., 1988). High-control individuals also have a tendency to engage in personal striving for extrinsic reasons (Sheldon & Kasser, 1995) and to hold financial success as a central aspiration in life (Kasser & Ryan, 1993). Such an aspiration is negatively related to psychological well-being and mental health (Kasser & Ryan, 1993). High-control individuals are more likely than others to show an inconsistency among their attitudes, traits, and behaviors (Koestner et al., 1992). Moreover, college students who are high on control tend to perform worse on examinations than do low-control students (Deci & Ryan, 1985a).

The present study extends past findings by examining the relations among causality orientations, academic experience, academic commitment, and academic performance. At present, three issues have not been adequately studied. First, although several studies have provided information about how causality orientations are related to experience and behavior, most of the studies (with a few exceptions, such as Hodgins et al., 1996) used experimental measures and one-time questionnaires to assess the dependent variables. Although these measures certainly have some advantages, there are several disadvantages as well. Experience and behavior measured in laboratories may be different from that of real life (e.g., Miller, 1987; Shaughnessy & Zechmeister, 1994). And one-time, nonexperimental measures, such as questionnaires, rely too much on people's memory and judgment and thus may not accurately represent what happens in everyday life (e.g., Larson & Csikszentmihalyi, 1983; Wheeler & Reis, 1991). An instrument that allows for repeated measurements of experience and behavior in natural settings, such as the one used in the present study, may provide additional information that cannot otherwise be obtained.

A second issue that has been ignored concerns the relation between causality orientations and academic performance. Past studies seemed to overlook two important problems—the confounding effect of academic aptitude on outcome variables and the fact that academic performance has many dimensions. Some studies (e.g., Deci & Ryan, 1985a) showed a positive relationship between autonomy and academic performance. However, high-autonomy students may have more aptitude than others. Unless academic aptitude is controlled for, it would be difficult to ascertain the real effect of causality orientations on academic performance.

Moreover, most researchers have used grades (e.g., a course grade or grade point average [GPA]) as the sole indicator of academic performance. Although grades are certainly a valid indicator of achievement, there are other important dimensions of academic performance. Consider students who opt for taking advanced-level courses. The possibility of earning an excellent grade in these courses is lower than when entry-level courses in the same subject area are taken. However, there is also a chance to learn more and become more knowledgeable in a particular subject. Next, consider students who take courses only to earn good grades. Their grades may be excellent but they often know less than students who opt for advanced courses. Course choices frequently indicate interest and eagerness to learn. If a student is not interested in a topic, then he or she may be satisfied with just fulfilling the minimum course requirements. Course levels also reflect academic achievement—advanced courses usually cannot be taken unless lower-level courses are successfully completed. In this study, both grades and course levels were used as achievement indicators. In addition, information about academic commitment, which might affect achievement in the long run, was gathered.

A third issue that deserves more study is whether gender moderates the relations among causality orientations, experience, and behavior. At least two sets of independent questions can be asked regarding gender differences in causality orientations: (a) Do men and women differ in the strength of their autonomy and control orientations? For instance, are women less autonomous than men? Are men generally more controlling than women? and (b) Do men and women differ with respect to how autonomy and control affect their experiences and behavior? For instance, do high-autonomy men and women behave the same way in everyday life? Do high-control men act differently from high-control women? Plenty of information has been gathered regarding the first set of questions but very little is known about the second set.

Gender differences in causality orientations have been reported in a number of studies. In a study that validated the GCOS, for example, gender differences were found (Deci & Ryan, 1985a). Men were significantly higher on control than were women, whereas women were significantly higher on autonomy than were men. Similar gender differences were reported when the GCOS was administered to respondents in Canada and Norway. Female college students who completed the French version of the GCOS in Canada scored higher on autonomy than did male college students (Vallerand et al., 1987). Norwegian high school girls were higher in autonomy orientation than were their male counterparts, who scored higher in control orientation (Martinsen,

1993). Instruments measuring perceived causality orientations in specific domains have shown similar gender differences (e.g., academic work: Vallerand & Bissonnette, 1992; Vallerand et al., 1989, 1992; gambling: Chantal et al., 1994; interpersonal relations: Blais et al., 1995; sports: Pelletier et al., 1995).

However, there is no systematic research on whether and how causality orientations may affect the two sexes differently. Research on agency and communion suggests that such gender differences may exist. Bakan (1966) used the terms *agency* and *communion* to refer to two broad organizing principles of life. Agency refers to one's existence as an individual and focuses on the self and the forming of separations. Communion refers to one's participation in a larger whole and focuses on others and the forming of connections. The agentic tendency involves self-assertiveness, self-direction, and self-expansion. The communal tendency involves a concern for others' welfare and a sensitivity to interpersonal matters. Although men and women may display both agency and communion, studies have generally shown that men are more agentic and women are more communal (Eagly, 1987; Feingold, 1994; Helgeson, 1994; Spence, 1984). Such differences may be related to gender-role expectations or to the development of skills as a result of occupying certain social roles, such as caretakers or decision makers (Eagly, 1987; Eagly & Wood, 1991).

Gender differences in agency and communion may affect how high-control men and women behave in everyday life. For instance, although all high-control individuals organize their behavior with respect to internal imperatives or external expectations, a communal tendency among high-control women may lead them to do things that are important to others but not to themselves. They may try to please others to the exclusion of their own needs. In contrast, an agentic tendency may lead high-control men to engage in activities that are considered important to others yet still allow a high level of perceived control. They fulfill certain social expectations but also enjoy a sense of control. In contrast, gender differences in agency and communion may not affect the behavior of high-autonomy men and women. These individuals organize their behavior according to their own interests and goals and may therefore be less subject to the influence of gender-role expectations.

The present study had two goals. First, I systematically examined the relations among causality orientations, academic experience, academic performance, and academic commitment. Second, I tried to ascertain whether gender and aptitude moderated such relations. I tested three hypotheses. First, I expected academic experience to correlate positively with autonomy and negatively with control. Second, I expected high-control girls to have negative experiences because they might focus on doing

things that were important to others but not to themselves, which would be consistent with a communal orientation. In contrast, high-control boys were not expected to have many negative experiences because they might focus on doing what was important to others while maintaining a high level of perceived control, which would be consistent with the agency dimension. Third, I expected that after controlling for the effects of aptitude, autonomy would have a positive and control a negative relation with both academic performance and academic commitment.

METHOD

Participants

This study was part of a 4-year longitudinal study designed to understand the roots of success and failure among talented teenagers (Csikszentmihalyi, Rathunde, & Whalen, 1993). Teachers from two suburban high schools in Chicago were asked to nominate freshmen and sophomore students who had talents in one or more of the following areas: mathematics, science, music, athletics, and art; 505 nominations were made. Of those students who were nominated, 208 agreed to participate and completed all the questionnaires in the first phase of data collection. Students who participated in the study had excellent grades in their talent area(s). Science and mathematics students were taking honors-level courses in their areas when they were nominated. These courses were at least 1 year more advanced than normal courses. Music students participated in at least one auditioned vocal or instrumental ensemble. Most of the athletes and art students participated in talent development programs offered by their schools. The majority of students who took part in the study were Caucasians from middle-class families. The data for this study came from 161 (70 male, 91 female) students who completed the GCOS and filled out the Experience Sampling Forms (ESF) for 1 week.

Measures

Autonomy and control orientations. Autonomy and control orientations were measured by the GCOS (Deci & Ryan, 1985a; for a revised version, see Ryan, 1989). The GCOS consists of 12 vignettes and 36 items. Each vignette describes a social or achievement situation (e.g., relating to a friend or failing an examination), followed by three items. One item measures the autonomy, another the control, and a third the impersonal orientation. Each item is rated on a 7-point scale. The total score for each orientation is obtained by summing up responses to the 12 items for that orientation, with higher scores indicating a stronger orientation. For the

purpose of this study, scores for the impersonal orientation were not used.

The reliability and validity of the GCOS have been demonstrated (see Deci & Ryan, 1985a)—Cronbach's alphas are .74 for autonomy and .69 for control; test-retest coefficients throughout a 2-month period are .75 for autonomy and .71 for control. In this study, Cronbach's alphas were .75 for autonomy and .59 for control. The Guttman split-half coefficients were .75 for autonomy and .61 for control. The GCOS also correlates with a number of theoretically related personality constructs (Deci & Ryan, 1985a).

Quality of academic experience. Information concerning experiences in everyday life was collected using the Experience Sampling Method (ESM) (Csikszentmihalyi, Larson, & Prescott, 1977; Larson & Csikszentmihalyi, 1983; also see Tennen, Suls, & Affleck, 1991, for information about different techniques used in the self-recording of everyday events), which allows for the repeated measurement of activities, thoughts, and experiences in a natural environment. The reliability and validity of the ESM have been demonstrated in a number of studies (Csikszentmihalyi & Larson, 1987). In this study, students were asked to carry an electronic pager for 7 consecutive days and to answer questions on the ESF whenever they were signaled. Seven to nine random signals were sent to students daily (between 7:00 a.m. and 10:00 p.m. on weekdays and 7:00 a.m. to midnight during weekends).

The responses analyzed here were given by students who filled out at least 15 ESFs in 1 week. Only those forms completed within 30 minutes after the signal were included (this information was indicated on the ESF); 6,193 valid responses were returned. The analyses in this article focused on the 2,144 schoolwork responses. The average number of observations per student was 13.32 (SD = 5.03, range = 3 to 25). These were selected from responses given to the following question: "What was the main thing that you were doing?" School-related activities (e.g., attending a class, doing homework, studying, preparing for an examination, etc.) were then chosen for analyses.

To analyze the respondents' experiences, I selected two sets of variables. The first set, which focused on perceived choice and the perceived importance of an activity, enabled me to examine the degree to which students behaved autonomously in everyday life (see Wong, 1993, for a more detailed discussion). The second set of variables, which involved activation, cognitive efficiency, perceived competence, perceived control, and percentage of flow, provided information about different dimensions of academic experiences (Csikszentmihalyi, 1990, 1993; Csikszentmihalyi & Csikszentmihalyi, 1988; Csikszentmihalyi & Larson, 1984).

In the first set of variables, perceived choice was measured by the following question: "Why were you doing this particular activity?" Students were asked to choose among the following three categories: "I had to do it," "I wanted to do it," and "I had nothing else to do." More than one choice could be selected. The percentage of time that respondents selected "I wanted to do it" (alone or together with other answers) was calculated (range of possible scores: 0%-100%). Perceived importance of an activity to oneself was measured by the item "Was this activity important to you?" Perceived importance of an activity to others was measured by the item "Was this activity important to others?" For both items, students recorded their responses on a 10-point rating scale ranging from 0 (*not at all*) to 9 (*very*).

In the second set of variables, activation was measured using the mean of four 7-point semantic differential items—alert-drowsy, active-passive, strong-weak, and excited-bored. Responses were recorded on 7-point scales. A high score implied a high level of alertness, activity, strength, and excitement efficiency (range of possible scores: 1-7). Cognitive efficiency was the mean of four items—concentration ("How well were you concentrating?"), ease of concentration ("Was it hard to concentrate?"), non-self-consciousness ("How self-conscious were you?"), and having a clear mind (a semantic differential item: clear-confused). Responses on the first three items were recorded on 10-point rating scales ranging from 0 (*not at all*) to 9 (*very*). Responses for "having a clear mind" were made on a 7-point rating scale ranging from 1 (*very confused*) to 7 (*very clear*). A high score indicated a high level of cognitive efficiency (range of possible scores: .25-8.5). Perceived control was measured by one item: "Were you in control of the situation?" Again, responses were made on a 10-point rating scale ranging from 0 (*not at all*) to 9 (*very*), with a higher score indicating a higher level of perceived control. Perceived competence was the mean of three items: satisfaction with one's performance ("Were you satisfied with your performance?"), living up to one's own expectations ("Did you live up to your own expectations?"), and living up to others' expectations ("Did you live up to the expectations of others?"). All responses were recorded on a 10-point rating scale ranging from 0 (*not at all*) to 9 (*very*). A higher score suggests better self-esteem (range of possible scores: 0-9). The percentage of flow (Csikszentmihalyi, 1990, 1993) was measured by two items: "challenge of the activity" and "your skills in the activity." Responses to these items were made on 10-point scales ranging from low to high. To calculate the percentage of flow, perceived challenge and skill were first standardized using the sample mean and standard deviation. Flow is operationally defined as a state in which the z scores of challenge and skill are in the top 25%.[1] Flow responses were coded as 1 and other nonflow responses were coded as 0. The percentage of flow (range of possible scores: 0%-100%) was then calculated for each student.

Academic performance (academic rank). Academic rank was derived from students' GPA (A = 4, B = 3, C = 2, D = 1, E = 0). School administrators ranked students by their GPA. Academic rank was then calculated as rank in class divided by class size, expressed as a percentage (e.g., an academic rank of 15% means that the student is in the top 15% of his or her class).

Academic commitment (percentage of time studying and course level). Percentage of time studying was computed by dividing the number of studying and homework responses by the total number of responses (range of possible scores: 0%-100%). Course level in each talent area was ranked by a separate scale. To determine how far students had progressed in their talent areas, a separate scale of difficulty was created for each area (for more details, see Csikszentmihalyi et al., 1993, pp. 270-274).[2] These scales were developed in consultation with the teachers of participants in this study. Initial versions of the scales were shown to teachers, who were asked to make any changes they deemed necessary. Score assignment was straightforward and required no subjective judgment. Scores could range from 0 to 11 (mathematics: 0-11, science: 0-10, music: 0-10, athletics: 0-11, art: 0-8). The higher the score, the more advanced was the course. Because the range of scores was different for each subject, scores were standardized before analyses were performed.

Academic aptitude. Aptitude was measured using Preliminary Scholastic Achievement Test (PSAT) scores. This widely used test consists of two sections: mathematics and verbal. The PSAT is similar to the Scholastic Achievement Test but is designed for high school sophomores and juniors. The total score for the PSAT score was obtained by adding the mathematics and verbal scores.

Procedure

As stated earlier, the data for this study came from a 4-year longitudinal study. During the 1st year, the research staff recruited students who were nominated by their teachers to participate in the study. Letters explaining the purpose of the study were sent to the nominated students and their parents. They were told that the study was designed to understand the activities, thoughts, and subjective experiences of adolescents. They also were assured that any information obtained would be kept confidential.

About 2 months after parental consent was obtained, each student who agreed to participate was scheduled to have a meeting with the research staff. During this meeting, the procedures of the study (e.g., how to use the pager) were discussed. To ensure that students understood all instructions, they were asked to fill out a sample ESF and were encouraged to ask questions. A background questionnaire concerning demographic information was also completed by the students at this time.

After the initial meeting, students were asked to carry pagers and fill out the ESF whenever they were signaled during 7 consecutive days. All paging took place in the 8 months that followed the initial meeting. After completing a week of ESFs, students were asked to meet with one research team member. During that meeting, students were debriefed and asked to describe any problems they had while completing the ESFs. When students failed to respond to signals, it was mostly because of random forgetfulness, malfunctioning pagers, or signal failures. The majority of respondents felt that their ESF responses were representative of their usual experience, and they did not feel that carrying the pager altered their experience in any important ways.

Approximately 1 ½ years after the ESF data were collected, information on the GCOS (Deci & Ryan, 1985a) and teacher ratings were collected. In addition, grades and course information were gathered every year during the study.

Analysis Plan

Hierarchical multiple regression analyses were performed to examine (a) how autonomy and control affected experience, performance, and commitment; and (b) whether the effects of autonomy and control on the dependent variables were moderated by gender (see Bissonnette, Ickes, Bernstein, & Knowles, 1990, for a discussion of statistical techniques used to study moderating variables). Preliminary analyses suggested that aptitude was a significant predictor only for academic performance and one aspect of academic commitment (i.e., course level in mathematics and science courses). Including aptitude in all analyses lowered the *N* substantially (e.g., using pairwise deletion, *N* dropped from 161 to 131 in the prediction of experiential variables). Therefore, aptitude was only included in the analyses when its effect was statistically significant. In the hierarchical regression analyses, aptitude (if included) was entered in the model first, followed by all the main effects of autonomy, control, and gender. Finally, three two-way interaction effects (Autonomy × Control, Autonomy × Gender, and Control × Gender) were entered in the model. These interactions were included because I was interested in whether gender (0 = male, 1 = female) moderated the effects of autonomy and control as well as whether autonomy and control interacted with one another.

All of the variables were standardized. The interaction terms were then created by multiplying the relevant independent variables with one another. Aiken and West (1991) have shown that this procedure is critical for an appropriate standardized solution with interaction terms involving continuous variables.

RESULTS

The means and standard deviations of all variables are presented in Table 1. There was a significant gender difference in autonomy orientation. Consistent with past studies, girls scored significantly higher on autonomy than did boys, $t(159) = -2.73$, $p < .01$. No gender difference in control orientation was found, $t(159) = -.30$, *ns.* The correlation between autonomy and control orientations was insignificant for all respondents, boys: $r(70) = .17$, *ns*; girls: $r(91) = .12$, *ns.*

Causality Orientations
and Academic Experience

The results for academic experience are summarized in Table 2.

Perceived choice and perceived importance. The only variable that predicted choice (i.e., percentage of time wanting to do schoolwork) was the Control × Sex interaction. The negative interaction effect suggested that among girls, control was associated with a low level of perceived choice. No such association was observed in boys, as is indicated by the insignificant main effect of control.

Autonomy was positively related to the perceived importance of schoolwork to self (IS). High-autonomy students often engaged in activities that were important to themselves. Control was positively related to perceived importance of schoolwork to others (IO). High-control students tended to involve themselves in activities considered important to others.

Preliminary analyses showed that IS and IO were significantly correlated, $r(161) = .48$, $p < .001$. In addition to examining both IS and IO as separate dependent variables, I also analyzed them simultaneously. Multivariate regression with IS, IO, and the IS × IO interaction as the dependent variables and control, gender, and the Control × Gender interaction as the independent variables were computed (see Jobson, 1992; Johnson & Wichern, 1998, for a discussion of multivariate regression). The results are presented in the following paragraph.

Both control (Wilks's lambda = .95), $F(3, 155) = 2.77$, $p < .05$, and the Control × Gender interaction (Wilks's lambda = .95), $F(3, 155) = 2.84$, $p < .05$, significantly predicted the dependent variables. Univariate tests showed

TABLE 1:   Means and Standard Deviations of All Variables

	All			Male			Female		
Variable	M	SD	n	M	SD	n	M	SD	n
GCOS autonomy	66.83	7.59	161	65.00	7.29	70	68.23	7.56	91
GCOS control	44.19	7.57	161	43.99	7.49	70	44.35	7.67	91
Gender (0 = male, 1 = female)	0.57	0.49	161	0.00	0.00	70	1.00	0.00	91
Choice	27.88	19.98	161	27.46	20.51	70	8.20	19.67	91
Importance to self	5.19	1.49	161	5.09	1.34	70	5.27	1.60	91
Importance to others	5.80	1.56	161	5.63	1.49	70	5.63	1.49	70
Activation	4.30	0.66	161	4.30	0.66	70	4.31	0.66	91
Cognitive efficiency	5.35	0.86	161	5.38	0.87	70	5.33	0.87	91
Perceived control	5.43	1.42	161	5.37	1.22	70	5.48	1.57	91
Perceived competence	5.87	1.18	161	5.89	1.14	70	5.85	1.21	91
Percentage of flow	4.18	13.37	161	4.56	15.40	70	3.89	11.66	91
Academic rank (1st year)	16.93	16.64	137	17.92	16.56	55	16.27	16.76	82
Academic rank (2nd year)	17.93	18.01	159	18.35	18.46	68	17.63	17.76	91
Academic rank (3rd year)	17.52	17.81	137	18.13	19.03	59	17.06	16.95	78
Academic rank (4th year)	15.80	16.88	114	15.78	18.17	46	15.81	16.09	68
Percentage of studying	11.46	7.73	161	10.94	8.09	70	11.87	7.46	91
Course level									
All areas	0.24	0.84	134	0.23	0.87	58	0.25	0.82	76
Mathematics and science	0.33	0.89	62	0.52	0.71	28	0.18	1.01	34
Music, athletics, and art	0.16	0.79	72	−0.01	0.94	30	0.30	0.65	42
Aptitude	102.90	17.73	134	106.09	18.81	54	100.75	16.74	80

NOTE: GCOS = General Causality Orientations Scale.

TABLE 2:   Summary of Multiple Regression Analysis for Variables Predicting Academic Experience

	Choice	Importance to Self	Importance to Others	Activation	Cognitive Efficiency	Perceived Control	Perceived Competence	Percentage Flow
Step variables								
1. Autonomy (A)	.06	.19***	.03	.10	.24***	.16**	.21***	.19**
	(0.75)	(2.63)	(0.38)	(1.21)	(3.09)	(2.01)	(2.67)	(2.19)
Control (B)	−.10	.06	.24***	.16**	−.08	.02	.01	.08
	(−1.35)	(0.80)	(3.14)	(2.10)	(−1.00)	(0.21)	(0.14)	(0.91)
Gender (C)	.02	.02	.08	−.01	−.08	.00	−.06	−.07
	(0.26)	(0.23)	(1.04)	(−0.17)	(−1.05)	(0.02)	(−0.81)	(−0.80)
R^2	.02	.05*	.07***	.04*	.06**	.03	.05*	.04*
2. A × B	.05	.08	.02	.10	.11	.08	.04	.08
	(0.64)	(1.01)	(0.26)	(1.27)	(1.40)	(1.08)	(0.49)	(0.93)
A × C	.05	.04	.01	−.06	.01	.11	.02	−.01
	(0.67)	(0.54)	(0.12)	(−0.73)	(0.12)	(1.44)	(0.22)	(−0.10)
B × C	−.13*	−.12	.09	−.04	−.17**	−.17**	−.16**	.04
	(−1.75)	(−1.59)	(1.10)	(0.58)	(−2.19)	(−2.15)	(−2.03)	(0.45)
R^2	.04	.07	.08	.06	.10**	.07*	.07*	.05
R^2 change	.02	.02	.01	.02	.04**	.04*	.02*	.01

NOTE: The first number in each cell is the β; the number in parentheses is the *t* value. The tests for R^2 examined the amount of variance explained by all the variables in each step. However, when some of the variables were insignificant, these tests sometimes became insignificant even though individual variables were significant.
*$p < .1$. **$p < .05$. ***$p < .01$.

that control was positively related to IO (as mentioned in the previous paragraph), whereas the Control × Gender interaction was related to the IS × IO interaction. Using the procedures described in Aiken and West (1991), the relation between IO and control was estimated across low (1 *SD* below the mean), middle (the mean), and high critical values (1 *SD* above the mean) of IS separately for the two sexes. For girls, control was positively related to IO at low (β = .32, *p* < .001) or moderate levels (β = .16, *p* < .05) of IS. No such relation was observed at

high levels (β = .00, *ns*) of IS. For boys, control was related to IO only at high levels (β = .23, *p* < .1) but not at low (β = −.16, *ns*) and moderate levels (β = .04, *ns*) of IS. These results suggested that high-control girls spent more time doing things that were regarded as important to others but not to themselves. High-control boys did the opposite. They tended to be involved in activities considered important to both themselves and others.

Activation, cognitive efficiency, perceived control, perceived competence, and percentage of flow. Autonomy orientation was positively related to cognitive efficiency, perceived control, perceived competence, and percentage of time experiencing flow while doing schoolwork. When compared to low-autonomy students, high-autonomy students more often concentrated well, felt they were in control, believed that they were competent, and perceived schoolwork as presenting challenges that matched their skills.

In contrast, control orientation was positively related to activation. When compared to low-control students, high-control students were more alert and active while doing schoolwork. The Control × Gender interaction was significant and negative for cognitive efficiency, perceived competence, and perceived control. The negative interaction suggested that high-control girls concentrated less well and felt less competent and less in control than low-control girls. This association was not observed among boys, as was suggested by the insignificant main effect of control.

Summary. The results partially supported my first hypothesis. Autonomy was positively related to academic experience. However, the relation between control and academic experience was not as strong as expected. The results supported my second hypothesis. High-control girls, but not high-control boys, reported negative experience while doing schoolwork.

Causality Orientations,
Academic Performance,
and Academic Commitment

The results for academic performance and academic commitment are summarized in Table 3.

Performance—academic rank. After controlling for aptitude, control orientation had a significantly positive relation with the 2nd-, 3rd-, and 4th-years' academic rank and a marginally significant positive relation with the 1st-year academic rank. Because an academic rank of 1% means that a student is in the top 1% of his or her class, a higher rank means poorer performance. Therefore, holding aptitude constant, students high on control performed worse than did those low on control. The Control × Gender interaction had a significant relation with

the 1st-year rank. After controlling for aptitude, there was a positive association between control and academic rank among girls. No such association was observed for boys. Autonomy was not related to academic rank. The main effect of autonomy and its interactions with all the other variables was insignificant.

Commitment—percentage of time doing schoolwork. The analysis showed that the Control × Gender interaction was a significant predictor of percentage of time doing schoolwork. The interaction effect was negative, implying that high-control girls spent less time on schoolwork than did low-control girls. This difference did not exist among boys, as was indicated by the insignificant main effect of control.

Commitment—level of courses in talent areas. Previous research suggested that different factors affect involvement in academic-oriented courses, such as mathematics and science, as opposed to nonacademic courses, such as music, athletics, and art. Therefore, separate analyses were computed for (a) mathematics and science and (b) music, athletics, and art. After controlling for PSAT, only the Control × Gender interaction significantly predicted course level in mathematics and science. The negative interaction suggested that high-control girls tended to take less advanced courses than did low-control girls. No such relation was observed among boys, as was indicated by the insignificant main effect of control.

Because PSAT was not a significant predictor for course level in music, athletics, and art, and leaving it in the model lowered the *N*, PSAT was dropped from the analyses. The main effect of control was significantly negative: high-control students tended to take less advanced courses in music, athletics, and art. Moreover, control also interacted with autonomy to affect course level. Following the procedure described in Aiken and West (1991), the relations between control and course level were estimated at low (1 *SD* below the mean), moderate (the mean), and high (1 *SD* above the mean) critical values of autonomy. The effects of control were significantly negative at both low (β = −.36, *p* < .01) and moderate (β = −.19, *p* < .05) autonomy levels. However, control was insignificant at high levels of autonomy (β = −.01, *ns*). Students with a high level of control and a low or moderate level of autonomy tended to choose lower-level courses. However, the negative impact of control on course level disappeared when autonomy was high. Students who were high on both control and autonomy were no more likely than others to pick lower-level courses.

Summary. The results partially supported my third hypothesis. After controlling for aptitude, control orientation was negatively related to academic performance

TABLE 3:   **Summary of Multiple Regression Analysis for Variables Predicting Academic Performance and Academic Commitment**

Step variables	1st Year Rank	2nd Year Rank	3rd Year Rank	4th Year Rank	Percentage Studying	Course Level Math and Science	Course Level Music, Art, and Athletics
1. Aptitude	−.36****	−.44****	−.41****	−.42****	—	.39**	—
	(−5.23)	(−6.62)	(−5.91)	(−5.60)	—	(2.62)	—
R^2	.18****	.24****	.24****	.22****	—	.10***	—
R^2 change	.18****	.24****	.24****	.22****	—	.10***	—
2. Autonomy (A)	−.07	−.03	−.06	−.05	.09	.03	.11
	(−1.14)	(−.054)	(−0.99)	(−0.74)	(1.14)	(0.30)	(1.20)
Control (B)	.12*	.15**	.16***	.23***	−.09	−.05	−.19**
	(1.87)	(2.43)	(2.58)	(2.72)	(−1.17)	(−0.04)	(−2.13)
Gender (C)	−.08	−.07	−.06	−.07	.04	−.13	.17*
	(−1.23)	(−0.96)	(−0.97)	(−0.91)	(0.47)	(−1.05)	(1.86)
R^2	.22****	.30****	.30****	.29****	.02	.12	.12**
R^2 change	.04*	.06**	.06**	.07**	.02	.02	.12**
3. A × B	−.08	.02	−.02	−.02	.06	.07	.18**
	(−1.07)	(0.32)	(−0.26)	(−0.31)	(0.68)	(0.60)	(2.06)
A × C	−.06	−.08	−.07	−.10	−.02	.17	−.07
	(−0.90)	(−1.15)	(−1.03)	(−1.36)	(−0.23)	(1.61)	(−0.71)
B × C	.14**	.05	.05	.04	−.16**	−.39***	.06
	(1.97)	(0.68)	(0.74)	(0.49)	(−1.97)	(−2.99)	(0.62)
R^2	.25****	.31****	.30****	.30****	.05	.27**	.19**
R^2 change	.03	.01	.00	.01	.03	.15**	.07

NOTE: The first number in each cell is the β; the number in parentheses is the t value. The tests for R^2 and R^2 change examined the amount of variance explained by all the variables in each step. However, when some of the variables were insignificant, these tests sometimes became insignificant even though individual variables were significant.
*$p < .1$. **$p < .05$. ***$p < .01$. ****$p < .001$.

and commitment. However, the relations between autonomy and academic performance and between autonomy and academic commitment were relatively weak.

DISCUSSION

This study examined the relations among causality orientations, academic experience, academic performance, and academic commitment in a group of talented adolescents. The role of gender in moderating such relations also was investigated.

Consistent with my first hypothesis, autonomy was positively related to academic experience. Autonomous students more often engaged in academic activities regarded as important to themselves, suggesting that high-autonomy students regulate their behavior based on personal needs and goals (Deci, 1980; Deci & Ryan, 1985a, 1985b, 1987). While doing schoolwork, they maintained a higher level of cognitive efficiency and felt more competent and in control than did students lower on autonomy. They were also more likely to experience flow, a psychological state of deep enjoyment and personal fulfillment (Csikszentmihalyi, 1990, 1993). Such positive experience was probably related to their focus on activities important to themselves.

In contrast, high-control students more often engaged in academic activities that they regarded as important to others. This lends further support to self-determination theory, which suggests that controlling individuals organize their behavior with respect to sources of reward in the environment or internally controlling imperatives. The heightened awareness of the importance of schoolwork for others probably led to a high level of activation among high-control students, making them alert and active. However, the main effect of control did not have a strong effect on experience. Instead, control often interacted with gender to affect academic experience.

Consistent with my second hypothesis, high-control girls had more negative experiences than did high-control boys. When compared to their low-control counterparts, high-control girls tended to engage in academic activities that were considered as important to others but not to themselves. Such a pattern did not exist among male students. This gender difference has been replicated in a study of social interaction on a sample of college students (Wong, 1995). Thus, girls high on control were inclined to please others and forgo things that were important to themselves, which appeared to have a negative impact on their experiences and academic work. In this study, high-control girls reported a low level

of choice, cognitive efficiency, perceived control, and perceived competence while doing schoolwork. They also devoted less time to studying and tended to have lower academic rankings during the 1st year of high school.

The differences between high-control boys and girls seem consistent with the widely reported gender differences regarding agency and communion. Numerous studies (Eagly, 1987; Feingold, 1994; Helgeson, 1994; Spence, 1984) suggest that men and women in the United States are different on the agency-communion continuum, with men more likely to be high on agency and women more likely to be high on communion. This difference seemed to interact with control orientation to affect experience and behavior. High-control students behaved with respect to internal imperatives or external expectations, as was indicated by their strong tendency to do things that were important to others. Yet, such tendency manifested itself differently for the two sexes. Being other-focused and sensitive to interpersonal matters (i.e., communal), high-control girls complied with the demands of their environment, doing things that pleased others but not themselves. Feeling alienated from what they did, their experiences were negative. Being self-focused and assertive (i.e., agentic), high-control boys concentrated their effort on activities that were important to both themselves and others. Although high-control boys did not report much negative experience in academic work, it remains to be seen whether they experienced negative emotions in other activities.

The findings on academic performance and academic commitment partially supported my third hypothesis. Control had a negative effect on almost all performance and commitment variables. In contrast, autonomy was only related to one aspect of commitment, that is, course level in music, athletics, and art.

After controlling for aptitude, control was positively related to academic rank (i.e., poor performance). A focus on internal imperatives (e.g., I won't be satisfied with my performance unless I get an A) or external rewards for performing well may have kept controlling individuals from devoting all their attention to school material and led to a decrease in academic interest and curiosity, all of which could adversely affect grades.

Both autonomy and control seemed to affect academic commitment. Control interacted with gender to affect percentage of time studying and course level in mathematics and science. When compared to high-control boys, high-control girls spent less time studying and took less advanced courses in mathematics and science. As mentioned earlier, this might be an outcome of their negative experience while doing schoolwork.

Course level in music, art, and athletics was influenced by both autonomy and control. When autonomy was low, control had a negative relation with course levels. When autonomy was high, the negative relation between control and course levels disappeared. Students who were low on autonomy but high on control might have decided to do just the minimum to fulfill certain academic requirements. However, among students who were relatively high on control and autonomy, a focus on external contingencies (a characteristic of control orientation) did not necessarily have a negative impact on course levels. Being aware of their choices and goals (a characteristic of autonomy orientation) might have led them to consider pursuing higher-level courses.

This finding reveals an interesting theoretical issue. Although it seems intuitive to regard autonomy and control as two ends of a continuum, it is important to point out that the GCOS was designed to measure the strength of both autonomy and control orientations. Everyone is assumed to be autonomous to a certain extent and control-oriented to a certain extent. Thus, a high score on one orientation does not necessarily mean a low score on the other. Individuals can score relatively high on both orientations. This study shows how autonomy and control can interact to affect academic outcomes and underscores the importance of understanding the role of that interaction in other behaviors.

A major limitation of this study concerns the timing of data collection regarding the GCOS and the ESFs. Ideally, both should be collected at around the same time. However, in this study, GCOS data were collected about 1 ½ years after ESM data were collected. Thus, the relations I observed between causality orientations and experience should be interpreted with caution. Although there is evidence that the GCOS is a reliable measure for periods up to 2 months, it is not known whether GCOS scores are stable beyond this time. Because the ESM data were collected before the GCOS data, the relation between the two might be affected by factors not included in this study, such as a significant event (e.g., drug use, divorce of parents) that altered students' causality orientations. However, I believe that these problems had little impact on my results for two reasons. First, the GCOS was designed to measure enduring personality characteristics. Although it is possible for causality orientations to change over time, it is unlikely that they will change dramatically in a period of 1 to 2 years. Second, my findings were consistent with self-determination theory. It is unclear whether the relations among causality orientations, experience, and performance might be different or stronger than the results reported here if both GCOS and ESM data were collected simultaneously. Only future research can address such a concern.

The fact that all participants in this study were talented may raise concerns about the generalizability of the findings. A comparison between this sample and a

normal adolescent sample revealed some differences in types of activities and quality of experiences (Csikszentmihalyi et al., 1993). For instance, this sample spent more time in academic activities. Moreover, their experience while doing these activities was less negative than that of the normal sample. These characteristics may lead one to wonder whether my findings on academic experience and performance are generalizable. Although it is important to keep in mind the special characteristics of my sample, I believe that my findings are applicable to the general adolescent population. There were many similarities between my sample and a normal adolescent sample (Csikszentmihalyi et al., 1993). For instance, both samples felt significantly worse while engaging in schoolwork and significantly better while socializing. Moreover, my findings involving gender differences in autonomy (girls scored higher on autonomy than boys) and the lack of correlation between autonomy and control orientations were consistent with those of other research using an adolescent sample (e.g., Martinsen, 1993). Therefore, I think my sample is more similar to than different from other samples of adolescents.

The major contributions of this study are threefold. First, this is one of the few studies that examines the relation between causality orientations and day-to-day experience doing schoolwork. Second, this study shows how control orientation and gender interact to affect day-to-day experiences. Past research has not systematically examined that interaction. Third, this study analyzes the relation between causality orientations and academic performance while controlling for aptitude. Such control was absent in most previous studies.

Finally, I would like to add a few words about future research. This study, as well as many others that examine causality orientations, relied heavily on the GCOS. It would be interesting to develop other measures of causality orientation that provide information not available from this measure. For instance, the ESM may be an interesting way to measure autonomy in day-to-day activities (Wong, 1993). This method allows researchers to study autonomy in different domains of life simultaneously. The interview method provides yet another way to study autonomy and control orientations. It allows researchers to understand more about the reasoning underlying certain behaviors. Such information is usually not available in one-time questionnaire measures or from the ESM, which consists mainly of questions requesting specific responses.

The present study was an attempt to examine the relations among causality orientations, academic experience, academic commitment, and academic performance. There are still many questions left to be answered.

This study has answered some and revealed others that need to be addressed.

NOTES

1. There are different ways to compute the percentages of flow, apathy, boredom, and anxiety. A more detailed discussion of the matter can be found in chapters 3 and 11 of Csikszentmihalyi, Rathunde, and Whalen (1993).

2. These scales were developed by Sam Whalen, a member of the research team working on the project.

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