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ORIGINAL ARTICLE

Variations of Cognitive Distortions and School Performance in Depressed and Non-Depressed High School Adolescents: A Two-Year Longitudinal Study

Diane Marcotte · Nadia Lévesque · Laurier Fortin

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Abstract The goal of this two-year longitudinal study was to examine the variations of cognitive distortions with depressive symptoms in a sample of high school students. The relationship between depressive symptoms and academic performance was also examined. Six hundred and forty-four participants, from 13 to 16 years of age ($M = 14.13$, $SD = 0.80$) at Time 1 completed the *Beck Depression Inventory*, the *Dysfunctional Attitudes Scale*, the *Cognitive Style Test* and the *Cognition Checklist* during regular classes. Grades in mathematics and French were obtained from students' records. Results revealed that although depressive boys seemed to adopt very high levels of cognitive distortions in comparison with other groups, the variations of cognitive distortions in relationship to depressive symptoms were detected more clearly for girls than boys. For girls, significant changes in cognitive distortions were present both for the subgroups who became depressed as well as for the subgroup who remitted from depression between Time 1 and Time 3. Results regarding academic performance were less consistent, with adolescents who remained depressed for the study's three testing points seeming to be the group whose academic performance was most impaired.

Keywords Adolescence · Depression · Cognitions · High school · Academic performance

During the last fifteen years, several studies have reported high rates of depressive symptoms in adolescent high school populations (Angold, 1988; Fleming & Offord, 1990; Kovacs et al., 1984; Petersen et al., 1993; Wichstrom, 1999). Among the short-term consequences of a depressive episode during adolescence are impaired school performance, peer isolation, and the tragic consequences associated with suicidal behaviors. On a long-term basis, the presence of a depressive episode during adolescence represents a major risk for the occurrence of a second

D. Marcotte (✉) · N. Lévesque
Psychology Department, University of Québec in Montréal,
C.P. 8888, Succ. Centre-Ville, Montréal, Québec, Canada, H3C 3P8
e-mail: marcotte.diane@uqam.ca

L. Fortin
University of Sherbrooke,
Canada

episode later in adolescence or at the beginning of adult life. Kandel and Davies (1986) found a consistency of depressive symptoms between the ages of 15 and 24. The first episode of depression takes place most often around 12–13 years of age if a family history of depression is present and around 16–17 years of age in other cases (Kovacs et al., 1984).

The prevalence of depressive symptoms in the adolescent population remains difficult to assess precisely. The heterogeneity of samples (general or clinical populations) as well as the diversity of assessment measures used to evaluate depressive symptoms limit comparisons between studies. In the present study, the term depression is used in reference to the presence of a high number of depressive symptoms as assessed by cutoff criteria on a self-evaluative measure, the *Beck Depression Inventory (BDI)*. The prevalence of this depressive syndrome in young people has been estimated between 10 and 30% by Hammen and Rudolph (2003) while the presence of a depressive mood has been found in 20–35% of boys and 25–40% of girls by Petersen et al. (1993). In Quebec, where the present study was conducted, we found a prevalence rate of about 15% for adolescents who exceeded the cutoff score on the BDI (Marcotte, 1996; Marcotte & Baron, 1993). On the other hand, when a diagnostic of a major depressive episode was assessed, rates between 5 and 9% were reported (Birmaher, Ryan, Williamson, Breant, & Kaufman, 1996; Fleming & Offord, 1990). During adolescence, a difference emerges between boys and girls in terms of prevalence rates, with girls presenting higher rates than boys. The onset of this higher depression rate for girls during adolescence, which is maintained during adulthood, emphasizes the importance of this developmental period during which factors leading to the onset of depression should be examined. Although many researchers have reported this gender difference, few have studied correlates associated with the emergence of that difference.

The cognitive model of depression

The cognitive model of depression is a model of depression etiology that has been the focus of a large body of empirical research (Clark, Beck, & Alford, 1999; Ingram, Miranda, & Segal, 1998). In Beck's cognitive theory, depressive disorder is explained in terms of depressogenic thinking schemata. The depressed individual's negative view of the him or herself, of the future, and of the world is called "the cognitive triad". Many studies have applied the cognitive model to the adult population and confirmed the presence of higher rates of cognitive distortions in depressed individuals. In the present study, Beck's model was applied to an adolescent population from a school setting. This model focuses on the role of cognitive mediation and explains depression by the existence of dysfunctional cognitive schemata. These biased cognitive schemata are developed during negative early experiences. They are conceptualized as stable structures that are activated by the presence of stressful events. Self-schemas are also conceptualized as organized representations of an individual's prior experiences (Ingram, Miranda, & Segal, 1998). These cognitive schemata produce different types of cognitive errors that are reflected in the pessimistic self-talk of the depressed individual.

Some studies have reported the presence of cognitive distortions in clinical samples of depressed adolescents. In their studies, Haley, Fine, Marriage, Moretti, and Freeman (1985) and Marton, Churchard, and Kutcher (1993) found a higher level of cognitive distortions in samples of depressive adolescents when compared to a non-depressed adolescent control group. Thurber, Crow, Thurber, and Woffington (1990) have identified a negative expectation toward the future as especially related to depression in a sample of hospitalized adolescents. In a comparative study of control, non-depressed psychiatric and depressed psychiatric samples of 12–17 year old adolescents, Kauth and Zettle (1990) also found a difference between the depressed and non-depressed groups on two measures of cognitive distortions. Finally, in a study conducted by Tems et al. (1993) with a sample of adolescents, although a significant decrease of depressive

symptoms was present following treatment, the decrease of cognitive errors that accompanied the remission of depression did not reach a statistically significant level. However, the small number of participants and the very short time interval are important limits of that study.

The presence of cognitive distortions in populations of depressed high school adolescents has rarely been explored in the literature, and neither has the relationship between academic functioning and depressive symptoms. Impaired academic functioning has often been reported as a consequence of depression but has rarely the main focus of the studies. Dalley, Bolocofsky, Alcorn, and Baker (1992) found that learning disabled students differed from the students in regular classes on depressive symptomatology. These students also exhibited a depressive attributional style and had more dysfunctional attitudes, as measured by the DAS. They also perceived themselves and were perceived by their teachers as less socially competent. On the other hand, the presence of different categories of irrational beliefs in relation to depressive symptoms was examined by Marcotte (1996) in a sample of 11 to 18 year old high school adolescents. Two types of irrational beliefs—a stronger tendency to dramatize situations and a lower frustration tolerance–differentiated the high and low depressive groups on the two measures of depressive symptoms used. Another category of irrational beliefs, the "self-directed should", showed an increase in the depressive group on one of the two measures of depression, reflecting a tendency of depressive adolescents to make unrealistic demands on themselves. In a study exploring the developmental aspect of depressogenic thinking, Garber, Weiss, and Shanley (1993) studied the progression of depressive cognitions in a sample of high school students in grades 7 through 12. Here again, positive correlations were observed between depression and negative automatic thoughts and dysfunctional attitudes on all three measures utilized. On the other hand, while scores on depression increase with age, a regression analysis revealed no change with age in the relationship between depressive modes of thinking and symptoms of depression. As well, no change occurred with age in cognitive distortions, suggesting that at this age, depressogenic thinking had already been developed. These results support the sensitivity and specificity criteria of the cognitive model (Ingram, Miranda, & Segal, 1998) which suggests that depressive cognitions should be present in depressive individuals and should be more present in depressive than control groups of individuals in order to consider cognition as a marker of vulnerability for depression. However, the stability of depressive cognition remains to be demonstrated with younger populations. In order to test that criterion, longitudinal designs are required to verify if the biased depressive cognitions remain present, although not always easy to assess, once the depressive symptoms have remitted. Very few studies have examined the variations of cognitive distortions on a longitudinal basis and most often, with the exception of the studies of Nolen-Hoeksema and Girgus (1994) and Marton et al. (1993), these studies were conducted with adult populations. In Marton et al.'s study, the remission of the depressive episode was associated with a decrease in cognitive distortions measured by the DAS, but nevertheless remained higher than seen in the normal never depressed adolescent group. Similar results were obtained by Nolen-Hoeksema and Girgus (1994). In their study, although depressed and non-depressed groups of third grade students did not differ before the onset of depression, the depressed group continued to demonstrate a more depressive attributive style after the remission of depressive symptoms. These results suggest that depressive cognitive distortions would play a role as a vulnerability factor in the recurrence of depression, and may support the stability hypothesis of the cognitive model. These results also differ from the ones reported with adult populations suggesting that depressive cognitions decrease with the remission of depressive symptoms and would be more state dependent rather than a personality trait (Clark, Beck, & Alford, 1999; Ingram, Miranda, & Segal, 1998).

Depressive symptoms and academic performance

The association between depression and academic performance rarely has been addressed directly in the literature. Traditionally, it is the impact of learning and conduct disorders that have been associated with a lower performance and a higher risk of school dropout. A few studies reported that depressive symptoms were associated with academic difficulties and lower performance (Chen, Rubin, & Bo-shu, 1995; Cheung, 1995). As mentioned earlier, Dalley et al. (1992) reported a higher level of depressive symptoms in students with learning difficulties. Lewinsohn, Gotlib, and Seeley (1995) found that dissatisfaction toward academic performance predicted the onset of depression and substance abuse. However, Kellam, Rebok, Mayer, Ialongo, and Kalodner (1994) reported that depressive symptoms in children predicted a lower academic performance for both genders, but a low academic performance predicted depressive symptoms for girls only. In the same perspective, Chen et al. (1995), found that a decline in academic performance was associated with a depressed affect, but that academic difficulties were predictive of later depression only for children from families in which the mother was rejecting and when a conflictual marital relationship was present. Depression was also associated with dropping out of school (Franklin & Streeter, 1992). These authors suggest that the presence of a depressive disorder would be a distinctive characteristic of dropouts who come from a higher socioeconomic background and who have had a good academic performance (Franklin & Streeter, 1995). In an eleven-year longitudinal study currently in progress in Canada (Fortin et al., 2004), we observed that depressive symptoms were the first variable predicting the risk of school dropout in a sample of 12- to 13-year-old students. In summary, although the association between academic performance and depression is beginning to be explored, more research is needed to determine the relationship between school difficulties and depression. At this point, we don't know if the depressive symptoms are the consequence of academic difficulties or if they preceded the decline in academic performance.

The goal of the present study was to examine variations of three measures of cognitive distortions in relation to depressive symptoms over an interval of two years. The association between depressive symptoms and academic performance is also examined. Because of the few longitudinal studies conducted with children and adolescent samples and because of the state-dependent status of depressive cognitions reported in studies conducted with adults, it is difficult at this point to suggest the hypotheses that, after the remission of depressive symptoms, cognitive distortions will remain at a higher level in depressed adolescents in comparison with never depressed students or if they will return to levels comparable to never depressed students. This study explored these variations over an interval of two years.

Method

Participants

The 644 white, French-speaking adolescents who participated in the present study were 13 to 16 years of age ($M = 14.13$ years, $SD = .80$; 303 boys and 341 girls; Grades 8 and 9) at Time 1, attending two high schools located in an upper middle class, urban, community in Quebec, Canada. All participants volunteered to enroll in the study. Participants, as well as parents of participants when they were younger than 14 years of age, signed consent forms prior to completing the questionnaires. Questionnaires were completed during regular class time.

Four groups of participants were formed based on changes to the BDI scores between Time 1 and Time 3 of the study and following the criteria proposed by Barrera and Garrison-Jones (1988) (0–9 for non-depressed and 16 and higher for depressed). The Control Group (C) included

students who were not depressed at Time 1 and Time 3 of the study; the Became Depressed group (BD) included those who became depressed by Time 3 but were not at Time 1; the Remitted Group (R) included students who became non-depressed by Time 3 but were depressed at Time 1; and finally the students of the Depressed group (D) were depressed at both Time 1 and 3 of the study.

Dependent measures

Beck depression inventory (BDI)

The severity of depressive symptoms was assessed by the French version of the BDI (Beck, 1978; Bourque & Beaudette, 1982). The BDI is a well-known self-report measure of depressive symptoms, consisting of 21 items assessing the severity of affective, behavioral, cognitive and somatic symptoms of depression. Each item is scored on a three-point scale. Total scores, obtained by adding the items, range between 0 and 63. The validity of this measure for use with adolescents has been confirmed (Barrera & Garrison-Jones, 1988; Strober, Green, & Carlson, 1981; Teri, 1982). A sensitivity of 100% and a specificity of 93.2% were obtained with a cutoff score of 16 in the selection of a sub sample which is comparable to the clinical population. An internal consistency coefficient of .88 was obtained in the present study.

Dysfunctional attitudes scale (DAS; Weissman & Beck, 1978)

A French version of the new version of the DAS (Power et al., 1994) was used. The DAS measures depressogenic attitudes and beliefs. This 24-items measure includes three subscales measuring three vulnerability factors: achievement ("People will probably think less of me if I make a mistake"), self-control ("I should always have complete control over my feelings") and dependency ("My happiness depends more on other people than it does on me"). Items are rated on a seven-point scale, ranging from totally agree (1) to totally disagree (7). Higher scores indicates that the respondent endorses more maladaptive beliefs. This measure has good internal consistency ranging from .68 for the self-control subscale, .74 for the dependency subscale to .85 for the achievement subscale.

Cognitive style test (CST)

A French version of the "Cognitive Style Test" (Blackburn, Jones, & Lewin, 1986) was used. Thirty short descriptions of everyday events are presented to the respondent who chooses one of four possible cognitive responses to the situation. The events are classified into three themes which relate to Beck's cognitive triad of self (events of an interpersonal nature, related to the self-image), world (situations which are more task orientated) and future (dealing with anticipated responses and plans) (Williams, 1992). A higher score represents a higher degree of depressive distortions as defined by Beck, including arbitrary inference, selective abstraction, overgeneralization, magnification, minimization, personalization. However, these categories are not systematically assessed. Some of the wording was redefined to adapt it to the life context of adolescents. The validity and reliability of the CST have been found to be satisfactory (Williams, 1992).

Table 1 Loading Results of the Eigth Variables on the Two Components Computed by the factor Analysis

	Factor 1	Factor 2
Self-control		.822
Achievement		.778
Dependency	.398	.435
CST-Future	.701	
CST-World	.697	
CST- Self	.770	
Anxious self-statements	.754	
Depressive self-statements	.813	
% of variance	39.72	17.28

Cognitions checklist. (CCL)

A French version of the "Cognition Checklist" (Beck, Brown, Eidelson, Steer, & Riskind, 1987) was used to assess the frequency of automatic thoughts. The CCL includes two subscales, one assessing the automatic thoughts related to depression (14 items) and the other assessing the automatic thoughts related to anxiety (12 items). The frequency of the occurrence of each automatic thought is assessed on a 5-point scale ranging from 0 (never) to 4 (always). The CCL presents a test-retest reliability of .79 and a good discriminate validity. Internal consistency coefficients obtained with a francophone adolescent sample were .85 for the anxiety subscale, .89 for the depression subscale and .93 for the total (Marcotte, 1996).

Academic performance

Grades in French and mathematics were obtained from the schools' records.

Procedure

The participants completed all questionnaires during a regular class. The general purpose of the study was explained to them by two trained research assistants, and informed consent forms were distributed. The questionnaires took approximately 50 minutes to complete.

Results

Gender differences and changes with time on depressive symptoms

Using the cutoff point of sixteen on the BDI, nineteen percent of participants ($n = 124$; 11.3% ($n = 34$) boys and 26.71% ($n = 90$) girls) were experiencing depressive symptoms at the beginning of the study. Preliminary analyses (ANOVA with repeated measures) were done in order to analyze the gender differences and changes over time on depression. They revealed that girls experienced more depressive symptoms than boys at each of the three times of the study (Time 1: $F = 40.43$; $p < .001$; Time 2: $F = 33.97$; $p < .001$; Time 3: $F = 16.76$; $p < .001$). Girls also reported fewer depressive symptoms over time ($F = 15.92$; $p < .001$) while boys did not change with time.

Table 2 Means (sample sizes) and Standard Deviations for Cognitive Distortions and Academic Performance at the Three Times of the Study for of Each Group and Gender (with the Exception of Mathematics for which no Significant Gender Difference was Observed)

Variable	Group	*N* (Boy/Girl)	Time 1		Time 2		Time 3	
			Boy	Girl	Boy	Girl	Boy	Girl
Factor 1	C	155/124	57.2 (10.3)	55.6 (11.5)	57.1 (8.4)	56.8 (7.6)	55.3 (7.4)	56.3 (7.7)
	BD	10/12	65.7 (7.6)	58.1 (8.8)	58.4 (9.3)	66.4 (14.0)	70.6 (10.1)	67.0 (10.2)
	R	9/31	61.7 (9.8)	70.9 (9.5)	60.6 (10.1)	62.8 (11.6)	56.7 (7.0)	59.1 (10.9)
	D	4/20	85.2 (14.7)	68.2 (17.4)	82.3 (22.6)	70.4 (10.6)	78.3 (14.4)	68.7 (6.6)
Factor 2	C	154/124	62.5 (10.6)	56.3 (10.8)	60.3 (11.5)	54.0 (11.5)	59.8 (10.2)	53.2 (11.4)
	BD	10/11	67.4 (11.3)	55.7 (11.2)	65.7 (13.8)	62.7 (13.7)	65.2 (10.6)	69.6 (13.5)
	R	9/31	67.2 (10.9)	58.9 (13.9)	61.6 (11.3)	57.7 (12.6)	63.4 (13.2)	56.7 (11.2)
	D	4/21	73.3 (15.5)	54.8 (10.8)	79.3 (5.3)	56.6 (9.6)	72.5 (15.3)	57.6 (7.2)
Dependency	C	154/124	28.0 (7.3)	28.7 (7.2)	27.4 (7.4)	28.6 (7.1)	25.8 (6.7)	27.6 (6.9)
	BD	9/8	31.6 (8.4)	30.0 (5.2)	30.7 (6.5)	34.6 (6.8)	32.0 (7.5)	38.9 (4.7)
	R	8/28	31.8 (6.4)	33.4 (9.5)	30.4 (4.9)	29.0 (7.5)	26.9 (6.5)	28.0 (6.8)
	D	4/15	38.3 (3.9)	30.3 (9.2)	33.5 (14.2)	33.9 (5.7)	37.3 (6.6)	35.0 (5.3)
French	C	(157/124)	71.8 (10.0)	77.9 (9.1)	72.6 (10.6)	78.1 (9.6)	70.5 (10.3)	77.6 (9.7)
	BD	(8/9)	71.3 (9.9)	76.1 (7.4)	64.8 (17.5)	75.6 (6.9)	68.0 (11.2)	76.2 (11.2)
	R	(9/31)	69.1 (11.9)	74.2 (9.3)	73.0 (7.6)	74.8 (9.4)	71.4 (8.7)	75.0 (9.3)
	D	(5/15)	66.2 (2.6)	78.4 (9.6)	62.6 (11.7)	75.7 (9.8)	61.4 (11.1)	73.3 (10.5)
Mathematic	C	(283)	74.8 (12.2)	71.0 (13.9)	66.8 (14.2)			
	BD	(17)	71.5 (7.5)	64.4 (11.0)	62.5 (14.3)			
	R	(40)	69.7 (11.9)	69.4 (12.6)	63.9 (11.9)			
	D	(20)	69.6 (12.5)	67.0 (8.5)	59.0 (12.1)			

Variations of cognitive distortions and academic performance with depressive symptoms

As a first step, a factor analysis was performed in order to reduce the number of cognitive variables involved in the study. A factor analysis with varimax rotation was performed with the eight subscales of the three measures of cognitive distortions (achievement, dependency, self-control, self, world and future subscales of the CST, and depressive and anxious self-statements). The loading of each variable obtained by that analysis is presented in Table 1. Two factors were extracted from that analysis. The first factor comprises five subscales (anxious and depressive self-statements; self, future and world subscales of the CST) while the second factor includes two variables (achievement and self-control subscales of the DAS). Because the dependency subscale of the DAS loaded on both factors with an similar weight, we decided to withdraw this variable from both factors and to treat it separately, as a single variable. Mean and standard deviations obtained from boys and girls of the four groups on these new cognitive variables and on academic performance are presented in Table 2.

The main objective of the present study was to examine the variations of cognitive distortions in one part, and academic performance in an other part, with depressive symptoms. ANOVAS with repeated measures (2 genders $\times$ 4 groups $\times$ 3 times) were computed to analyze the differences between the four groups using data collected at the three times of the study. The two factors obtained by the factors analysis and the dependency subscale of the DAS, as a single variable, were used as dependent variables. The same statistical procedure was utilized to examine grades in mathematics and French. The results of these analyses are presented in Table 3.

Table 3 Result of the ANOVA with Repeated Measures Over the Three Times of the Study for Cognitive Distortions and Academic Performance

		Variation	SS	df	MS	F
Factor 1	Between	Group	1661.2	3	5537.1	38.1***
		Gender	166.4	1	166.4	1.2
		Group × gender	1839.8	3	613.3	4.2**
	Within	Time	171.3	2	85.6	2.6
		Time × group	1858.7	6	309.8	9.5***
		Time × gender	124.2	2	62.1	1.9
		Time × group × gender	1006.6	6	167.7	5.1***
		error	21987.1	674	32.6	
Factor 2	Between	Group	6182.5	3	2060.8	7.8***
		Gender	4747.9	1	4747.9	18.0***
		Group × gender	1353.2	3	451.5	1.7
	Within	Time	9.9	2	5.0	0.1
		Time × group	1236.7	6	206.1	3.5**
		Time × gender	483.7	2	241.8	4.2*
		Time × group × gender	949.9	6	158.3	2.7*
		error	39485.9	684	57.7	
Dependency	Between	Group	3168.6	3	1056.2	10.2***
		Gender	9.5	1	9.5	0.1
		Group × gender	241.7	3	80.6	0.8
	Within	Time	12.3	2	6.2	0.2
		Time × group	601.8	6	100.3	4.0**
		Time × gender	162.6	2	81.3	3.2*
		Time × group × gender	247.6	6	41.3	1.6
		error	17229.0	684	25.2	
French	Between	Group	1587.1	3	529.0	2.2
		Gender	4112.7	1	4112.7	17.1***
		Group × gender	618.2	3	206.1	0.9
	Within	Time	106.7	2	53.3	2.0
		Time × group	380.8	6	63.5	2.3*
		Time × gender	7.9	2	4.0	0.2
		Time × group × gender	135.5	6	22.6	0.8
		error	19035.4	700	27.2	
Mathematic	Between	Group	4338.1	3	1446.0	4.1**
		Gender	786.7	1	786.1	2.2
		Group × gender	512.6	3	170.9	0.5
	Within	Time	3347.5	2	1673.7	20.2***
		Time × group	511.9	6	85.3	1.0
		Time × gender	82.3	2	41.2	0.5
		Time × group × gender	344.5	6	57.4	0.7
		error	58446.1	704	83.0	

Factor 1

A main effects of group, an interaction effect of group by gender, and a time by group by gender interaction were detected in Factor 1. As illustrated by Figs. 1 and 2, results revealed different trajectories for boys and girls. Between groups differences were detected for boys at the three times of the study (Time 1: $F(3,178) = 11.26$, $p < .001$; Time 2: $F(3,178) = 10.57$, $p < .001$; Time 3 $(3,178) = 23.58$, $p < .001$). The D group of boys demonstrated a higher level

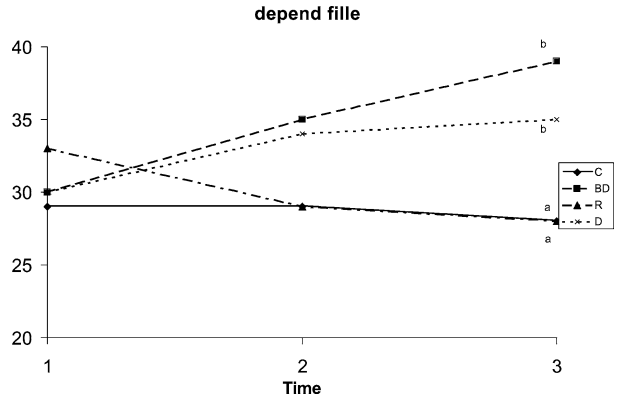

Fig. 1 Results of ANOVA with repeated measures on dependency for girls

of cognitive distortions and distinguished itself from all other groups, except the BD group at Time 3. However, these results must be interpreted cautiously because of the small sample size for the depressed group of boys. Results of planned comparisons also confirmed that the BD group of boys changed between Time 1 and Time 3 ($F(2,11) = 0.86$, $p < .001$). Finally, it is interesting to note that the C group of boys also reported a decrease of cognitive distortions with time ($F(2,455) = 4.35$, $p < .05$).

For girls, between groups differences were also detected at the three times of the study (Time 1: $F(3,187) = 15.64, p < .001$; Time 2: $F(3,187) = 12.98, p < .001$; Time 3 $(3,187) = 13.02, p < .001$). As illustrated in Fig. 2, the R group changed with time ($F(2,92) = 10.10$, $p < .001$). This group obtained a high level of cognitive distortions, similar to the D group at Time 1, while this level became similar to the control group at Time 3 of the study. On the other hand, the BD group reported a similar level of cognitive distortions as the control group at Time 1, and a similar level as the D group at Time 3 of the study. It is also interesting to observe that the D group reported a higher level of cognitive distortions than the C group at the three times of the study.

Factor 2

Main effects of group and gender were detected, as well as a group by time interaction. Less important but significant time by gender and time by group by gender interactions were also detected. Again, the girls' and boys' trajectories appeared to be different. Boys' groups were

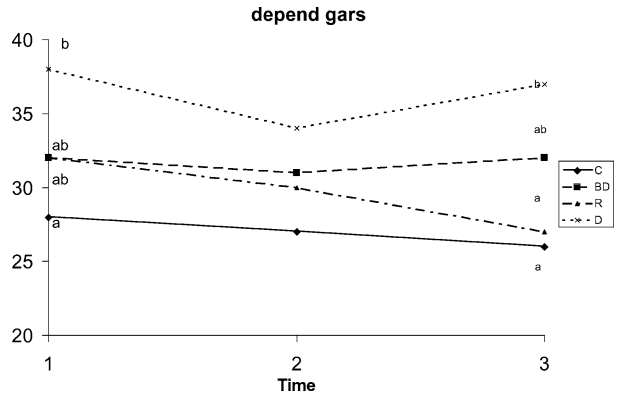

Fig. 2 Results of ANOVA with repeated measures on dependency for boys

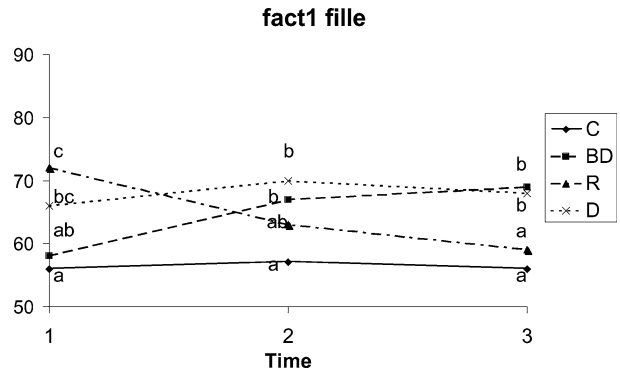

Fig. 3 Results of ANOVA with repeated measures on factor 1 for girls

different on this factor at Time 1 and Time 2 (Time 1: $F(3,177) = 2.82$, $p < .05$; Time 2: $F(3,177) = 4.51$, $p < .01$) and girls' groups were different at Time 2 and Time 3 (Time 2: $F(3,187) = 2.84$, $p < .05$; Time 3 (3,187) = 9.54, $p < .001$). As can be seen in Fig. 3, although the D group of boys obtained higher scores than other groups, no significant change with time for any groups was noticeable. On the other hand, for girls, it is possible to observe a significant change with time for the BD group ($F(2,32) = 4.19$, $p < .05$); this group adopted a level of cognitive distortions similar to the other groups at Time 1 and moved toward a higher level of depressive distortions than all other groups at Time 3 [Fig. 4].

Dependency

A main effect of group and interaction effects of group by time and gender by time were obtained on that measure of cognitive distortions. Between groups differences were present at Time 1 and Time 3 for boys (Time 1: $F(3,175) = 3.71$, $p < .01$; Time 3: $F(3,175) = 5.96$, $p < .001$) and at the three times of the study for girls (Time 1: $F(3,185) = 2.85$, $p < .05$; Time 2: $F(3,177) = 4.22$, $p < .01$; Time 3: $F(3,185) = 11.70$, $p < .05$). For boys, only the C group decreased with time ($F(2,461) = 3.89$, $p < .05$) but it is important to note again that the D group obtained higher scores than the C group. For girls, things seemed to be different with significant changes being present for the BD ($F(2,23) = 4.98$, $p < .05$) and R ($F(2,83) = 3.60$, $p < .05$) groups [Figs. 5 and 6].

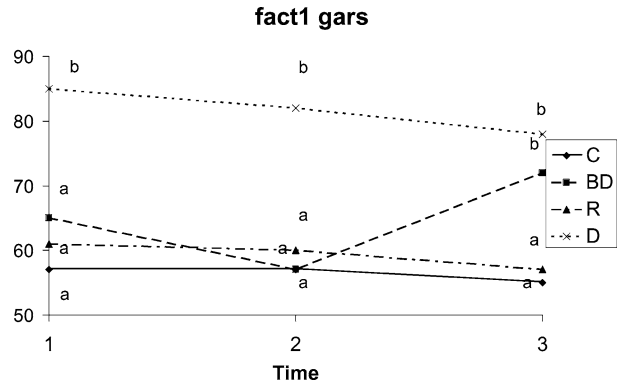

Fig. 4 Results of ANOVA with repeated measures on factor 1 for boys

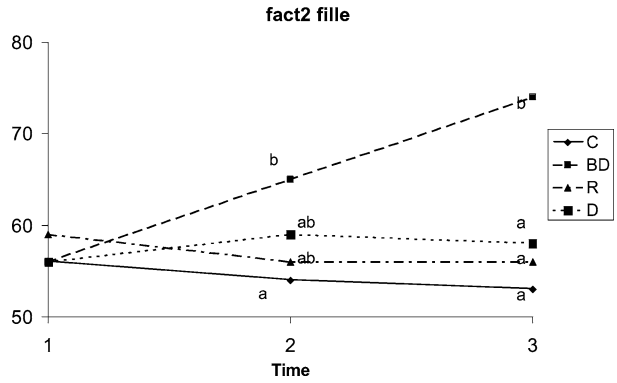

Fig. 5 Results of ANOVA with repeated measures on factor 2 for girls

Academic performance

A gender effect revealed that girls obtained higher grades than boys in French and an interaction effect of group by time indicated that groups changed in a different manner with time. Although an examination of means seem to indicate that the D group of boys obtained lower grades at the three times of the study and that the D group of girls experienced the most important decrease in their performance, the results of planned comparison did not confirm these changes. Regarding the changes on grades in mathematics, no differences between genders were detected and, the C and D groups were the ones who presented a significant decline of grades with time.

Discussion

One of the main objectives of the present study was to examine the stability of cognitive distortions in relation to depressive symptoms over an interval of two years. A second objective was to explore the association between academic performance and depressive symptoms. Although some previous studies have supported the presence of cognitive bias in depressive adolescent populations (Dalley, Bolocofsky, Alcorn, & Baker, 1992; Kauth & Zettle, 1990; Thurber, Crow, Thurber, & Woffington, 1990), the variations of depressive cognitions rarely have been examined with a longitudinal design. In the present study, we verified, on one hand, if the adolescent boys and girls who became depressed over an interval of two years increased their adherence

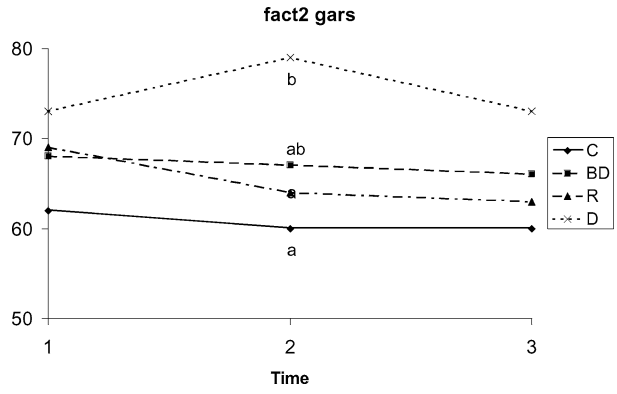

Fig. 6 Results of ANOVA with repeated measures on factor 2 for boys

to cognitive distortions during the same time interval. On the other hand, the decrease in this cognitive bias was also tested in the subsamples of boys and girls who were depressed at the beginning of the study and not depressed two years later. We also verified if the performance in French and mathematics changed with the onset and the remission of depressive symptoms.

Variations of cognitive distortions and depressive symptoms

In the present study, several variations of cognitive distortions in relation to depressive symptoms over a two year interval were observed. Although those variations were present for both genders, they were much more present for girls than boys. For the first factor, which included essentially the subscales of the CCL and the CST, both genders reported higher levels of these types of cognitive distortions as they became depressed. Moreover, girls also reported a decrease in cognitive distortions with remission of their depressive symptoms. These results seem to indicate a state-dependent status for these kinds of cognitive distortions which are represented by the CCL and the CST. It is possible to think that these measures assessed cognitive distortions which were more on the surface and thus changed more easily with depressive symptoms, at least for girls, than the cognitive distortions measured by the DAS.

Gender differences were particularly apparent on the second factor and on dependency, which regrouped essentially the subscales of the DAS. Our results revealed the presence of variations of these depressive distortions with depressive symptoms for girls but not for boys. Girls who became depressed between the Time 1 and Time 3 of the study increased their biased cognitions about all three components of the DAS–achievement, self-control and dependency. Moreover, when they went into remission, girls reported a decrease in their beliefs about dependency. These results support the results that were obtained with adult populations in which variations in depressive cognitions were observed more frequently in women than in men (Barnett & Gotlib, 1990).

On the other hand, the results of the present study were different than the ones reported by the few longitudinal studies conducted with adolescents regarding the stability of depressive cognitions. Although the means obtained by remitted groups were always higher, but not statistically significant, than the ones of the control never depressed groups, we did not observe a higher level of depressive cognitions in remitted adolescents than in the control group as reported by other studies conducted with adolescents and children (Marton, Churchard, & Kutcher, 1993; Nolen-Hoeksema & Girgus, 1994). Neither did we observed at Time 1 significantly higher levels of cognitive distortions in the groups who became depressed than in control group. This difference would have reflected a cognitive vulnerability already present before they became depressed. In this sense, these results also point to a state-dependent conceptualization of the cognitive distortions, for girls, rather than a personality trait. Results for boys were less consistent. Finally, it is interesting to note the high levels of depressive cognitions obtained by the group of boys who remained depressed throughout the three times of the study. A characteristic of these long term depressed boys seems to be that they endorsed very high levels of depressive cognitions, higher than other groups and higher than girls, and that they maintained it for the three times of the study.

Variations of academic performance and depressive symptoms

The results on these variables are more difficult to interpret. The variations of depressive symptoms in the groups who were not depressed or who became depressed were not accompanied by variations in academic performance. However, the adolescents who were depressed at the three times of the study experienced a decline in their performance in mathematics. Although

the adolescents in the control group also presented a decline, the decrease in performance by the depressed adolescents appeared to be more accentuated.

Limits of the study

A number of limitations of the present study must be acknowledged. Although the sample size of the present study was important, the small number of boys who remained depressed for the two years of the study limits the interpretation of the results for this subgroup of adolescents as mentioned earlier. The question of the stability of cognitive distortions will also need to be explored again in further studies to differentiate the types of depressive cognitive processes which are more state-dependent or more permanent (i.e. a personality trait.) This aspect of the Beck's theory should also be explored with a research design that includes a priming procedure as described by Ingram et al. (1998). In this procedure, a negative mood is induced in vulnerable individuals before registering the level of depressive cognitions. The results of the present study should also be replicated among a clinical sample to examine differences in the role of cognitive distortions between clinical samples and school samples. Also, one of the limits of this study was certainly the use of a self-reported measure of depressive symptoms rather than a clinical diagnosis of major depression.

Conclusion

The results of the present study suggest a need to explore more precisely if cognitive distortions should be viewed as being more state-dependent for girls and a more stable or enduring trait-like characteristic for boys. Our results also suggest that different types of cognitive distortions could be more stable while others would vary with the presence of depressive symptoms and that these differences are present between genders. Our findings are similar to the conclusions of Haaga et al. (1991) who suggested that, although a large number of studies supported the finding that depressive cognitions are state-dependent, some studies found elevated scores in remitted patients. Clark et al. (1999) suggest that research is needed to determine the existence of specific cognitive distortions as a vulnerability factor that persist beyond the depressive episode.

Another important avenue for future research will be to explore the stability of cognitive distortions in relationship to the presence of stressful events for both genders. The influence of normative stressful events characteristic of adolescence at the onset of puberty, for example the transition from primary to high school and the beginning of romantic relationships, could interact with the presence of cognitive distortions and could have a different influence for girls and boys. Examining these relationships would also permit the application of some of the vulnerability hypotheses of the cognitive model of depression in adolescent populations.

Finally, the links between academic performance and depressive symptoms needs to be explored more precisely in future studies. Although depressed adolescents obtained lower scores on academic performance than non depressed adolescents, our results did not allow us to support the finding that variations of depressive symptoms are accompanied by changes in academic performance.

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