

Depressive Symptoms, Socio-Economic Background, Sense of Control, and Cultural Factors in University Students from 23 Countries

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We measured depressive symptoms with the Beck Depression Inventory in 17,348 university students from 23 high-, middle-, and low-income countries, and assessed associations with individual level and ecological level factors using multi-level random effects regression modelling. Wide variations in depressive symptoms were observed between countries, with lower levels in Western and Southern Europe and South and North America, intermediate levels in Central and Eastern Europe, and higher levels in Pacific-Asian samples. Poorer socio-economic background and low sense of control were associated with depressive symptoms within each country. Independently of individual level effects, higher depressive symptoms were recorded in countries with greater income inequality and with less individualistic cultures. Personal circumstances, beliefs, and cultural factors may all contribute to depressive symptoms in this population.

Key words: depression, students, socio-economic status, income inequality, control, individualism

Poor mental health contributes substantially to the global burden of disease, and it has been estimated that by 2020, depression will be the most common cause of disability worldwide (Murray & Lopez, 1996). There are large international variations in the level of clinical and subclinical depression, and the explanations for these are poorly understood (Ballenger et al., 2001). Comparisons of levels of mental distress assessed with different instruments can be misleading, so a number of international studies of depression and depressive

symptoms using standardized measures are in progress (Alonso et al., 2004; Andrade et al., 2003; Angst et al., 2002; Demyttenaere et al., 2004; Simon, Goldberg, Von Korff, & Ustun, 2002).

Depression is a significant issue in young people. The problem has been highlighted in university students, since depressive symptoms affect academic performance, are associated with health-compromising behaviors, and may in extreme cases contribute to suicide (Furr, Westefeld, McConnell, & Jenkins, 2001; Hysenbegasi, Hass, & Rowland, 2005; Reifman & Dunkel-Schetter, 1990). The present analysis focuses on depressive symptoms in university students assessed in 23 countries, and explores factors both at the individual and national levels that might contribute to variations in the levels of symptoms. The sample included the U.S. and countries of Western Europe, former communist countries of Central and Eastern Europe, Pacific (East) Asian states, and developing countries such as South Africa and Colombia.

International studies provide an opportunity to assess associations between depressive symptoms and social and cultural factors across a wide range of environmental and economic settings. Two variables that are associated with depression in population studies are low socio-economic status (SES) and perceived lack of control. A meta-analysis of more than 50 studies showed that depression was inversely associated with SES as defined by income or educational attainment (Lorant et al., 2003). It was concluded that the odds of reporting depression are about 1.81 times higher in people from lower rather than higher social

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positions, and similar conclusions have been drawn from narrative reviews (Muntaner, Eaton, Miech, & O'Campo, 2004). The extent to which these associations are present for subclinical levels of depressive symptoms in young adults is less certain. Additionally, most of this work has been carried out in North America and Western Europe, and there is less evidence concerning former communist, Pacific Asian, and developing countries (Bostanci et al., 2005). It is not known whether these SES variations are due to differences in socio-economic circumstances or are the effects of education. Education is an important determinant of adult SES, but may have specific effects, inculcating more effective ways of coping with life adversity (Mirowsky & Ross, 2003). In the present study, all respondents had a similar level of educational attainment, so the impact of other determinants of socio-economic position (specifically family wealth and parental education) could be investigated.

An inverse association between sense of control and depression has been observed in community studies in the U.S., Eastern Europe, and Russia (Bobak, Pikhart, Rose, Hertzman, & Marmot, 2000; Pearlin, Lieberman, Menaghan, & Mullan, 1981; Perlman, Bobak, Steptoe, Rose, & Marmot, 2003; Takakura & Sakihara, 2001). Effects in Pacific Asian countries have been less consistent (Takakura & Sakihara, 2001) and Sastry and Ross (1998) have argued that perceived control may not be so relevant in Asian cultures, because it is less valued than in Western society. Low perceived control is also characteristic of lower SES individuals, and it has been proposed that variations in perceived control mediate SES differences in depression and well-being (Lachman & Weaver, 1998). In the present analysis, we not only studied whether perceived control was related to depression across a wide range of nations, but also tested whether sense of control mediated SES effects, by determining if the association between depression and SES was reduced when sense of control was taken into account.

Multi-level modelling was used to investigate the relationship between depressive symptoms and ecological level economic and cultural factors. A positive association between national wealth and average subjective well-being has been observed in cross-national comparisons (Diener, Diener, & Diener, 1995; Diener, Oishi, & Lucas, 2003), though this association is primarily driven by the low subjective well-being of respondents in very poor countries (Diener & Biswas-Diener, 2002), since there is no consistent relationship across wealthier countries (Inglehart & Klingemann, 2000). A related factor is income inequality, and it has been argued that depression levels are higher and well-being lower in countries with wide income disparities (Wilkinson, 2005). Culturally, there has been particular interest in the dimension of individualism versus collectivism in relation to well-being (Hofstede

& McCrae, 2004; Oyserman, Coon, & Kimmelmeier, 2002). Individualistic national cultures are ones in which people primarily look after themselves and their families and emphasize personal autonomy and self-fulfillment. This is contrasted with collectivist cultures which are characterized by mutual obligations and expectations, in which people are integrated into cohesive groups and subsume personal interests into communal goals. Subjective well-being has typically been shown to be higher in individualistic societies (Veenhoven, 1998). The reason is thought to be that individualistic cultures emphasize the maintenance and enhancement of self-esteem, since personal happiness is a central goal. In collectivist cultures, the self is less important than successful execution of obligations and duties (Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997). However, the relationship across countries between individualism-collectivism and well-being is potentially confounded with economic development and national wealth which may also engender positive effects (Schyns, 1998). We therefore examined the association of depressive symptoms with individualism-collectivism when these factors were taken into account (Oyserman, Coon, & Kimmelmeier, 2002).

Much of the research on economic and cultural factors has been based on measures of subjective well-being, and these are imperfectly negatively correlated with depressive symptoms. Analyses have typically correlated aggregate country scores to investigate ecological level factors, in contrast to the individually based correlation and regression methods used to assess factors such as SES and sense of control. The present study utilized a multi-level modelling approach so that individual and ecological factors could be tested in the same analyses.

Method

The International Health and Behaviour Study (IHBS) is an anonymous questionnaire study of health behaviors, attitudes, and risk awareness in university students. The rationale is summarized by Steptoe and Wardle (1996), and results for various behaviors have been published elsewhere (Steptoe et al., 2002a, 2002b). The study was carried out with a network of collaborators in participating countries. The questionnaire used for data collection was developed in English, then translated and back-translated into 18 languages (Bulgarian, Chinese, Dutch, Flemish, French, German, Greek, Hungarian, Icelandic, Italian, Japanese, Korean, Polish, Portuguese, Romanian, Slovakian, Spanish, and Thai). Between one and three universities were sampled in each country; the universities were chosen pragmatically, but represent fairly typical public institutions in each country. Data were

Table 1. Mean Depression Ratings (Age-Adjusted)

Country	N	Men		Women	
		Mean (95% CI)	%BDI \geq 8 (95% CI)	Mean (95% CI)	%BDI \geq 8 (95% CI)
Belgium	515	2.8 (2.2 to 3.4)	8 (3 to 13)	3.2 (2.6 to 3.8)	11 (7 to 16)
Bulgaria	730	3.9 (3.4 to 4.4)	17 (13 to 21)	4.3 (3.8 to 4.8)	18 (14 to 22)
Colombia	732	3.9 (3.4 to 4.5)	14 (10 to 18)	4.0 (3.5 to 4.5)	17 (13 to 22)
England	704	4.5 (4.0 to 4.9)	18 (14 to 22)	4.3 (3.7 to 4.8)	14 (10 to 19)
France	669	4.8 (4.3 to 5.3)	18 (14 to 22)	4.3 (3.8 to 4.8)	17 (13 to 21)
Germany	690	3.2 (2.7 to 3.7)	11 (6 to 15)	3.9 (3.5 to 4.4)	15 (11 to 19)
Greece	755	4.4 (3.9 to 4.9)	17 (13 to 21)	4.3 (3.9 to 4.8)	21 (17 to 25)
Hungary	554	3.5 (2.9 to 4.2)	14 (8 to 19)	5.0 (4.5 to 5.5)	25 (21 to 29)
Ireland	415	5.7 (4.7 to 6.6)	32 (24 to 40)	6.1 (5.6 to 6.7)	29 (25 to 34)
Italy	1767	3.8 (3.4 to 4.1)	16 (13 to 19)	4.1 (3.8 to 4.4)	18 (15 to 20)
Japan	427	7.3 (6.6 to 7.9)	36 (31 to 42)	7.3 (6.7 to 7.9)	41 (35 to 46)
Korea	708	7.4 (6.8 to 8.1)	43 (38 to 48)	7.5 (7.1 to 7.9)	45 (41 to 49)
Netherlands	687	2.7 (2.1 to 3.3)	7 (3 to 12)	3.5 (3.0 to 3.9)	13 (9 to 17)
Poland	707	3.8 (3.3 to 4.4)	14 (10 to 19)	5.2 (4.7 to 5.7)	25 (21 to 29)
Portugal	883	3.6 (3.1 to 4.0)	16 (13 to 20)	3.3 (2.8 to 3.7)	12 (8 to 16)
Romania	719	4.5 (4.0 to 5.0)	18 (14 to 22)	6.1 (5.6 to 6.6)	33 (29 to 37)
Slovakia	1193	5.3 (4.9 to 5.7)	24 (21 to 28)	5.7 (5.4 to 6.1)	31 (28 to 34)
South Africa	573	7.4 (6.8 to 7.9)	36 (31 to 41)	6.4 (5.9 to 7.0)	31 (27 to 36)
Spain	483	4.3 (3.6 to 4.9)	19 (14 to 24)	4.8 (4.2 to 5.3)	23 (19 to 28)
Taiwan	351	7.9 (7.1 to 8.6)	45 (39 to 51)	7.6 (6.9 to 8.3)	42 (36 to 47)
Thailand	843	6.0 (5.5 to 6.5)	34 (30 to 38)	5.3 (4.9 to 5.7)	29 (26 to 32)
USA	1599	3.4 (3.0 to 3.8)	14 (11 to 18)	4.1 (3.8 to 4.4)	18 (15 to 20)
Venezuela	644	3.0 (2.5 to 3.5)	9 (5 to 13)	3.1 (2.6 to 3.6)	11 (7 to 15)
Total	17348	4.4 (4.2 to 4.6)	19 (17 to 21)	4.8 (4.5 to 5.0)	22 (21 to 24)

collected from students aged 17–30 years who were not studying medicine or health-related topics. A variety of students were involved, including those studying physical sciences, engineering, law, social science, languages, geography, history, and economics. The questionnaire was administered to large groups of students usually at the end of a class, so participation rates exceeded 90%. The sample size in each country varied because of time constraints or the preferences of coworkers. Students were told that the survey concerned activities related to health and that an international comparison was being carried out, but no further details were given. Twenty-three countries were involved in this analysis, with a total of 7509 men and 9839 women providing usable data.

Iceland participated in the IHBS, but was not included in this analysis, since several ecological level measures were not available. The sample in South Africa was recruited from a university with almost exclusively black students. The number of respondents in each country sample is detailed in Table 1.

Psychological Measures

The measurement of depressive symptoms across diverse countries is problematic, since depression may manifest itself differently in different cultures. Depressive symptoms in this study were assessed with the

13-item Beck Depression Inventory (BDI) (Beck & Beck, 1972), using existing language versions where available, or translated into the primary language of the country. Scores were highly skewed (kurtosis = 4.72), so for the purposes of analysis the BDI was categorized into a binary variable, using the cut-off of 8 or more to define elevated levels of depressive symptoms. Scores of ≥ 8 have been shown to correspond to clinicians' ratings of mild-to-moderate depression (Beck & Beck, 1972). The internal consistency (Cronbach α) was high in every country, ranging from .79 to .94.

Perceptions of control were assessed with six items taken from the surveys conducted by the MacArthur Foundation Network on Successful Mid-Life Development (Lachman & Weaver, 1998). Each item (e.g. "There is little I can do to change many of the important things in my life" was rated on a 5-point scale from 1 = "disagree strongly" to 5 = "agree strongly". Ratings were averaged to produce a sense of control score ranging from 1–5, with higher ratings indicating lower control. The Cronbach α for the sense of control scale was .64.

Individual socio-economic background was assessed with two measures. Firstly, participants were asked to rate their family background into wealthy (within the highest 25% in your country in terms of wealth), quite well-off (within the 50–75% range for your country), not very well-off (within the 25–50%

range for your country), or quite poor (within the lowest 25% in your country in terms of wealth). The population was subsequently divided into poorer (not very well off and quite poor) and wealthier (wealthy, quite well off) categories. Secondly, the students were asked about the education of their mothers and fathers. A division was made between respondents who had one or both parents who had only primary education, and those where both parents had attended high school or university.

Country-Level Measures

The economic prosperity of each country was indexed by the per capita gross domestic product (GDP) in US\$ for 1998. Income inequalities were assessed using a standard economic measure, the Gini coefficient (World Resources Institute, 1996). The Gini coefficient is derived from the Lorenz curve of the proportion of total income that is earned by lower income sectors of the population. It ranges from 0 = perfectly equal (everyone has the same income) to 100 = perfectly unequal (one person has all the income). Access to university education may be relevant, since in some countries there is a wider distribution of SES backgrounds of students than others. If SES background influences depressive symptoms, this might affect comparisons across country samples. We therefore analyzed data from the World Bank (2000) concerning the number of students per 100,000 inhabitants enrolled in tertiary education in each country. Individualism/collectivism was indexed using the ratings derived by Hofstede (2001) from several surveys, including questionnaires completed by more than 116,000 employees of IBM in 72 countries. Scores for individualism/collectivism are derived primarily from responses to questions related to behavior in the work environment. Individual ratings were aggregated on a national basis to generate scores for each country, with higher values indicating more individualistic cultures. These ratings have been positively associated with a number of other value classification systems, and national differences in working practices and organizational structures (Hofstede, 2001).

Statistical Analysis

The average BDI score and the proportion of respondents with high levels of depressive symptoms ($BDI \geq 8$) were calculated for men and women separately in each country. All analyses used high versus low BDI score as the dependent variable, since the continuous BDI scores were highly skewed. There was a modest negative association between depressive symptoms and age. Since country samples varied slightly in average age (range 18.8 to 22.6 years), all analyses were adjusted for age. Data on levels of depressive symptoms in each country sample are presented as mean values

and the prevalence of high levels of depressive symptoms, both with 95% confidence intervals (CI). Associations between SES measures (family wealth and parental education), sense of control, and depressive symptoms were analyzed using logistic regression adjusting for gender and age. We tested whether sense of control mediated SES effects by computing the change in odds ratios for family wealth and parental education after sense of control had been entered into the same statistical model. Country was entered as the primary sampling unit for survey analysis in STATA in order to achieve accurate confidence intervals given the clustered nature of the data. Unstandardized regression coefficients and 95% confidence intervals are presented.

Multi-level random effects logistic regression analysis on high levels of depressive symptoms ($BDI \geq 8$) was carried out. Analyses were also conducted using multi-level linear regression on continuous BDI ratings, and the results were similar to those of the logistic analysis. Preliminary checks for multi-collinearity indicated that none of the correlations between independent variables exceeded the thresholds considered problematic. There were two levels in the multi-level models, one composed of individual-level variables and the second of country-level variables. In order to ensure that odds ratios for the different factors could be compared on the same metric, standardized z scores were computed for sense of control, per capita GDP, Gini coefficient, access to tertiary education, and individualism/collectivism. All variables were entered in a single step. The model included individual-level variables (age, gender, family wealth, parental education, and sense of control), economic ecological levels factors (*per capita* GDP, Gini coefficient, and access to tertiary education), and individualism/collectivism scores. The results are presented as odds ratios for each factor adjusted for all other factors in the models and 95% confidence intervals. These analyses were carried out using STATA XT models.

Results

Prevalence of Depressive Symptoms

Age-adjusted mean depression scores for the 23 country samples are summarized in Table 1. The overall averages were 4.4 for men and 4.8 for women. Differences between countries were highly significant ($p \ll .0001$), with the highest levels being recorded in Taiwan, Korea, Japan, and South Africa. Between countries, the correlation between mean BDI scores in men and women was 0.92, $p \ll .001$. Overall, 19% of men and 22% of women had scores above the threshold for high levels of depressive symptoms, while 4.9% of men and 4.2% of women had scores indicative of severe depression ($BDI \geq 16$). The difference between countries in the proportion of participants with high levels

of depressive symptoms was significant ($p \ll .0001$). The highest levels were in Taiwan, Korea, Japan, South Africa, and Thailand, while values were lowest in Belgium, the Netherlands, and Venezuela.

Socio-Economic Factors and Depressive Symptoms

The two markers of SES (family wealth and parental education) were modestly but positively associated ($r = .18, p \ll .0001$). The proportion of respondents who stated that they came from relatively poor families (in the lower 50% of wealth for their country) was 36.2%, varying from fewer than 20% in Belgium, England, and Ireland, to more than 60% in Bulgaria and South Africa (Table 2). The proportion of respondents whose parents were not both educated to high school level or above ranged from $\ll 10\%$ in Bulgaria, England, the Netherlands, and Slovakia to $\gg 50\%$ in Italy, Spain, and Thailand. Students from poorer backgrounds within countries were likely to be more depressed. The odds of high levels of depressive symptoms ($BDI \geq 8$) were 1.56 (CI 1.42 to 1.71) for participants with lower compared with higher family wealth, and 1.17 (CI 1.06 to 1.29) for lower versus higher parental education. The association between high BDI and family wealth was significant in 20 countries, but not significant in Bulgaria, Colombia, and Romania. Parental education had a less consistent association with depression, with low parental educa-

tion being significantly related to greater BDI scores in only seven countries.

Sense of Control and Depressive Symptoms

Age-adjusted scores on the sense of control scale averaged 2.25 (CI 2.20 to 2.29) in men and 2.32 (CI 2.27 to 2.37) in women, with higher scores reflecting less control. The average sense of control reported by men and women across countries was highly correlated ($r = 0.97, p \ll .001$), and there was no gender difference. Sense of control tended to be greatest in the countries of Western Europe, the U.S., and South America, and lowest in Pacific Asian countries (Table 3). In regression analyses adjusting for age and gender, low sense of control was associated with depressive symptoms in each country ($p \ll .001$) except for Romania. The hypothesis that sense of control would be less strongly associated with depressive symptoms in Pacific Asian countries was not confirmed.

Mediation of SES Effects by Sense of Control

The extent to which low sense of control mediated associations between SES and depressive symptoms was analyzed using logistic regression, controlling for country intra-cluster effects. When low sense of control was added to the model, the odds for less wealthy backgrounds were reduced by 27% from 1.56 to 1.41 (CI 1.29 to 1.54, $p \ll .001$), while those for low parental education fell by 37% from 1.16 to 1.10

Table 2. Individual and Ecological Level Variables

Country	Less than average wealth %	One or both parents did not attend high school %	Gross GDP US\$ 1998 (thousands)	Gini coefficient of inequality	N tertiary students per 100,000 inhabitants	Individualism/collectivism
Belgium	11.8	14.5	24.3	26	3494	75
Bulgaria	75.7	5.1	1.5	31	2942	30
Colombia	30.8	19.0	2.1	57	1643	13
England	17.9	9.6	24.2	33	3135	89
France	54.4	20.8	24.4	29	3600	71
Germany	30.0	22.5	25.7	28	2628	67
Greece	28.1	25.0	11.9	34	3149	35
Hungary	59.1	10.7	4.8	28	1777	80
Ireland	14.0	18.4	24.9	34	3618	70
Italy	27.5	53.3	20.3	33	3103	76
Japan	37.5	40.0	34.3	26	3139	46
Korea	55.1	47.8	8.7	32	4974	18
Netherlands	35.2	8.5	24.9	30	3176	80
Poland	38.2	16.9	4.0	27	1946	60
Portugal	25.4	47.1	11.3	36	3060	27
Romania	58.6	12.2	1.6	28	2998	30
Slovakia	27.9	7.0	3.7	20	1715	52
South Africa	69.6	48.6	3.1	59	1524	65
Spain	31.9	55.9	15.1	33	4017	51
Taiwan	45.2	46.7	18.0	33	3473	12
Thailand	42.3	50.5	2.0	46	2096	20
USA	22.4	26.9	33.1	37	5339	91
Venezuela	24.4	14.5	4.4	47	2847	17

Table 3. Mean Ratings of Sense of Control (Age-Adjusted)

Country	Sense of Control (95% CI)	
	Men	Women
Belgium	2.25 (2.17–2.33)	2.46 (2.39–2.54)
Bulgaria	2.24 (2.18–2.30)	2.21 (2.15–2.57)
Colombia	1.94 (1.88–2.00)	1.92 (1.86–1.99)
England	2.15 (2.10–2.21)	2.17 (2.10–2.23)
France	2.30 (2.24–2.36)	2.40 (2.33–2.46)
Germany	2.07 (2.01–2.14)	2.14 (2.08–2.20)
Greece	2.28 (2.22–2.34)	2.39 (2.33–2.45)
Hungary	2.12 (2.04–2.20)	2.20 (2.14–2.27)
Ireland	2.12 (1.99–2.23)	2.20 (2.13–2.27)
Italy	2.43 (2.39–2.47)	2.51 (2.48–2.55)
Japan	2.62 (2.54–2.69)	2.70 (2.62–2.77)
Korea	2.49 (2.41–2.57)	2.54 (2.48–2.59)
Netherlands	2.25 (2.18–2.33)	2.37 (2.31–2.43)
Poland	2.38 (2.31–2.44)	2.42 (2.36–2.48)
Portugal	2.19 (2.13–2.24)	2.24 (2.19–2.30)
Romania	2.29 (2.23–2.35)	2.34 (2.28–2.40)
Slovakia	2.44 (2.38–2.49)	2.52 (2.47–2.57)
South Africa	2.49 (2.42–2.55)	2.48 (2.41–2.54)
Spain	2.25 (2.17–2.33)	2.35 (2.28–2.43)
Taiwan	2.46 (2.37–2.55)	2.53 (2.44 to 2.62)
Thailand	2.72 (2.65–2.79)	2.67 (2.62–2.73)
USA	1.98 (1.93–2.04)	2.00 (1.97–2.04)
Venezuela	1.75 (1.69–1.82)	1.78 (1.71–1.84)
Total	2.25 (2.20–2.29)	2.32 (2.27–2.37)

Higher scores indicate lower sense of control.

(CI 0.99 to 1.20, $p = .052$). Thus the impact of SES on depressive symptoms was partly dependent on low sense of control. The odds of high levels of depressive symptoms for individuals reporting lower sense of control were 2.34 (CI 2.24 to 2.45, $p < .001$) in the fully adjusted model.

National and Individual Predictors of Depression

The multi-level logistic regression on high levels of depressive symptoms ($BDI \geq 8$) is summarized in Table 4. These analyses were carried out with 16,923 participants. High levels of depressive symptoms were associated with younger age, being female, and coming from a relatively poor family background, but not with parental education. Low sense of control was strongly associated with elevated depressive symptoms, with the likelihood of high BDI scores more than doubling with every unit change in the standardized sense of control score. The two economic measures were associated with higher depression scores. Elevated depressive symptoms were more prevalent in more affluent countries and in those with higher Gini coefficients, so greater income inequality was associated with elevated depression. Access to tertiary education was not associated with high depressive symptoms. Finally, the likelihood of high levels of depressive symptoms was lower among respondents from more individualistic countries, odds

0.74, CI 0.69 to 0.78, $p < .001$. Individual, and country-level factors were independently associated with depressive symptoms and including measures of economic prosperity and cultural background, did not attenuate associations between depression, personal socio-economic background, and sense of control.

Discussion

The interpretation of this international comparison of depressive symptoms relies on a number of assumptions. We used the same measure of depressive symptoms in all countries so as to allow for direct comparisons. Similar groups of healthy participants of comparable ages and educational background were assessed, since education, health, and age are all related to depression. Response rates in each sample were high. Nevertheless, depression may manifest itself differently in different cultures, leading to under-recognition or misclassification (Iwata & Buka, 2002; Iwata, Turner, & Lloyd, 2002). Although the internal consistency of the BDI was uniformly high, this does not mean that the measure was necessarily equivalent in all countries (Byrne & Campbell, 1999). There may be linguistic and cultural differences in the tendency to report distress, and in the threshold for admitting depressive symptoms.

Moderately severe symptoms of depression were present in about one in five university students in this

study, with rates varying substantially between countries. Higher average symptom levels and more individuals with high levels of depressive symptoms were reported in samples from Taiwan, Korea, Japan, Thailand, Ireland, Slovakia, South Africa, and Romania. This study did not attempt to collect representative data on depressive symptoms from students in each country.

Nevertheless, the concerns about depression in college students previously reported from the U.S. and Western Europe would appear to be relevant to other parts of the world as well. Previous studies in South Africa and Pacific Asian countries have shown high levels of depressive symptoms in students (Hindin & Gultiano, 2006; Mkize, Nonkelela, & Mkize, 1998; Sherina, Rampal, & Kaneson, 2004), while the low levels reported from Colombia and Venezuela mirror the low rates among Argentinean students (Iwata & Buka, 2002). Gender differences were as expected, with significantly higher levels of depression in women than men, and a greater frequency of BDI scores above threshold. The gender difference was not large, but a similar pattern has been observed in other international studies of subclinical symptom levels (Copeland et al., 1999).

There is a possibility that cultural differences in acquiescent response bias influenced these results, with lower levels of depressive symptoms being reported in countries with more prevalent response biases towards favorable self-presentation. Two findings argue against such an interpretation. First, Van Hemert, Van de Vijver, and Poortinga (2002) have demonstrated the functional equivalence of the BDI in individual and cross-sectional studies, with similar factors relating to variation at the individual level and to differences in average ratings across countries. Second, Smith (2004) has shown that greater bias in responses to personally relevant questions is found in nations that score higher in measures of collectivism, particularly at the family level. If such a bias had been operating in this study, we would have expected lower BDI scores in more collective nations. In fact, the reverse trend was observed, with collectivism being associated with higher reported depressive symptoms. Recent studies of cultural differences in socially desirable response biases follow the same pattern (Lalwani, Shavitt, & Johnson, 2006).

Nevertheless, the patterning of depressive symptoms across nations showed a clear elevation of mean levels and the prevalence of high levels of depressive symptoms in students from Pacific Asian compared with Western countries (Table 1). The prevalence of high levels of depressive symptoms was around 38% in students from Japan, Korea, Taiwan, and Thailand, compared with 13.9% for men and 17.1% for women from North Western Europe and the U.S. Higher rates of negative self evaluation and self-criticism have been described in Pacific Asian compared with Western countries (Heine, 2005; Heine, Lehman, Markus, &

Kitayama, 1999; Kanagawa, Cross, & Markus, 2001). Kitayama (2002) has argued that in the U.S. and other Western countries, people are encouraged to have a positive outlook about the self, because high self-esteem is regarded as evidence of well-being (Taylor & Brown, 1988). Japanese people by contrast are thought to have a greater tendency to reflect on shortcomings as a step towards self-improvement. These differences were reinforced in the present study by the lower levels of sense of control in Pacific Asian students. We found no evidence to support the hypothesis that perceived control is less relevant to emotional well-being in Pacific Asian cultures (Sastry & Ross, 1998).

Whether the higher prevalence of depressive symptoms in educated young adults from Pacific Asian countries translates into higher levels of clinically significant depression is less certain. Some international surveys involving standardized diagnostic interviews indicate that current and lifetime rates of major depression in population samples are somewhat lower in Japan, China, and Taiwan than in Western countries such as the U.S., the Netherlands, and England, although results have been inconsistent (Andrade et al., 2003; Demyttenaere et al., 2004; Simon, Goldberg, Von Korff, & Ustun, 2002). One possible explanation is that high levels of depressive symptoms in university students reflect a transient life stage, perhaps associated with the special academic and social pressures of the college environment. Young people in Japan, Korea, and other Pacific Asian countries work very hard to win the "entrance wars" for admission to university (ipsi chiok or entrance examination hell in Korea (Lee, 2003)), and some report a loss of focus and purpose once this is achieved. After young men and women advance beyond this period of their lives, the experience of adult work and social life may induce a different pattern of affective response. Iwata and Buka (2002) have noted that Japanese students score particularly low on the positive affect items of depressive symptom scales. It is also possible that the use of anonymous self-report questionnaires may elicit a different pattern of response from face-to-face interviews utilized in depression prevalence studies in certain cultures.

Depressive symptoms were more prevalent among students from less wealthy backgrounds. The regression analysis indicates that respondents from less wealthy backgrounds were 42% more likely to have depression scores above threshold than wealthier individuals after adjustment for all other factors. This effect was consistent across almost all countries, and indicates that even when educational attainment is held constant, lower SES is associated with greater depression (Lorant et al., 2003). Our assessment of family wealth was relative rather than absolute. We reasoned that students would find it difficult to estimate the absolute wealth of their family backgrounds, and that such measures would be difficult to interpret in a study in

Table 4. *Multilevel Logistic Regression on Depression Scores ≥ 8*

	Odds Ratio Adjusted for All Other Factors (95% CI)
Age	0.96 (0.94 to 0.98)***
Gender	1.16 (1.07 to 1.26)***
Low family wealth	1.42 (1.31 to 1.55)***
Low parental education	1.09 (0.99 to 1.20)
Low sense of control	2.33 (2.23 to 2.44)***
GDP 1998	1.20 (1.10 to 1.31)***
Gini coefficient	1.09 (1.05 to 1.15)***
Tertiary education access	1.03 (0.98 to 1.09)
Individualism /collectivism	0.74 (0.69 to 0.78)***

Note: *** $p < .001$.

which per capita GDP ranged from less than \$3,000 in Bulgaria, Columbia, Romania, and Thailand, to more than \$ 25,000 in Germany, Japan, and the U.S. The second marker of SES, parental education, showed a less robust relationship with depressive symptoms. Nevertheless, the results indicate that SES differences in depressive symptoms are not driven solely by educational attainment and by the greater life skills that may be acquired through education, but that family background also contributes.

As anticipated, depressive symptoms were more common in individuals reporting low sense of control over their lives. This effect was very strong, with an adjusted odds ratio of 2.33 (Table 4). Low sense of control is also more prevalent in lower SES groups. We therefore tested the hypothesis proposed by Lachman and Weaver (1998) that perceived control would mediate SES differences in depressive symptoms in this population. The results demonstrated partial mediation, in that 27% of the variation in depressive symptoms associated with family wealth was accounted for by low sense of control. Nonetheless, the effect of family wealth remained significant not only after taking sense of control into account, but also the aggregate country-level factors such as level of economic development and economic inequality. This result is consistent with the notion that relative SES within a population is a determinant of mental well-being (Wilkinson, 1999).

Most research concerning ecological or national factors and well-being has been carried out at the aggregate level, correlating average well-being scores with aggregate estimates of national characteristics (Diener, Oishi, & Lucas, 2003). This literature has not been integrated with studies of individual socioeconomic and cognitive factors, which involve testing associations between personal background and well-being. Multi-level methods allowed us to assess associations between depressive symptoms and individual and country-level factors simultaneously. Economic prosperity showed an interesting pattern of associations with depressive symptomatology. Depressive symptom levels were higher in countries with higher GDP and

where the distribution of wealth was less equitable. Van Hemert, Van de Vijver, & Poortinga et al (2002) showed no association between Gini coefficients of economic inequality and BDI ratings across 20 countries, but their BDI scores were not obtained from homogenous comparable samples as was the case in this study. Inglehart and Klingemann (2000) demonstrated that the association between positive well-being and national wealth depends on the range of nations included in analyses, and that effects are inconsistent when comparisons are restricted to more affluent nations. Diener and Biswas-Diener (2002) argue that money only enhances subjective well-being insofar as it helps people meet basic needs, so different patterns may apply in privileged sectors of society.

The findings related to individualism-collectivism indicate that cultural characteristics may contribute to the pattern of depressive symptoms across nations independently of economic prosperity and individual background. The likelihood of high levels of depressive symptoms was lower in more individualistic cultures, with an estimated 26% reduction in the odds of elevated symptoms with every unit change in individualism-collectivism score. The fact that these effects were independent of individual ratings of lack of control implies that associations are not mediated through personal perceptions of control over life. Other unmeasured aspects of personal experience such as low social support or high life stress may mediate these effects. We used Hofstede's (2001) individualism-collectivism ratings in the analyses, but these have a number of limitations (Oyserman, Coon, & Kimmelmeier, 2002). The ratings were mostly derived from samples of employees of a multi-national corporation in the 1970s, so will have been shaped by the economic and historical circumstances prevailing at that time. The scale is based on the assumption that individualism and collectivism are opposite poles of a single dimension, while other workers have argued that the two constructs are independent. The meta-analyses described by Oyserman, Coon, and Kimmelmeier (2002) indicate that countries differing in individualism do not necessarily differ in rates of collectivism as well. Our analyses were not able to distinguish these possibilities. However, Allik and Realo (2004) have demonstrated that national variations in individualism are positively related to social capital and trust, suggesting that higher levels of social support could underlie favorable associations with depressive symptoms.

The strengths of the present study are that a standard measure of depressive symptoms with demonstrable high internal consistency in each country sample was administered to comparable groups of young adults in each center, with high response rates in each sample. Uniform assessments of other individual-level factors were also obtained, and the statistical approach allowed individual and ecologic level correlates of depressive

symptoms to be modelled simultaneously. However, the study has several limitations aside from cultural variation in the interpretation of the BDI described earlier. Analyses were cross-sectional, so causal conclusions cannot be drawn. The samples in each country were not representative but derived from a small number of universities, and assessment in other centers might have generated different results. University students are not, of course, representative of their countries. They were tested in this study since we wished to compare “like with like” across nations, and students are a homogenous, easily identifiable, and accessible group of comparatively healthy young adults. It is not certain whether depressive symptom levels of general population samples of similar age would have been higher or lower than the levels obtained in this study. University students typically come from more privileged backgrounds than other sectors, so comparatively low levels might be expected, although some studies have reported higher levels of depressive symptoms in undergraduates than among the general population (Adlaf, Gliksmann, Demers, & Newton-Taylor, 2001). We did not collect data from our participants on individualism-collectivism, and the national databases used were obtained in an earlier era from different types of people than those included in the study. Other risk factors for depression such as life stress and social support were not assessed, and these would have thrown additional light on the individual determinants of mental well-being.

Nevertheless, the study has identified potentially important variations in depressive symptoms between students from different countries, and indicates that both individual and aggregate level psychological and social characteristics are related to levels of distress. Depressive symptoms in university students are associated with academic impairment, including missing classes and decreased productivity, and with an increased possibility of dropping out of education (Heiligenstein, Guenther, Hsu, & Herman, 1996; Meilman, Manley, Gaylor, & Turco, 1992). They are also associated with low levels of preventive health behavior and elevated risk behaviors (Furr, Westefeld, McConnell, & Jenkins, 2001; Hawton, Simkin, Fagg, & Hawkins, 1995), and underlie a substantial proportion of suicides among students. A broader understanding of the contribution of background socio-demographic factors, individual attitudes, and cultural characteristics may therefore promote greater insight into the nature of affective disturbance in this population, and point to ways of more effective management.

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