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ORIGINAL PAPER

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A comparative study of psychopathology in Greek adolescents in Germany and in Greece in 1980 and 1998 – 18 years apart

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Abstract *Objective* In the 1980s, we assessed Greek adolescents living in Germany and Greek adolescents living in Greece. Data from this earlier study supported the hypothesis of selective migration with higher psychopathology self-rating scores in Greek adolescents in Greece as compared to Greek adolescents in Germany. The current study uses the same design and instruments so that the comparison of the mental health of populations in the same areas, almost two decades apart, becomes possible. *Methods* In 1980, a total of 2631 Greek adolescents were assessed in Munich, Germany or Veria, Greece. In 1998, 2920 Greek adolescents were assessed in Munich, Germany and Veria, Greece. The General Health Questionnaire (GHQ-28) was used to assess mental health status at both times. *Results* 1) GHQ-28 scores showed a significant increase from 1980 to 1998 in both locations. 2) While in 1980, Greeks in Veria, Greece had higher psychopathology scores than Greek adolescents in Munich, Germany, this (with the exception of depression) was no longer true for 1998. 3) At both times and both locations adolescent girls scored higher in the GHQ-28 than adolescent boys. *Conclusions* While the 1980 data supported the selective migration hypothesis, this was no longer true for the 1998 data. The increase in psychopathology in both locations is alarming and deserves further exploration.

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Introduction

Larger populations of migrant workers mainly from Mediterranean countries migrated to West Germany in the 1960s and 1970s to obtain jobs mainly as unskilled workers. From 1955 to 1980, there was an increase in the number of foreign workers in the Federal Republic of Germany from 79,000 to 4,453,300. Several studies assessed the mental health status of foreign workers in Germany. Publications by Häfner (1980, 1981) on this topic received wide attention. His studies showed that foreign guest-workers in a German city at the time of assessment were mentally healthier than German controls. This result was most likely a consequence of the selection of foreign guest-workers on the basis of their physical and mental health. Meanwhile the next generations, largely born in Germany have been raised. Steinhausen and Remschmidt (1982) and Steinhausen (1985) have assessed the offspring of Greek workers in Germany and they largely came to the same conclusions as Häfner with adult foreign workers in Germany.

Guest-workers and their families have been exposed to considerable changes in their social and cultural environment. They have to learn a new language, conform to new standards and have to accept attitudes and moral values, which at least partially differ from those in their home country. The relationship between acculturation, psychological distress and psychiatric disorder has been a long-standing research issue (Fabrega 1969; Nachson et al. 1972; Madianos,1984; Berry 1986; Burnam et al. 1987; Caetano 1987; Mavreas and Bebbington 1990; Kaplan and Marks 1990). The hypothesis was that alienation and isolation from the native group may occur in a new country and as a result of this distress the rates of psychiatric disorders are higher among highly acculturated migrants. Quite a few studies, however, have not confirmed this hypothesis and it has been shown that

migration does not necessarily increase the risk for mental disorders. Various factors must be taken into account; some of them appear to be protective such as positive family functioning and good social networks, financial resources and social support, while others can increase the risk such as negative life events, chronic difficulties and isolation in a foreign country.

In 1980 we conducted a study assessing a large sample of adolescent Greek students in Munich, Germany, and a larger sample of adolescent Greeks in Veria, Greece, using the General Health Questionnaire (GHQ)-28-item scale. Generally, Greek adolescents in Greece showed higher scores in the GHQ-28 and its sub-scales than Greek adolescents living in Germany. These results confirmed the hypothesis of selective migration rather than the acculturation-stress hypothesis (Fichter et al. 1988).

In the two decades following this research, mobility within and between countries has greatly increased. Greece and Germany are members of the European Community and communication and broadcasting systems have vastly expanded. Eighteen years after our first study on Greek adolescents, we have again assessed practically the complete adolescent population of Greeks in the identical locations.

Method

Samples

The samples of this study were taken from Greek students in Greece and Germany who at the time of assessment attended private or public schools in their city of residence. The Greek schools in Germany were schools of the Greek Republic for Greek students; these schools were organized according to the Greek school system and were subject to the supervision and coordination by the Greek Ministry of Education in agreement with the Bavarian Department of Education. This study was conducted in grades 8 to 12 mainly covering students aged 13 to 19. The study took place in Munich, Germany, because a large number of Greeks immigrated to this area during the last few decades, and in the Greek provincial town of Veria in Northern Greece which was point of departure for many emigrants. Practically all "Gymnasien" (grades 7 to 9) and "Lyzeen" (grades 10 to 12) in Munich and Veria were included in this study covering all Greek schools for this age group in these regions at the time of assessment.

Greek adolescents in Munich, Germany

In July 1979, 815 Greek students (443 girls and 372 boys) were assessed at the age of 10 to 21 years. They attended one of the two "Gymnasien" in Munich, or the "Gymnasium" or "Lyzeum" in the town of Dachau a suburb of Munich. In 1998, another 881 Greek adolescents (445 girls and 436 boys) were assessed in Munich. The students attended one of two "Gymnasien" or one of two "Lyzeen" in Munich. The age range of the sample was from 13 to 21 years. The screening of the Munich sample took place in January 1998 ("Lyzeen") and June 1998 ("Gymnasien").

Greek adolescents in Veria, Greece

In 1980, 2631 Greek adolescent students aged between 11 to 26 years (1394 girls and 1237 boys) were screened in Veria. The screening was performed from September 1980 to November 1980. The students attended one of five "Gymnasien" or one of four "Lyzeen" in Veria. From March to May 1998, 2920 Greek students aged between 12 and 21 years (1506 girls and 1414 boys) were assessed in Veria. These students attended one of six "Gymnasien" or one of seven "Lyzeen". A seventh "Gymnasium" in Veria had to be dropped from the study because of long delays in receiving permission to screen the students; it was substituted by the only "Gymnasium" in Makrohori which lies 10 km from Veria.

Design

This study includes two independent waves of assessments with a time interval of about 18 years. It is important to note that the study is not truly longitudinal as each proband was assessed only once. Therefore, the cross-sectional study design includes only between-subject factors (year of assessment, place of assessment, and sex) each factor having two levels (1980 vs. 1998, Munich vs. Veria, and female vs. male).

According to the official statistical data published by the relevant public departments, 978 students visited the Greek schools in Munich in the school year 1997/98. At the time we visited the schools, 97 (9.9 %) could not be assessed; 43 students (4.4 %) were ill on the day of assessment. According to the directors of the schools, these students attended the lessons regularly and suffered from minor infections at the day of assessment. No psychiatric illnesses which might have caused their absence were reported by the school. Forty-two students (4.3 %) were attending an examination and could not be assessed, while 11 students (1.1 %) visited on the day of assessment a special course for the final examination and could not attend regular lessons. Only one student (0.1 %) refused participation in the study.

In Veria 3244 students visited the schools assessed. A total of 324 (10 %) could not be assessed for a variety of reasons: 128 (3.95 %) were ill. According to the directors of the schools these students, too, attended the lessons regularly and suffered from minor infections or accidental injuries on the day of assessment. No psychiatric illnesses which might have caused their absence were reported by the school. On the day of assessment, 180 (5.57 %) attended other events (e. g., school excursions or special lessons) 8 (0.25 %) students were excluded from the lessons for disciplinary reasons, while 3 (0.09 %) arrived too late at school and could not participate in the study, and another 3 (0.09 %) students refused to participate. Two students (0.06 %) were foreigners from Albany and were excluded from the study.

Assessments

The General-Health Questionnaire (GHQ) is a self-report questionnaire frequently used for the screening of mental disorders in the community (Schmitz et al. 1999). At both cross-sections we used the factor analyzed 28-item version (GHQ-28) which gives a total score and in addition scores on somatic complaints, anxiety, social dysfunctions and depression (Goldberg and Hillier 1979). Responses were scaled from 0 to 3 with higher scores denoting more severe symptoms. In addition a 40-item questionnaire on eating disturbances was used at both cross-sections; results of this are published elsewhere (Fichter et al. 1988).

The study has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and was also approved by the Greek school authorities in Athens.

The GHQ-28 was translated into Greek by native speakers who were also fluent in English and German. The translation was re-translated into the original language of the questionnaire, compared and corrected. After our first study was completed, Garyfallos et al. (1991) published a Greek version of the General Health Questionnaire. However, in order to make GHQ results comparable in both our studies we decided to use our own translation once again.

Procedure

Permission for conducting this study in schools was obtained from the Greek and German Departments of Education. The students filled out the General Health Questionnaire in their classroom, while at least one of the investigators (F. X. or E. G.) was present. Subjects scor-

ing 32 or more in the GHQ-28 were defined as being at *high risk* and adolescents with GHQ-28 scores below or equal to 7 constituted a *low risk* group. For the 1980 sample high and low risk individuals according to this definition were identified post-hoc from the data available.

Statistical analysis

Besides standard descriptive procedures, analyses of variance (ANOVAs) were conducted to test hypotheses about sex differences (boys vs. girls), differences over time (1980 vs. 1998) and place differences (Munich vs. Veria) and their interaction effects. Except for the first two ANOVAs reported, age was introduced into the models as a covariate. If the *F* test was significant, specific differences between the groups were determined by post hoc Scheffè multiple-comparison tests performed at the 0.05 alpha level.

Results

General results

Two preliminary analyses of variance (ANOVA) were computed to assess possible age differences between locations (analysis 1) and GHQ scores (analysis 2). An analysis of variance was computed to test the hypothesis if age differences exist between the two locations (Munich vs. Veria) and time (1980 vs. 1998). Sex differences were not tested in this analysis. The interaction between groups was significant ($F_{(1,7245)} = 13.83$, $p < 0.01$). A posteriori Scheffé test ($D_{crit} = 0.05$, $p < 0.05$) revealed that the Greek sample in Munich (1998) was slightly older (15.8 ± 1.3) than all other samples (Greeks in Veria, 1998: 15.5 ± 1.5; Greeks in Munich, 1980: 15.5 ± 1.6). The Greek students in Veria (1980) had the lowest average age of the entire sample (14.9 ± 1.6).

To test the GHQ-28 values for possible age effects, the data were split into three age groups: below 15 years, from 15 to 17 years and above 17 years. The ANOVA revealed statistically significant age differences for the GHQ-28 total score ($F_{(2,7222)} = 161.45$, $p < 0.01$), GHQ-28 'somatic symptoms' ($F_{(2,7222)} = 128.12$, $p < 0.01$), GHQ-28 'anxiety and sleeping disturbances' ($F_{(2,7222)} = 144.64$, $p < 0.01$), GHQ-28 'social dysfunctions' ($F_{(2,7222)} = 91.13$, $p < 0.01$) and GHQ-28 'severe depression' ($F_{(2,7222)} = 57.28$, $p < 0.01$). All scale scores increased with age. As a consequence of the results of the two preliminary ANOVAs, age was used as a covariate in all further analyses. Descriptive statistics, however, are reported using data not corrected for age.

Table 2 shows the results of the GHQ-28, broken down by place, time and sex. Concerning the *GHQ-28 total score* the Greeks in Veria had higher average scores in 1980 and 1998 compared to the Greeks in Munich (main effect of place; $F_{(1,7216)} = 41.10$, $p < 0.01$). A main sex effect was also observed ($F_{(1,7216)} = 339.60$, $p < 0.01$). The female adolescents scored higher on the GHQ-28 total scores than the male adolescents at both time points ($D_{crit} = 0.01$, $p = 0.05$). Mean values of the total score increased over time (main time effect; $F_{(1,7216)} = 140.80$, $p < 0.01$), both genders showing an increase of scores from 1980 to 1998. ANOVA yielded a significant interaction for location and time ($F_{(1,7216)} = 4.63$, $p < 0.05$). The posteriori Scheffé test ($D_{crit} = 0.01$, $p = 0.05$) revealed an increase of scores from 1980 to 1998 both within the Greek sample in Munich and the Greek sample in Veria. The interaction between location and sex was not significant ($F_{(1,7216)} = 0.67$, n.s) indicating that total scores of boys and girls between Munich and Veria did not differ. The interaction between time and sex showed signifi-

Table 1 Screening samples of Greeks in Munich, Germany, and Greeks in Veria, Greece, by age, sex, and risk across time

Sample	N	Age (Mean + standard deviation)	High risk group (GHQ ≥ 32) N (%)	Low risk group (GHQ ≤ 7) N (%)
1980				
Munich				
Girls	443	15.6 ± 1.5	50 (11.3)	21 (4.7)
Boys	372	15.4 ± 1.6	17 (4.6)	36 (9.7)
Total	815			
Veria				
Girls	1394	15.0 ± 1.6	230 (16.5)	92 (6.6)
Boys	1237	14.8 ± 1.5	72 (5.8)	160 (12.9)
Total	2631			
1998				
Munich				
Girls	445	15.8 ± 1.3	109 (24.5)	10 (2.2)
Boys	436	15.8 ± 1.4	45 (10.3)	43 (9.9)
Total	881			
Veria				
Girls	1506	15.5 ± 1.5	411 (27.3)	54 (3.6)
Boys	1414	15.5 ± 1.5	141 (10.0)	123 (8.7)
Total	2920			

Table 2 Means and standard deviations (SD) of the General Health Questionnaire (GHQ-28) separately for boys and girls across location (Greeks in Munich, Germany, vs. Greeks in Veria, Greece) and time (1980 vs. 1998)

	1980		1998	
	Munich Mean ± SD	Veria Mean ± SD	Munich Mean ± SD	Veria Mean ± SD
Total Score				
Boys	0.50±0.31	0.53±0.32	0.61±0.35	0.65±0.36
Girls	0.64±0.39	0.73±0.43	0.86±0.42	0.88±0.47
Somatic Complaints				
Boys	0.37±0.37	0.45±0.40	0.50±0.40	0.53±0.43
Girls	0.50±0.43	0.65±0.54	0.77±0.48	0.79±0.55
Anxiety				
Boys	0.54±0.47	0.64±0.49	0.71±0.57	0.72±0.54
Girls	0.74±0.59	0.92±0.62	1.07±0.65	1.06±0.67
Social Dysfunctions				
Boys	0.85±0.34	0.75±0.36	0.86±0.36	0.87±0.37
Girls	0.93±0.37	0.86±0.38	0.96±0.36	0.97±0.41
Severe Depression				
Boys	0.23±0.40	0.29±0.43	0.37±0.48	0.46±0.54
Girls	0.38±0.56	0.48±0.58	0.62±0.63	0.70±0.67

cant differences over all factor levels ($F_{(1,7216)} = 14.97$, $p < 0.05$), female adolescents achieving higher scores than the male adolescents both in the year 1980 and in 1998 ($D_{crit} = 0.01$, $p = 0.05$).

For the GHQ-28 '*somatic complaints*' (see Fig. 1 and Table 2) highly significant differences were observed for location ($F_{(1,7214)} = 56.23$, $p < 0.01$), for time ($F_{(1,7214)} = 96.24$, $p < 0.01$) and for sex ($F_{(1,7214)} = 261.37$, $p < 0.01$). The comparisons between the levels of the factors sex and time revealed a significant interaction ($F_{(1,7214)} = 16.77$, $p < 0.01$). The amount of somatic complaints increased within each sample for males and females over time ($D_{crit} = 0.01$, $p = 0.05$), with the female students reporting more somatic complaints in 1980 and 1998 than the male students. A significant interaction between time and location ($F_{(1,7214)} = 15.77$, $p < 0.01$) indicates an increase of somatic complaints over time in Munich and Veria ($D_{crit} = 0.01$, $p = 0.05$). The adolescent students in Munich showed a lower number of complaints in comparison with the students in Veria. The differences in the GHQ-28 'somatic symptoms' were more pronounced between Munich and Veria in 1980 ($t_{(3423)} = 6.06$, $p < 0.01$) as opposed to 1998 ($t_{(3796)} = 1.58$, n. s.). This is in accordance with the result of the second-order interaction between time, place and sex ($F_{(1,7214)} = 9.97$, $p < 0.05$). The boys as well as the girls scored higher in Veria than in Munich ($D_{crit} = 0.02$, $p = 0.05$) but the effect was clearly less pronounced in the sample of 1998 compared to the sample of 1980. Specific comparisons yielded only for 1980 a significant difference between Munich and Veria in the number of complaints for the males ($t_{(1598)} = 3.14$, $p < 0.01$) and the females ($t_{(1823)} = 5.48$, $p < 0.01$).

For the GHQ-28 '*anxiety*' significant main effects were obtained for location ($F_{(1,7216)} = 38.78$, $p < 0.01$), time ($F_{(1,7216)} = 82.61$, $p < 0.01$) and sex ($F_{(1,7216)} = 322.36$, $p < 0.01$). Again, adolescents in Veria reported more anxiety than their peers in Munich. Anxiety increased from 1980 to 1998 and was clearly different between the male sub-sample and the female sub-sample. This pattern of results was also reflected by the significant first-order interaction between time and sex ($F_{(1,7216)} = 14.64$, $p < 0.01$). The anxiety scores rose in boys and girls over time ($D_{crit} = 0.01$, $p = 0.05$) with females showing greater anxiety at both times of measurements. The significant first-order interaction between time and location ($F_{(1,7216)} = 25.08$, $p < 0.01$) indicated that in 1980 the adolescents at Veria reported more anxiety than those in Munich. This difference between Munich and Veria could no longer be found in 1998 ($D_{crit} = 0.01$, $p = 0.05$).

As to GHQ-28 '*social dysfunctions*' adolescents in Munich had significantly higher scores than adolescents in

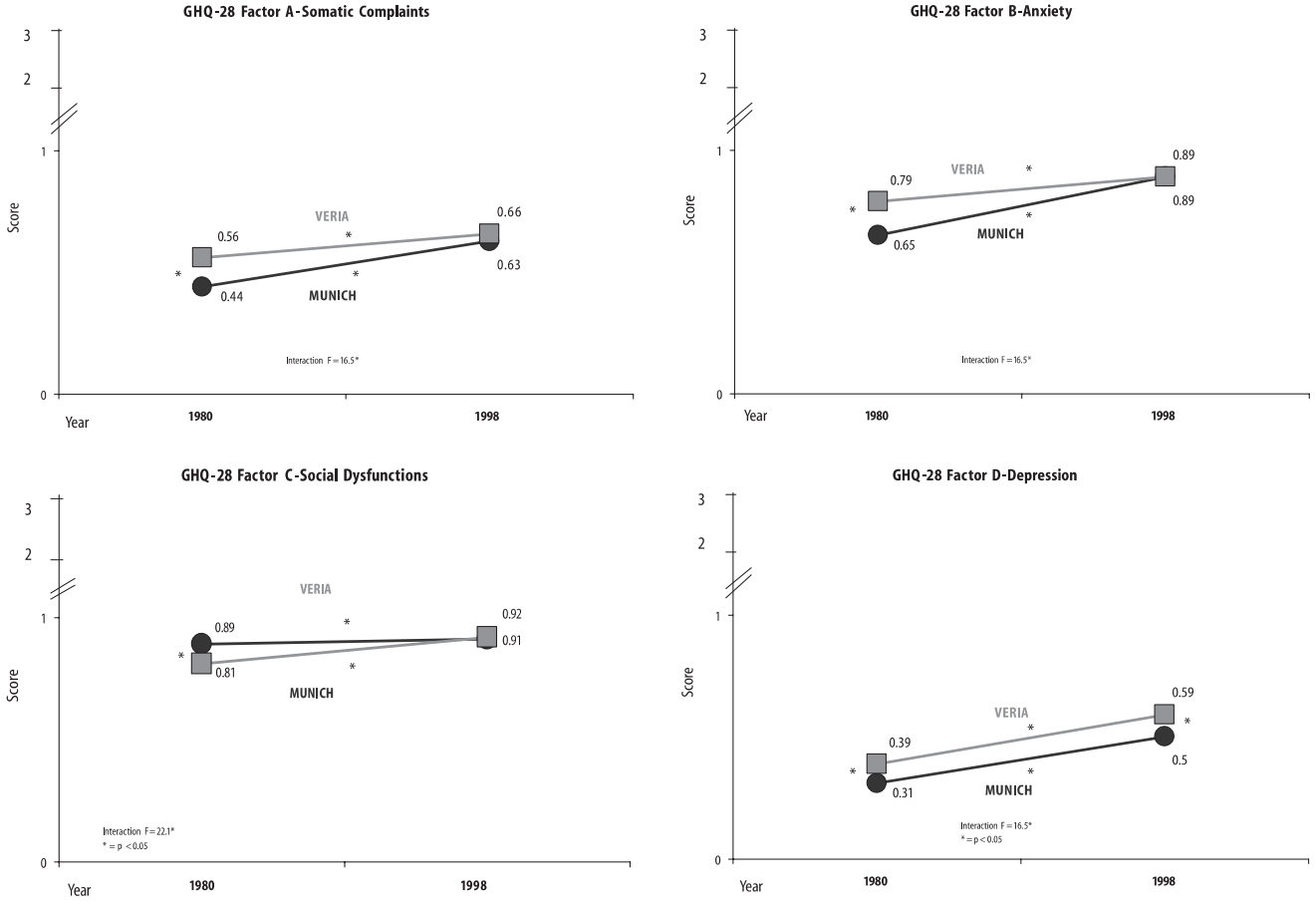

Fig. 1 Comparison of Greek adolescents in Munich, Germany, and Greek adolescents in Veria, Greece, 1980 vs 1998 using the GHQ-28 (Mean Scores, * = $p < 0.05$)

Veria ($F_{(1,7215)} = 4.49$, $p < 0.05$). The amount of reported dysfunctions increased from 1980 to 1998 ($F_{(1,7215)} = 30.59$, $p < 0.01$) and showed a significant sex difference ($F_{(1,7215)} = 82.41$, $p < 0.01$). Only the interaction between time and location was significant ($F_{(1,7215)} = 18.65$, $p < 0.01$). The scores obtained in 1980 were higher in Munich than in Veria ($D_{crit} = 0.01$, $p = 0.05$). The inverse effect with higher scores in Veria was observed in 1998. Using specific comparisons, the difference between Munich and Veria was considerably larger in 1980 ($t_{(3424)} = 5.34$, $p < 0.05$) than in 1998 ($t_{(3796)} = 0.93$, n. s.).

Concerning GHQ-28 '*severe depression*' females reported significantly more depressive symptoms than males ($F_{(1,7202)} = 169.76$, $p < 0.01$). Higher average scores of the GHQ-28 'severe depression' were observed in Veria than in Munich ($F_{(1,7202)} = 43.59$, $p < 0.01$) and the amount of depression increased over time ($F_{(1,7202)} = 134.16$, $p < 0.01$). Only the first-order interaction between time and sex was significant ($F_{(1,7202)} = 7.57$, $p < 0.01$). According to the post hoc Scheffé test, the male adolescents had lower score values than the female adolescents in 1980 as well as in 1998 ($D_{crit} = 0.01$, $p = 0.05$). The mean scores of depression increased more over time in girls than in boys.

Differences within the high risk groups

Table 1 shows sizes of the samples with two cross-sectional studies in 1980 and 1998 in both locations, the average age and the number and percentage of persons in the high risk group (GHQ-28 ≥ 32) and the percentage of the persons in the low risk group (GHQ-28 ≤ 7). At both times and both locations the percentage of our risk persons was higher among girls as compared to boys. An important finding was that the percentage of high risk persons increased considerably in both sexes and for both locations from 1980 to 1998. The percentage of persons at high risk almost doubled from 1980 to 1998.

The same preliminary analyses were conducted for this sub-sample of high risk students as for the total sample described above. An ANOVA with the factors time and location showed statistically significant age differences for the factor time ($F_{(1,1054)} = 7.60$, $p < 0.01$). Location of assessment as well as the interaction did not reach the level of statistical significance. The students in 1980 (15.7 ± 1.6) were slightly younger than the students in 1998 (16.1 ± 1.4). Again, the sub-sample was split into three age groups (see above). A series of ANOVAs upon the sub-scales of the GHQ-28 revealed a significant effect of age for the GHQ-28 'somatic symptoms' ($F_{(2,1055)} = 6.98$, $p < 0.01$) and the GHQ-28 'severe depression' ($F_{(2,1055)} = 3.84$, $p < 0.01$). Therefore – as for the total group – age was used as a covariate in all subsequent analyses.

For the GHQ-28 total score, no main effect or interaction reached the level of significance. For the GHQ-28 'somatic complaints', only the first-order interaction between location and sex was statistically significant ($F_{(1,1049)} = 4.86$, $p < 0.05$). The female adolescents reported more somatic complaints in Veria than in Munich and female students in Veria had higher scores than males ($D_{crit} = 0.03$, $p = 0.05$). For the GHQ-28 'anxiety and sleeping disturbances' sex differences were observed ($F_{(1,1049)} = 8.78$, $p < 0.01$). The amount of anxiety was larger in female than in male students. None of the other factors or interactions were statistically significant. For the GHQ-28 'social dysfunctions' time, location and sex failed to reach the level of significance. For the GHQ-28 'severe depression', there was a significant first-order interaction between location and time ($F_{(1,1049)} = 8.78$, $p < 0.01$). The adolescents in 1998 showed significantly higher depression scores in Veria than in Munich ($D_{crit} = 0.04$, $p = 0.05$); however, in the year 1980 higher scores were obtained in Munich than in Veria. The depression scores decreased in Munich over time, whereas the score values increased in Veria from 1980 to 1998.

Discussion

In the international literature on cross-cultural research on the mental health of migrants, there are several studies which compare persons who migrated to another country with persons who remained in the country of origin. The major aim of our study was to assess mental health status in present day adolescents in Greeks in Greece and second generation Greek migrants in Germany and to compare these results with those obtained 18 years earlier in adolescent populations at the same locations. Larger samples of adolescents were assessed in two locations at two points in time cross-sectionally. Using this design we can of course not describe the longitudinal course of particular persons which was not the aim of this study.

One major finding of our current study was that psychopathology measured by the General Health Questionnaire GHQ-28 showed a significant increase (for girls and boys together) from 1980 to 1998 for the total score and in the sub-scales somatic complaints, anxiety, social dysfunctions and depression. There were no data in our own data set that can explain this increase of psychopathology over time. One possible reason for this increase could be increased achievement demands made on adolescents by their families and at school. Another, alternative explanation could be that today's adolescents are more ready to talk about their problems and burdens than adolescents two decades ago.

An increase in mental health problems in Greek samples has been reported in several studies. In nationwide Greek surveys Kokkevi et al. (2000 a, b) reported an increase in alcohol consumption in the years before 1998; the increase was most apparent in women; illicit drug use increased in adolescents of both genders during the same time. Ierodiakonou et al. (1998) reported about changing patterns of attempted suicide in Greece.

Motti-Stefanidi et al. (1993) studied the behavioral and emotional problems and competencies of 466 children aged 6–11 years in Athens by administering Achenbach's Child Behavior Checklist to the parents. In comparison to other countries, relatively high scores were obtained on both the internalizing and externalizing scales, and relatively low scores on the competence scales. The authors explained the high scores partly through cultural factors, the Greek parents' attitudes towards their children and their beliefs and practices in child rearing. The authors cited a report of the World Health Organization (WHO) on child mental health and psychosocial development in Greece and suggested that Greek children are cherished and loved, but are expected to behave according to a strict set of parental demands and are the focus of high expectations to achieve academically. Decades ago, Parker & Lipscombe (1981) described that overprotectiveness and other characteristics of Greek parents tend to encourage shyness and timidity in their children. It is likely that – as in other Western countries – educational principles and practices at home as well as in schools may have changed in Greek families over the last years and decades. On the other hand, academic pressures in Greek schools appear to have increased over time. Ierodiakonou (1988) noted that the spirit that prevails in Greek schools is not that of collective work, but of antagonistic individualism. Families wish to send their children to the best possible university and academic failure is considered a family tragedy. The increase in psychopathology observed over time has to be seen also considering the contextual changes which took place in Greece and which had an influence on the population in general and on adolescents particularly.

The rapid economic and increased social and cultural changes in Greece during the last decades due to immigration, migration, urbanization and industrialization were considered by Madianos and Stefanis (1992) as important factors affecting the mental health of the general population in Greece. In two nationwide cross-sectional studies in Greece in 1978 and 1984, the authors found a statistically significant increase of symptoms of depression in all geographic areas across Greece and a statistically significant increase of the prevalence rates of current major depression episodes in both sexes during this time period. Madianos and Stefanis argued that this impressive increase in only 6 years is caused by the atmosphere of demoralization, unfavorable economic conditions following the economic recession of 1984 with increased unemployment rates, rising average annual consumers general index, increased general costs of living and also an increase in public debt. These factors have been found to be also relevant for the statistically significant increase of suicidal ideation and suicide attempts from 1978 to 1984 in the same samples (Madianos et al. 1993). Semi-urban-rural areas in Greece (like Veria) have also been suffering from a greater degree of economic problems (Madianos and Stefanis 1992). Furthermore, mental disorders in the rural population are probably diagnosed and treated with delay and/or insufficiently resulting from a limited availability of mental health services in rural areas compared to urban areas (Zacharakis et al. 1998).

Our findings of increased rates in 1998 may also have been influenced by an increased readiness by adolescents to talk about mental problems. Madianos et al. (1999) studied the opinions about mental illness of residents of two boroughs in greater Athens in 1979/1980 and in 1994. Their findings suggested that respondents in the second study (1994) expressed more positive attitudes towards the mentally ill living in the community, and were more liberal-minded about and tolerant towards deviant behavior. They responded with less authoritarian attitudes to issues concerning the civil rights of psychiatric patients and their social restriction than their counterparts from the first study, 14 years earlier. The 1994 study sample showed a fair knowledge of the etiology of mental illness. They expressed views indicative of a humane approach to the treatment methods employed in psychiatry.

A second major finding of our study is that while in 1980 GHQ-28 scores for most scales were higher in Veria (Greece) than in Munich (Germany) and that in 1998 these differences for the GHQ total scales and subscales no longer existed with the exception of the GHQ depression subscale. Our data from 1980 confirmed the hypothesis of selective migration and not the acculturation-stress hypothesis. According to the selective migration hypothesis migrants select themselves or are selected by others on the basis of their health status. Greek migrants were selected by German officials on the basis of their physical and mental health. In second generation Greek adolescent migrants, mental health status was still better than in their Greek counterparts in Greece. With almost two decades having elapsed since then this effect seems to have worn off. Greek adolescents in Greece are no longer distinguishable from Greek adolescents in Germany on the basis of their mental health status as measured by the GHQ. There is one exception to this statement: while the GHQ depression score has increased in Veria and Munich, GHQ depression scores were still significantly higher in Veria, Greece, than in Munich, Germany. In 1998 Greeks in Veria, Greece, and Munich, Germany, did no longer differ from each other concerning the GHQ scales somatic complaints, anxiety and social dysfunctions.

Madianos (1984) explored the influence of acculturation on mental health of Greek immigrants in the USA in a representative sample of 225 adults, living in New York City. According to him "acculturation results when the groups of individuals having different cultures, come into continuous contact with subsequent changes in the original culture of either or both groups" (Madianos et al. 1998 p. 96). Madianos (1984) reported that recent immigrants showed more psychopathological symptoms (anxiety, depression, psychosomatic complaints) than old or second generation immigrants.

According to the acculturation-stress hypothesis,

sometimes formulated as migration-morbidity hypothesis, migrating to another country with differences in culture, language, etc. puts stress on the individual which increases the risk of becoming mentally or physically ill. Stress can be imposed through language- or social/control barriers, conflicts between two countries and loss of family traditions which may act as protective factors. Thus, Madianos (1984) reported that for those Greek immigrants in the USA, who tended to accept only elements of American technology but who continued to live in the Greek community (thus keeping their ethnic identity) risks of exposure to acculturation stressors was low. The policy of Greek school authorities in Germany and Greece are directed at maintaining Greek identity. In large Bavarian cities Greeks maintain their own school system which is used by most Greeks living in the area. Many Greek administrative parties, institutions, clubs, foundations and the Greek-orthodox church make up for a strong social network. This network may protect immigrants from losing ethnic and traditional ties. Nevertheless psychopathology is measured in the GHQ-28 and its sub-scales somatic complaints, anxiety, social dysfunctions and depression increased in Greek students in Munich from 1980 to 1998 at least as much as it did in Greek students in Veria, Greece. Thus, there may be some acculturation stress in this second generation migrant sample after all.

Some studies about migrants compared migrants with native individuals in their new country. Thus, Adamopoulou et al. (1990) compared psychiatric symptoms of Greek Cypriot attenders at a primary health care center in North London with those of native English attenders using the GHQ. The GHQ scores did not reveal statistically significant differences between the two samples. Similarly Mavreas and Bebbington [1989, 1990] assessed 291 Greek Cypriot immigrants from the general population of Camberwell, London, regarding the influence of migration and acculturation on the development of psychiatric disorder. Using the Greek Immigrant Acculturation Scale they found no relationship between acculturation and mental disorder and in their study found no evidence that immigration provoked psychiatric breakdown. The authors argued that the Greek Cypriot community had characteristics that may protect them from traumas of the early stages of re-settlement. Klimidis et al. (1994) failed to find support for the migration-morbidity hypothesis, assessing 631 adolescents in Australia (some of them immigrants, some of them native-born).

Steinhausen and Remschmidt (1982) assessed Greek immigrant children and German children aged 8–11 years in West Berlin. The prevalence of psychiatric disorders in the Greek immigrant children was significantly lower than in German children. Although the Greek families lived under more strained socioeconomic conditions than the German families, the children of the two groups did about equally well at school. The authors interpreted the lower rate of disorders of family functioning among Greek families as the main determinant of lower psychiatric morbidity among Greek children.

The third major finding of our study was that in 1980 and 1998 adolescent girls scored significantly higher than adolescent boys. These results are in accordance with most other studies covering this topic especially those using self-rating scales. Klimidis et al. (1994) reported gender differences in psychopathology, with higher scores for girls. Girls in that study were more likely to describe themselves as inferior, worthless, unsure and shaky than boys and were more likely than boys to describe themselves as unstable, nervous and dissatisfied. Madianos (1984) found that the women (as compared to the men) of his immigrant sample reported more anxiety, depression, psychosomatic complaints and conflicts resulting from acculturation-frustration stressors. According to his interpretation, migrant women showed a higher degree of acculturation than men. He interpreted this as an indication for a higher tendency to reject traditional Greek values by women who hope to be integrated more rapidly into the American society, where the female social position and roles are more equal to men. Generally, in psychiatric epidemiology of mental disorders women have higher scores in scales measuring anxiety, depression or mental distress, possibly because they are more open to admit these symptoms (Kessler 1994).

Although the stability of the factor structure of the GHQ is known to be high (Werneke et al. 2000), there was the possibility that the changes reported reflected differing factor structures of the GHQ at both time points. Therefore we factor analyzed the GHQ items separately for both time points. Principal component analyses with varimax rotation resulted in factor solutions very similar to the factor structure reported by Goldberg and Hillier (1979). In the 1980 data only item D5 ("Found at times you couldn't do anything because your nerves were too bad?") was shifted from "Severe depression" to "Anxiety". In the 1998 data only three items were allocated differently from the original factor structure: Item D5 again shifted from "Severe depression" to "Anxiety". Items C2 ("Been taking longer over the things you do?") and C7 ("Been able to enjoy your normal day-to-day activities?") were allocated to "Anxiety" instead of "Social dysfunction" as in the original factor analysis. We felt these to be minor changes to the factor structure. Confirmatory factor analyses using the Amos 3.6 statistical software (Arbuckle 1997) validated our decision. The root mean square error adjusted (RMSEA) was 0.036 for the 1980 data and 0.035 for the 1998 data. Both coefficients confirmed a very high similarity of the factor structures found in Greek students to the structure reported by Goldberg and Hillier (1979).

A strength of our study at both points of time was that several of the investigators (F.X and E.G) were fluent in both Greek and German language. Bird (1996) wrote that fine-tuning of the research process in cross-cultural research involves methodological strategies exemplified by the development of culturally sensitive

translations of instruments into different languages or by the use of interviewers from the same cultural and language background as the study subjects. This was the case in our study.

There are several limitations to our study:

It can be argued that the thresholds we used for the GHQ-28 are arbitrary. Goldberg, Oldehinkel and Ormel (1998) demonstrated that the best threshold may vary between settings and samples. In order to get a high sensitivity, we chose a fairly low threshold. The threshold is only relevant for the data presented in Table 1 and not relevant for the bulk of data we present.

Another, major limitation of our survey is that our data are based on self-rating rather than expert-ratings or interviews. However, in an exploratory sub-study in 1998 a smaller number of our high risk group and a smaller number of our low risk group was interviewed, using the SCID-I for DSM-IV diagnoses (First et al. 1996; Wittchen et al. 1998).[1] None of the students of the low risk group received a psychiatric diagnosis in the interview. The interviews of the high-risk group (weighted lifetime prevalence rates, based on the total sample) revealed that 1.5 % of the boys in Munich and 1.8 % of the boys in Veria carried a psychiatric diagnosis. For girls the prevalence of DSM-IV diagnosis was 10.5 % in Veria and 5.2 % in Munich. Substance use disorders in females in Veria were frequent, while none of the boys in Veria received a substance use or dependence diagnosis, 3.5 % of the girls showed substance use or dependence. Girls in Veria showed a prevalence of 1.4 % for alcohol abuse and a prevalence of 0.7 % for alcohol dependence. For a somewhat older age group of adolescents and young adults in Germany a prevalence of 4.5 % for alcohol abuse and of 2.5 % for alcohol dependency and increasing rates with age have been reported (Wittchen et al. 1997; Holly et al. 1997; Holly and Wittchen 1998). However, because of the very low N, the interview data of our sub-study have severe limitations and data are only suggestive.

There is one very important point to be stressed. One must keep in mind that only a very small number of interviews was done, which severely limits any interpretation of the interview data. Data are therefore only suggestive. It cannot be totally ruled out that sample effects may have contributed to the results of our study such as the increase in psychopathology over time. Although we assessed almost the total school population of certain class levels in the two locations at both cross-sections, we could not assess the limited number of students who at the time of assessment were not present in school. Physically or mentally ill students may be over-represented among them. We replaced one "Gymnasium" in Veria by the only "Gymnasium" in Makrohori. This "Gymnasium" was comparable to the "Gymnasiums" dropped from the study regarding number of students and classes, organization, contents of lessons and methods of teaching. At the time of our study there was no "Lyzeum" in Makrohori. Students in the relevant age ranges attended "Lyzeums" in Veria. We studied students representative for the age-groups in the area in 1980 and 1998 – 18 years apart. The samples were cross-sectional and, thus, independent for the student populations of the two locations at the two times of assessment. Generally, GHQ-28 scores in 1980 tended to be higher in Veria than in Munich (exception social dysfunctions); 18 years later in 1998 GHQ-28 scores were higher in both locations than 18 years before. In 1998 the GHQ scales showed no differences between the two locations (Veria and Munich) with the exception of GHQ-depression which was higher in Veria (Greece) than in Munich (Germany). Data from our first cross-section in 1980 confirmed the hypothesis of selective migration. Greeks who were selected to be allowed to come to Germany as migrant workers were screened on the basis of their health. Their children, who as adolescents had been assessed in 1980, on average were mentally healthier than their counterparts in Veria, Greece. The adolescents in Veria, Greece were children of Greek parents who had not come as migrant workers to Germany.

In 1998 the adolescents in Munich, Germany were no longer healthier than their counterparts in Veria, Greece (with the exception of depression). In 1998 more time had elapsed since the migration of the parents to Germany. Also, over the years from 1980 to 1998 traveling and communication had become much easier and more accessible so that there was a lot more exchange between Greeks in Greece and in Germany. Differences which existed in 1980 between migrant Greeks and Greeks who remained in their homeland apparently have diminished.

The most striking finding relevant for health- and school authorities was the increase in psychopathology in both locations (Veria, Greece and Munich, Germany) from 1980 to 1998 as measured by the GHQ-28. One possible reason for this finding is that achievement pressures are higher in present day Greek schools in Greece and Germany, compared to earlier decades. Further reasons need to be explored in future studies.

[1] In 1998 SCID-I interviews were conducted in Munich with 7 of the 10 males and 28 of 109 females of the high risk group and with 11 of the 43 males and 4 of the 10 females in the low risk group. In Veria, 11 of the 141 males and 39 of 411 females in the high risk group and 6 of 123 males and 7 of 54 females in the low risk group were interviewed using SCID-I. Interviewees were selected by a random procedure taking every third (in Munich) or ninth (in Veria) student from the list of high risk individuals which was ordered according to the proband code. Proband codes were assigned for each school separately and within school according to class starting with the lower classes. As only a small number of students could be interviewed because of our limited resources, this part of the study is of exploratory nature only.

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