ORIGINAL ARTICLE

The impact of migraine on work, family, and leisure among young women – a multinational study

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SUMMARY

Objective: To assess the impact of migraine on work, family, and leisure among young women who were employed full or part time, or as a full-time student.

Research design and methods: This cross-sectional telephone survey with 6-month recall was conducted in Israel and eight European countries (Finland, Germany, Greece, Italy, Norway, Spain, Sweden, and The Netherlands). Random-digit dialing was used to identify study participants: women 18–35 years of age with migraine, who used medication to treat their migraine, and who were employed or full-time students.

Results: Of 1810 participants, 42% self-reported having a physician diagnosis of migraine. During the prior 6 months, 46% of participants missed at least 1 day of work or school and 74% were prevented from functioning fully at work or school because of migraine. Mean work/school absenteeism due to migraine was 1.9 days over 6 months (range, 0.8 days in Sweden to 2.8 days in Norway). Over half of participants reported one or more occurrences of being unable to spend time with family or friends (62%) or being unable to enjoy recreational or leisure activities (67%) because of migraine. The percentage of study participants using triptans was lowest in southern Europe and highest in the Nordic countries, ranging from 1% in Greece to 50% in Sweden. Country, age, marital status, physician diagnosis of migraine, and number of migraines or severe headaches in the prior year were independent predictors of the mean number of days of migraine-related work loss. Migraine-related work loss was lowest in Sweden and greatest in Greece, Israel, and The Netherlands. Higher work loss was recorded for those 18–24 years of age; those who were separated, widowed, or divorced; those with migraine diagnosed by a physician; and those with more frequent migraines or severe headaches (≥ 24/year). The 6-month recall period used when estimating patient-reported work loss, and identifying participants with migraine based on self-reported migraine or severe headache, were the most important limitations of the study.

Conclusions: We found substantial migraine-related impairment of productivity at work and school as well as of family and leisure time among young women in Israel and eight European countries.

Introduction

Migraine is a chronic, episodic neurological disorder that affects women more commonly than men and is most prevalent among patients between the ages of 25 and 55 years, the peak productive years[1]. In western Europe and the United States (US), the overall prevalence of migraine is estimated to be 11%: 15%–18% among women and 6% among men[2].

Defined as episodic head pain, typically moderate or severe, migraine lasts 4–72 hours without treatment, is often unilateral and pulsatile or throbbing, and may be aggravated by movement[3]. Nausea, vomiting, photophobia, phonophobia, or a combination of these symptoms accompanies migraine. The unpredictable and disabling nature of migraine attacks imposes a substantial burden on affected patients, interfering with their normal functioning at work and at home. Patients and family members report that migraine negatively impacts participation in family life and family relationships[4,5]. Thus, the detrimental impacts of migraine extend to family life and leisure time, and hence to family and household members of migraine patients.

Understanding the work and family impact of migraine among young women is necessary before identifying those most affected and providing them with targeted interventions to reduce migraine-related disability. Young women are an important target population because the prevalence of migraine is high in this group[2]. In addition, this group may be more amenable to migraine intervention since migraine onset is more likely to be recent, and these women may not have had the opportunity to be fully educated about their condition and the available treatments. Our primary objective was to describe the impact of migraine on work, family, and leisure, assessed via a telephone survey, among a random sample of young women who were employed full or part time, or who were full-time students, in nine participating countries (Israel and eight European countries). As a secondary objective, we assessed participant-level characteristics associated with migraine-related work loss.

Methods

Survey

This cross-sectional telephone survey was conducted in June 2003 in Israel and eight European countries (Finland, Germany, Greece, Italy, Norway, Spain, Sweden, and The Netherlands). These countries were chosen because they are among the largest in Europe and they are geographically representative of the Pan-European region. Random-digit dialing, using residential telephone lists, was used to identify study participants. The residential lists were obtained through local telephone providers in each country and included all listed residential telephone numbers.

The survey was developed to determine the impact of migraine on the lives of study participants. The items used in the survey were newly created specifically to identify the impact of migraine on work, leisure, and family. The wording and limited response options were created to allow for ease of response to a telephone survey. The survey consisted of separate sections that assessed migraine or headache symptoms and treatment as well as the impact of migraine on work, relationships, family, leisure, and psychological well-being. The surveys were translated from English into the appropriate native or official language for use in each of the nine participating countries and were then back-translated into English. The back-translated surveys were compared with the originals, and any discrepancies were discussed by the translators and corrected.

The surveys were administered by trained interviewers within each country. The average time to complete this telephone survey was 15 minutes.

Participants

Women eligible for participation in this survey were 18–35 years of age with a self-report of migraine or severe headache and who used either prescription or over-the-counter medication to treat their migraine or severe headache. Study participants had to be employed (full or part time) or full-time students. Moreover, to be eligible for the survey, women had to report each of the following three features when their migraine or severe headache was untreated: (1) throbbing unilateral pain; (2) inability to go to work or school or having to lie down for more than 2 hours; and (3) presence of at least one of the predefined symptoms of nausea or vomiting, phonophobia, pain lasting for a few hours to a couple of days, photophobia, or a halo or aura in their vision. Women were excluded from the survey if they experienced daily headaches, if they had less than six migraines or severe headaches in 1 year, or if they took no medication for their headaches. Study participants were not compensated for their participation.

Migraine Definition

For the purposes of this survey, we considered women who fulfilled the eligibility criteria above to have migraine. The limitations of our ability to diagnose migraine are explored in the Discussion section.

Statistical Analyses

A minimum sample size of 200 participants from each of the nine countries was chosen based on the maximum acceptable margin of error for a dichotomous response (6.93 at the 95% confidence level within each country, 2.31 at the 95% confidence level across all nine countries). The data were summarized using descriptive statistics. These included measures of central tendency (means) and variability (standard deviation) for continuous variables. Percentages were reported for categorical variables.

Poisson models were used to determine independent predictors of work loss (namely, the number of days of missed work or school because of migraine in the past 6 months; and the number of days arrived late or left early because of migraine in the past 6 months)[6]. A Poisson model is considered appropriate for modeling counts (e.g., number of days) or rates (e.g., number of days per unit time). Any variables statistically significant ($p < 0.05$) in the bivariate analysis were evaluated for inclusion in the final multivariate model. Variables evaluated in the bivariate model included demographic variables (participant's country, age, and marital status), job or school status, and headache characteristics (physician diagnosis of migraine, number of migraines or severe headaches in the past year). Once the statistically significant variables from the bivariate analysis were selected, only those variables statistically significant ($p < 0.05$) in the multivariate model, according to type 3 likelihood ratio statistic, were included in the final model. A Pearson's scale parameter was introduced into the model to correct for overdispersion. The analysis was conducted using Statistical Analysis Software, version 8.0.

Results

Participants

A total of 1810 participants were identified across nine different countries, with the number of participants per country ranging from 200–208. The characteristics of participants are shown in Table 1. Participants were, on average, 29 years of age (range, 18–35 years) and mean age ranged by country from 27 years in Israel to 30 years in Germany. Over one half (58%) of study participants were employed full time, followed by part-time employed (26%), and full-time student (16%). There were differences in employment status across countries, with 77% of participants in Greece employed full time (high), compared with 43% in The Netherlands (low).

Participants averaged 23 migraines or severe headaches per year, ranging from a low of 11 per year in Finland to 34 per year in Germany (see Table 1). Overall, 42% had a self-reported physician's diagnosis of migraine; the percentage of participants with a physician's diagnosis ranged from a low of 25% in Italy to 57% in Finland. Most participants treated their migraine with over-the-counter medications (55%), followed by non-triptan prescription medication (26%) and triptans (20%). There were clear differences across countries in the percentages of participants currently using triptans: use was highest in the Nordic countries (Norway 37%; Finland 41%; and Sweden 50%) and lowest in Greece (1%) and Italy (5%).

Survey Results

Impact of Migraine on Work or School

During the prior 6 months, nearly one half (46%) of participants missed at least 1 day of work or school because of migraine. The mean number of days absent due to migraine was 1.9. Overall, 41% of participants reported arriving late to or leaving early from work or school during the 6-month period; the mean number of days arriving late or leaving early was 1.5 days. Nearly three of four participants (74%) were prevented from functioning fully at work or school during the prior 6 months because of migraine; a mean of 4.3 days of reduced function was reported over this time period.

The impact of migraine on work or school is shown by country in Figures 1 and 2. The mean number of days absent from work or school due to migraine ranged from 0.8 days in Sweden to 2.8 days in Norway.

Of all participants, approximately 4 of 10 individuals (39%) indicated that migraine had negatively affected their job or school performance (Figure 3), with a range from 38% of full-time employees to 44% of full-time students. Inability to perform what was required at school or work because of migraine was reported by 71% of participants. Sixteen percent reported that migraine prevented them from reaching their career goals, while 6% reported that their migraine condition caused a missed career opportunity.

Impact of Migraine on Family and Leisure

Nearly two-thirds of participants (62%) reported one or more occurrences of being unable to spend time with family or friends because of migraine (see Figure 3). The mean number of occurrences was 2.9 (SD, 5.7) over the prior 6-month period. Meanwhile, 67% of participants reported one or more occurrences of being unable to enjoy recreational or leisure activities because of migraine, with a mean of 3.4 occurrences (SD, 5.8) over

Table 1. *Participant demographic and migraine characteristics by country*

|	Finland	Germany	Greece	Israel	Italy	Netherlands	Norway	Spain	Sweden	*Total*
	N = 200	*N* = 200	*N* = 200	*N* = 200	*N* = 201	*N* = 200	*N* = 208	*N* = 200	*N* = 201	*N* = 1810
Age, mean (SD)	29.2 (5.0)	30.2 (4.3)	29.5 (5.0)	26.7 (4.9)	28.8 (5.0)	28.4 (5.3)	28.4 (5.2)	27.4 (5.5)	28.9 (4.9)	28.6 (5.1)
Employment status, %										
full-time employed	74.5	47.5	77.0	52.0	60.2	43.0	47.6	54.5	54.5	58.0
part-time employed	3.5	46.5	10.0	28.0	22.4	44.5	40.9	16.5	16.5	26.4
full-time student	22.0	6.0	13.0	20.0	17.4	12.5	11.5	29.0	29.0	15.6
Marital status, %										
single, never married	21.5	23.0	41.5	45.5	51.8	24.5	26.9	54.0	36.8	36.1
live with partner	22.0	12.5	6.5	4.0	5.0	31.0	17.8	22.5	37.8	17.7
married	49.5	60.0	45.5	48.0	39.8	42.5	51.0	17.0	18.4	41.3
separated/divorced	7.0	4.5	2.5	2.5	1.5	0.0	4.3	4.5	5.5	3.6
widowed	0.0	0.0	4.0	0.0	2.0	2.0	0.0	2.0	1.5	1.3
Number of migraine/severe headaches in past year: mean (SD)	11.4 (4.8)	33.9 (42.9)	20.4 (23.1)	21.4 (19.3)	25.1 (30.9)	25.9 (59.0)	30.6 (39.8)	18.4 (16.9)	18.6 (15.2)	22.9 (32.8)
Physician diagnosis of migraine, %	56.5	43.5	26.0	48.5	24.9	39.5	45.2	51.5	45.3	42.3
Treatment of migraine, %										
triptan	41.0	9.5	1.0	10.0	4.5	14.5	37.0	8.5	49.8	19.6
non-triptan prescription medication	26.5	28.5	40.0	33.5	20.9	31.0	14.9	23.5	13.4	25.7
over-the-counter medication	32.5	62.0	59.0	56.5	74.6	54.5	48.1	68.0	36.8	54.6
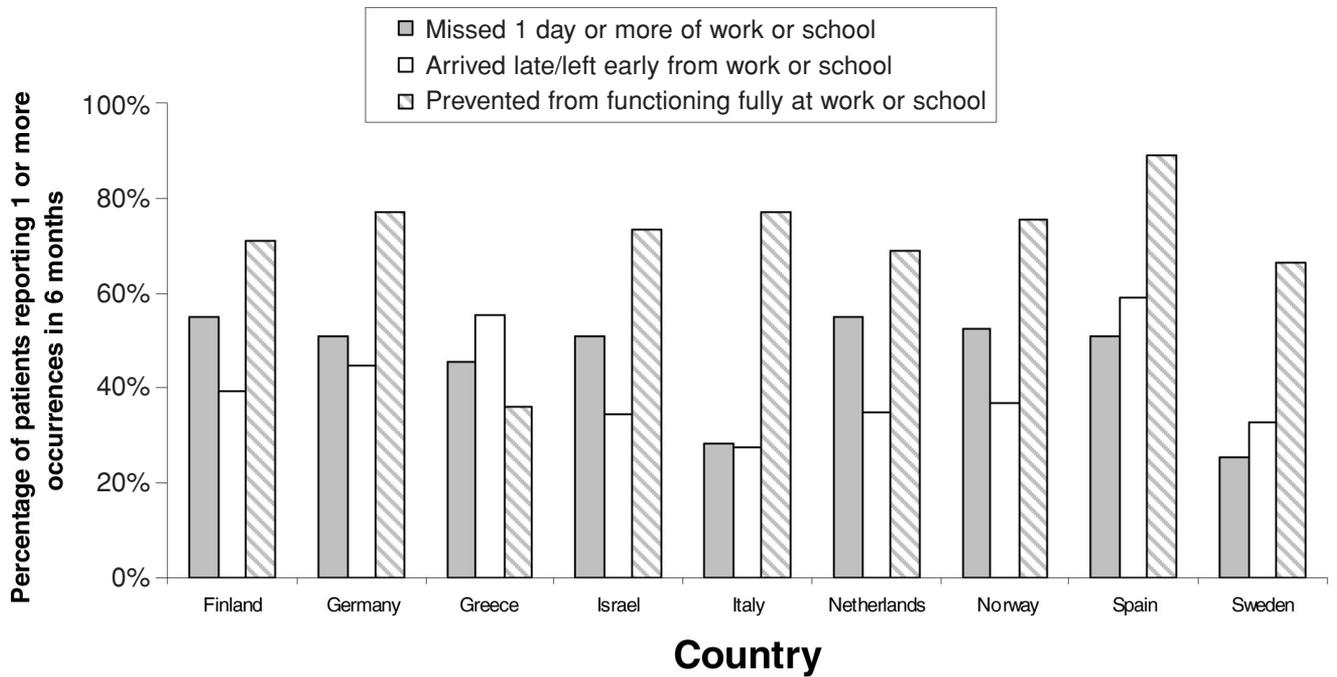
Figure 1. *Percentage of patients who, because of migraine, missed 1 day or more of work or school, arrived late to or left early from work or school at least once, or were prevented from functioning fully at work or school at least once during the 6 months before the survey*
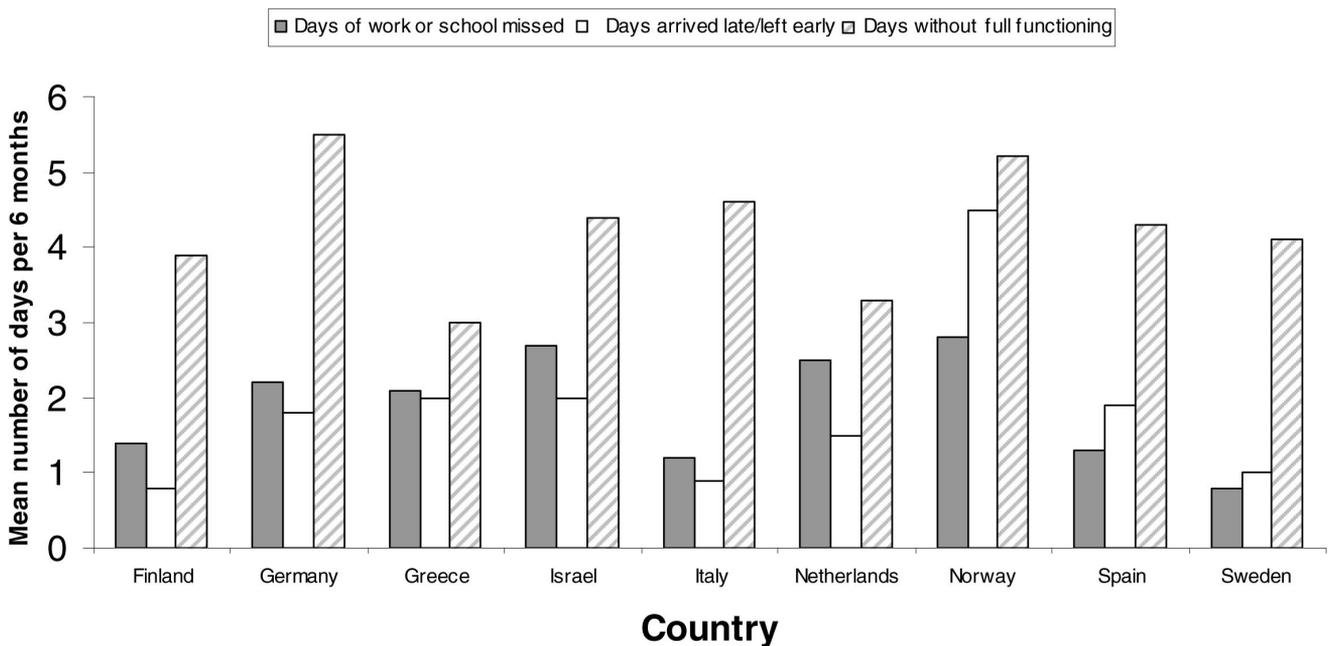

Figure 2. *Mean number of days during the past 6 months when participants missed work or school, arrived late to or left early from work or school, or were not fully functioning at work or school because of migraine*

the prior 6-month period. Over one half indicated that migraine caused them to miss out on social activities.

Variables Associated with Migraine-Related Impact on Work or School

In bivariate analyses, participant's country, age, marital status, physician diagnosis of migraine, and number of

migraines or severe headaches in the past year were statistically significant predictors ($p < 0.05$) of days missed from work or school. The only variable which was not a significant predictor in bivariate analyses was the participant's job or school status. The same variables were statistically significant predictors in bivariate analyses of the number of days arrived late or left early because of migraine. Therefore, the participant's job or school status
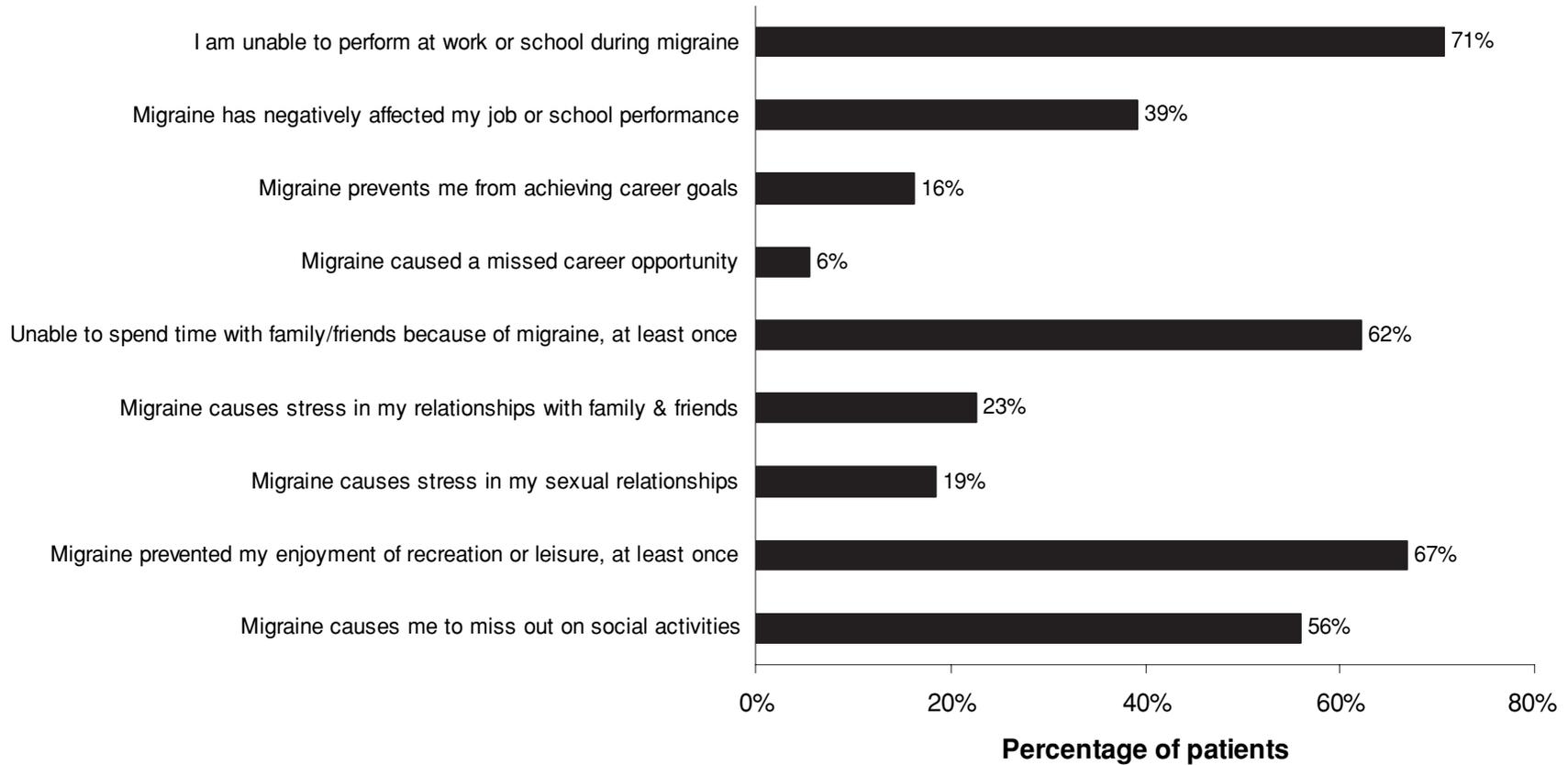
Figure 3. *Impact of migraine on work, family, and social activities during the 6 months before the survey: percentage of patients responding in the affirmative to survey questions*

Table 2. *Multivariate analysis of predictors of number of days of missed work or school and of number of days arrived late or left early because of migraine in prior 6 months*

	Number of days missed work or school			Number of days arrived late to, or left early from, work or school		
	RR	95% CI	*P* value	RR	95% CI	*P* value
Country						
Finland	1.9	1.6–2.4	< 0.0001	1.1	0.9–1.3	0.056
Germany	2.6	2.2–3.2	< 0.0001	1.8	1.5–2.2	< 0.0001
Greece	2.8	2.3–3.4	< 0.0001	2.5	2.1–3.0	< 0.0001
Israel	3.0	2.5–3.5	< 0.0001	2.0	1.7–2.3	< 0.0001
Italy	1.5	1.3–1.9	< 0.0001	1.0	0.8–1.2	0.86
Netherlands	3.5	3.0–4.2	< 0.0001	1.8	1.5–2.2	< 0.0001
Norway	3.2	2.7–3.9	< 0.0001	1.4	1.2–1.7	0.0001
Spain	1.3	1.1–1.6	0.0045	1.7	1.5–2.0	< 0.0001
Sweden	1.0		–	1.0		–
Marital status						
single, never married	0.8	0.7–0.9	0.0015	0.9	0.8–1.1	0.55
live with partner	0.6	0.5–0.7	< 0.0001	0.9	0.7–1.0	0.14
married	0.5	0.5–0.6	< 0.0001	0.6	0.5–0.8	< 0.0001
separated/divorced/widowed	1.0		–	1.0		–
Participant age						
18 to 24	1.2	1.1–1.3	< 0.0001	1.1	1.0–1.3	0.01
25 to 29	0.7	0.7–0.8	< 0.0001	1.0	0.9–1.1	0.57
30 to 35	1.0		–	1.0		–
Physician diagnosis of migraine						
Yes	1.5	1.4–1.6	< 0.0001	1.7	1.6–1.8	< 0.0001
No	1.0			1.0		
Number of migraine/severe headaches in past year						
6 to 11	0.5	0.5–0.6	< 0.0001	0.4	0.4–0.5	0.0001
12 to 23	0.6	0.6–0.7	< 0.0001	0.5	0.5–0.6	0.0001
≥ 24	1.0		–	1.0		–

RR = risk ratio; CI = confidence interval
The reference/comparison group for each variable is listed last

was excluded from the subsequent multivariate analysis. All remaining variables (country, marital status, age, physician diagnosis of migraine, and number of migraines or severe headaches in the past year) were also statistically significant in the two multivariate models, as shown in Table 2.

There were significant differences across countries in the mean number of days of school or work missed in the past 6 months because of migraine (type 3 likelihood ratio test, 8 df: $\chi^2 = 479.3$; $p < 0.0001$). The mean number of days of school or work missed for participants in The Netherlands was 3.5 times the number for those in Sweden (Table 2), after controlling for marital status, participant age, physician diagnosis of migraine, and number of migraines or severe headaches in the past 6 months. Similarly, those in Norway and Israel had a 3-fold or higher risk of missing a day of work or school because of migraine compared with those in Sweden. Participants

who were married had 0.5 times the mean number of missed days of work or school compared with those who were separated, widowed, or divorced (RR = 0.5; 95% CI: 0.5, 0.6) (see Table 2). Participants diagnosed with migraine by a physician had 1.5 times the mean number of missed days of work/school compared with those not diagnosed with migraine by a physician (risk ratio [RR] = 1.5; 95% CI: 1.4, 1.6). Those participants with ≥ 24 migraines or severe headaches in the past year were significantly more likely to report a higher number of days missed of work or school compared with those with 6–11 migraines (RR = 0.5; 95% CI: 0.5, 0.6) and those with 12–23 migraines in the past year (RR = 0.6; 95% CI: 0.6, 0.7) (see Table 2).

The differences across countries were less pronounced for the number of days arrived late to or left early from work or school due to migraine as compared with the number of days of work or school absences due to

migraine, with Sweden once again having the lowest risk among all countries (see Table 2). Those individuals who were married, and those who were not diagnosed with migraine by a physician, were less likely to report arriving late or leaving early because of migraine ($p < 0.0001$ for both comparisons).

Discussion

The results of this cross-sectional telephone survey showed a substantial impact of migraine on work and school productivity as well as the family and leisure time of young women in eight European countries and Israel. Participants were of a similar mean age in the different countries; however, other characteristics differed quite substantially across countries, including frequency of migraine headache, percentage with a physician diagnosis, and type of migraine medication used. Overall, during the prior 6 months, participants had missed a mean of 1.9 days of work or school because of migraine, and nearly half had missed at least 1 day.

Extrapolation of our findings to a 1 year period equals a mean of 3.8 days per year (country range, 1.6–5.6 days/year) of work or school missed (absenteeism) because of migraine among women in this survey. This finding is similar to those of prior cross-sectional studies of migraine in Europe and the United Kingdom (UK), in which women reported from 1.1–3.8 days per year of work absence because of migraine[7–10]. Work absence among men was slightly lower in these reports (0.8–1.6 days/year), and average absenteeism for men and women in the UK was 2 days per year in one report[11]. Reported absenteeism among patients being screened for or participating in clinical trials for migraine tends to be higher (2.0–2.5 days per month in one American study[12] and a mean of 8.3 days per year in a multinational study[13]) most likely because these patients tend to be more severely affected by migraine than those in the general population[10].

Further work losses result from the decrease in productivity that occurs when patients experience a migraine attack at work. Prior cross-sectional studies report 0.8–9.4 workdays per year lost because of reduced productivity[7,9–11], calculated by multiplying the number of workdays affected by migraine attacks times the percentage of reduced effectiveness on these days. We did not ask survey participants to estimate their percentage of reduced effectiveness during migraines. However, as extrapolated from our findings for a 6-month period, participants reported a mean of 8.6 days per year (country range, 6–11 days/year) during which they were prevented from functioning fully at school or work because of migraine. This is somewhat less than that

in a UK study[11], in which women reported attending work with migraine on 20 days per year.

Few studies have evaluated determinants of work loss among individuals with migraine. Using a cross-sectional telephone survey in the US, Schwartz *et al.*[14] found that headache type, headache pain severity, and educational level were each independent predictors of the workplace impact of headache. Participants with migraine were at greatest risk of lost workdays (odds ratio, adjusted for headache type, race, educational level, sex, and pain intensity, of 6.8 [95% CI: 5.2, 9.0] relative to tension-type or other type of headache) as well as at greatest risk of reduced effectiveness workday equivalents (adjusted odds ratio, 3.2 [95% CI: 2.7, 3.7] relative to tension-type headache). Moreover, the risk of either a lost workday or reduced effectiveness workday equivalents increased with increasing pain severity. Women were at higher risk than men of a lost workday (adjusted odds ratio, 1.5 [95% CI: 1.3, 1.9]), and participants with some college or more education were at higher risk of a reduced effectiveness workday equivalent than those with less education.

We did not evaluate pain severity or educational level in the present study. However, we identified country, age, marital status, having a physician diagnosis of migraine, and a higher number of migraines or severe headaches in the prior year as being independent predictors of work loss as measured by either the number of days of work or school missed or the number of days arrived late to or left early from work or school because of migraine. Work loss was lowest in Sweden. The mean number of days of work loss was greatest among participants from certain countries (The Netherlands, Norway, Israel, and Greece, in particular), among the youngest participants (those 18–24 years of age), and among those who were separated, widowed, or divorced. The reduced migraine-related work loss among those who were married could be explained by the higher level support system of those migraineurs involved in a committed relationship, which may help the patient better manage the consequences of migraine. Moreover, participants with migraine diagnosed by a physician had higher work loss. This could be accounted for by the fact that those who seek the care of a physician tend to have higher levels of disability[15]. Finally, and not surprisingly, work loss was greater among those with more frequent migraine or severe headache (≥ 24/year).

We found large differences across countries in terms of patient characteristics, such as the mean number of headaches reported, the percentage of patients with a physician diagnosis of migraine, the medication selected, as well as work loss because of migraine. There are at least two explanations for these differences. First, the results may reflect cultural differences about the perceived seriousness of migraine and its impact on patient functioning. Second, it is possible that the sampling

approach may not have captured equally representative samples from each country.

Work functioning and social functioning have been identified as being two of the most important determinants of the migraine-specific quality of life of patients who experience migraine attacks[16,17]. Migraine has a substantial detrimental impact on the family life of patients with migraine as well as on household partners and other family members of these patients[4,5]. In the present survey, the impact of migraine on family life and leisure time of participants was considerable, with 62% of participants reporting one or more occurrences of being unable to spend time with family or friends and 67% reporting one or more occurrences of being unable to enjoy recreational or leisure activities over the prior 6-month period because of migraine.

Multiple studies have shown that treatment of acute migraine attacks with triptans can significantly reduce migraine-related productivity loss and costs as compared with placebo or the patient's usual non-triptan therapy[18–23]. Moreover, rizatriptan therapy has been shown to significantly improve the social functioning scale from the migraine-specific quality-of-life questionnaire[24,25], a scale that measures 'interaction with people who are close to you; interactions with other people; and ability to enjoy life'[16].

The strengths of the present survey are that the results were obtained from a large sample of young women with migraine, who were receiving treatment for their migraine, from nine predominantly European countries. Participants responded to a standardized questionnaire, which allowed us to compare results across the nine countries.

Our findings, however, should be evaluated in the context of the limitations of the telephone survey. Patients' diagnosis of migraine or severe headache was based on patient self-report without verifying the diagnosis. Moreover, the criteria used to identify eligible participants as having migraine have not been previously validated. These criteria are similar to those of the International Headache Society (IHS)[3] for migraine without aura with three exceptions: (1) we did not require participants to have at least five attacks fulfilling the criteria; (2) we did not require headache duration to be 4–72 hours; and (3) we did not require that nausea and/or vomiting or photophobia and phonophobia be present. Thus, using our criteria, in theory, a woman could have been included in the survey who had unilateral, pulsating headache, was functionally disabled, and had pain lasting for a few hours to a couple of days but no nausea, vomiting, photophobia, or phonophobia, thereby not fulfilling IHS criteria for migraine without aura. Moreover, we did not specify the nature or timing of aura for those participants who experienced it. Finally, participants with migraine-like headaches caused by another disorder could have been included in the survey.

Another limitation of this study is recall bias, as participants may have been unable to accurately recall their decreased functioning with regard to work, family, and leisure over a 6-month period. Studies examining work productivity of patients with migraine have used recall periods ranging from diary recordings on an hourly basis[21,22] or when a migraine resolves[19,20] to recall periods of up to 24 months[26]. Burton et al.[18] noted that reported monthly migraine-related work loss increases with the recall period among individuals with migraine. Similarly, van Roijen et al.[9] found that absenteeism increased from a mean of 3.2 days per year with 2-week recall to 4.2 days per year with 3-month recall. Thus, we may have collected lower work loss estimates with a shorter recall period or with prospective data collection (e.g., in a diary).

There are also limitations in the sampling and data collection methods themselves. The sampling method required that participants have telephones within their household, and thus households without a telephone were not represented. Some women eligible for the survey may have had an unlisted residential telephone number or only a cellular telephone. However, telephone coverage in the countries included in this study is high, reported to range from 94% to 98% in Finland, Israel, and Sweden[27–29]. Moreover, since our sample is younger and productive (working or in school), the rate of telephone coverage should be higher than for countries as a whole. The data collection method may result in a bias toward socially acceptable responses or a higher rate of non-response to sensitive questions than a self-administered questionnaire even though respondents were assured of complete confidentiality[30,31]. Therefore, the impact of migraine on work, family, and leisure may in fact be greater than that reported.

Conclusions

The results of this cross-sectional telephone survey indicate substantial impairment of productivity at work and school as well as of family and leisure time because of migraine among young women in Israel and eight European countries. We found considerable variability among countries in the percentage of women with a physician diagnosis of migraine and in the type of medications used for migraine. In general, the percentage of patients using migraine-specific therapy, namely, use of triptans, was low, particularly in southern European countries. Our findings suggest that levels of migraine control in young women could be improved in many, if not most, of these countries.

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