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# Migraine Prevalence, Burden, and Socio-demographic Characteristics Globally and in Israel: **A Narrative Review**

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#### **ABSTRACT**

Migraine is very common headache disorder, usually starting at a young age with a higher prevalence in females. In this narrative review, we summarized the prevalence, burden, and socio-demographic characteristics of migraineurs worldwide and specifically in Israel. We searched standard electronic bibliographic databases, including MEDLINE (via PubMed), Embase, Google Scholar, and Up to Date using combinations of search terms and reviewed the articles we found. The factors reviewed included prevalence and incidence, burden, sex differences, age distribution, cognitive function, socioeconomic status, religion, country of origin, and urban vs. rural dwelling. IMAJ 2023; 25: 639-643

KEY WORDS: disability adjusted life years (DALYs), global burden of disease (GBD), headache, migraine, socioeconomic status (SES)

> igraine is a neurological condition characterized by head-Lache attacks accompanied by hypersensitivity to visual, auditory, olfactory, and cutaneous stimuli as well as nausea and vomiting. Most people with migraine have episodic migraine, in which they present with a headache fewer than 15 days of

> There are two major types of migraine: migraine with aura and migraine without aura. The clinical syndrome of migraine without aura includes a unilateral headache lasting 4–72 hours, with a pulsating quality of moderate to severe intensity aggravated by routine physical activity and associated with nausea and/or photophobia and phonophobia.

> In migraine with aura transient, focal neurological symptoms usually precede or sometimes accompany the headache. Typically, migraineurs have recurrent attacks lasting several minutes of unilateral fully reversible visual, sensory, or other central nervous system symptoms that develop gradually and are generally followed by a headache with the associated migraine symptoms [2].

> A subgroup of people with migraine has chronic migraine, defined as: headache occurring on 15 or more days per month

for more than 3 months, with the features of migraine headache on at least 8 days [2]. Chronic migraine tends to develop as a slow increase in headache frequency over months and years, a process termed migraine transformation [1].

In this narrative review, we summarize data from different epidemiological fields and compare the global data to what is known in Israel with regard to migraine prevalence, burden, and socio-demographic characteristics.

#### **BURDEN**

The Global Burden of Disease (GBD) study from 2016 confirmed that headache in general, and migraine in particular, was a global public health problem in both sexes and for all age groups, but mostly in young and middle-aged women [3]. Migraine is ranked in the three most burdensome neurological disorders in the United States in terms of absolute number of disability adjusted life years (DALYs) after stroke and dementias [4]. In 2016, migraine ranked in the top 10 of years of life lived with disability (YLDs) in 195 countries and caused 11.2% of all YLDs in women between 15 and 49 years of age. For migraine, mean lost workdays were about 1 day/month and mean lost housework days were the same in males but approached 2 days/month in females [5]. Moreover, migraines accounted for roughly 4 million emergency department (ED) visits in 2016. Overall, headache was the fifth most common cause for an ED visit and the third most common reason for ED visits in females aged 15-64 years. More than 4.3 million office visits were due to migraine [6]. Dueland and colleagues [7] found a migraine-related deficiency of productivity at work along with a negative influence on family and leisure time among young women in Israel and eight European countries. While migraine is a global health problem, the burden may vary from country to country.

## PREVALENCE AND INCIDENCE

Migraine was ranked as the second most prevalent neurologic disorder with the second highest incidence of new onset in 2017 [4]. In 2018 in the United States, the overall age-adjusted prevalence

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of migraine or severe headache was 15.9%. The prevalence in females was roughly double that of males [6]. Woldeamanuel and Cowan [8] reported that global migraine prevalence was 11.6%, 10.4% in Africa, 10.1% in Asia, 11.4% in Europe, 9.7% in North America, and 16.4% in Central and South America. Their results showed a pattern of rising global migraine prevalence. In 2016,

the age standardized prevalence of migraine was highest in Italy (21,388 prevalent cases per 100,000) and lowest in China (13,053

LOWER SOCIOECONOMIC STATUS, INCOME, AND EDUCATION
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AND MIGRAINE ATTACK FREQUENCY

prevalent cases per 100,000). In Israel there were 17,550 prevalent cases per 100,000 [3]. Migraine prevalence was reported as 7.9–9.7% in China, 17.8% in Israel, 17.0% in Russia, 5.1–17.1% in South Korea, and 7.2–17.3% in Turkey [9].

Data from the Third Israeli National Health Interview Survey (INHIS) from 2014-2015 showed that the prevalence of chronic migraine was 8.8%, whereas in the first INHIS from 2003–2004 the prevalence was 6.8%. The percentage of change between these surveys was 24.9% [10]. In an Israeli study with 4603 participants, who were selected randomly from a large community, 46% reported chronic pain in at least one site and 13% had headaches [11]. Migraine is one of the most common neurologic disorders worldwide, with a high prevalence and morbidity, particularly among young adults and females.

#### **SEX**

In the United States, headache or head pain was the 10th most common reason for ED visits in females under 15 years of age [6]. Buse and co-authors [12], based on the analysis of data from American Migraine Prevalence and Prevention (AMPP), supported previous findings that migraines are not only more prevalent in females, but also more disabling and associated with more symptoms and greater healthcare resource utilization. In Europe, women were also diagnosed with headache more often than men, and some authors suggested that men were underdiagnosed with this *female* disease [13]. In women, a younger age and higher attack frequency was associated with a higher probability of receiving a brain magnetic resonance imaging, yet overall access to healthcare and diagnostics for both sexes was equal [13]. Israeli women reported a significantly higher prevalence of chronic health disorders, including migraine, compared to men and women in other countries [14].

### AGE

The global prevalence of migraine was higher in females than males, across all age groups [15]. In the United States, migraine is most common in the age range 30–39 years, with a 7% and 24% prevalence in men and women, respectively. The prevalence was lower in those 12 to 17 years of age and was lowest in adolescents and those older than 60 years [16]. According to the AMPP study, which estimated migraine onset based on

self-reported data, incidence peaked between the ages of 20 and 24 years in women and the ages of 15 and 19 years in men. Median age of onset was 25 and 24 years in women and men, respectively. Four of 10 women, and 2 of 10 men will present with migraine in their lifetime, mostly before the age of 35 years [17]. The mean age for migraine in Europe was 43 years. In

males, lifetime prevalence peaked in the age range 20–30 years, while in females there was a plateau at 20–50 years of age. Preva-

lence fell dramatically in both sexes after 60 years of age [5]. The third INHIS showed that the average age for multiple chronic conditions including migraine in Israel was  $47.2 \pm 16.3$  years, with a median age of 53 years [10]. Peles at al. [18] reported that the mean age of migraine in Israel was  $36.94 \pm 13.61$  years. The highest prevalence was observed equally in individuals in their fifth and sixth decades of life. Globally the peak in the prevalence of migraine and YLDs are in individuals aged 35-39 years. In both sexes, the percentages of YLDs were highest those aged 15-49 years (migraine 8.2%), and lowest in the elderly over 70 years of age (migraine 1.3%) [3].

Migraine usually affects young people; however, one Israeli study found a higher mean age.

### **COGNITIVE FUNCTION**

Patients with migraine are at an elevated risk of mild changes in several cognitive domains. The most frequently reported cognitive changes were impaired visual and verbal memory, reduced information processing speed, more executive dysfunction, and higher attention deficit [19]. Low educational status is an important demographic risk factor for transformation into chronic migraine, while higher education seems to act as a protective factor against migraines [15].

In the United States, frequent headache is common in the general population and is more prevalent in those with less than a high school education [20].

In Italy Chiappedi and colleagues [21] compared the total intelligence quotient in 11–14 year olds with headache and controls and found no differences. However, the working memory index was lower in patients with headache. These results suggest that although cognitive functioning of adolescents with headache was within normal limits, it differed from healthy individuals regarding memory and verbal skills. Other studies reported significant differences between headache and control groups in scores for mean total intelligence quotient and verbal intelligence quotient. Significant negative correlations were found between the total intelligence quotient, verbal intelligence quotient, performance intelligence quotient, and the frequency of attacks as well as between the total intelligence quotient score and the age of headache onset [22]. Migraine traits do not seem to predispose migraineurs to long-term cognitive

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Table 1. Prevalence, sex, burden on economy, age, origin, cognitive effects, religion, urban vs. rural, and socioeconomic status of migraine

	Global	United States	Europe	Israel
Prevalence	11.6%	15.9%	11.4%	8.8%
Sex	Higher in females than males	Higher in females than males	Higher in females than males	Higher in females than males
Burden on economy	Migraine ranked in the top 10 YLDs in 195 countries in 2016	Migraine ranked in the 3 most burdensome neurological disorders in terms of absolute number of DALYs	For migraine, mean lost workdays were about 1 day per month	Migraine-related deficiency of productivity at work and influence on family and leisure time
Age	Peak prevalence between 35 and 39 years	Most common in 30 to 39 years	Mean age for migraine was 43 years	Average was 36.4 years
Origin	Prevalence of migraine in Asia- Pacific countries was close to that of North American and European countries	Migraine prevalence is highest among Native Americans, Asians have the lowest prevalence	The prevalence of migraine in non-Caucasians was about half of that in Caucasians	The health status of all immigrant groups was poorer than native-born Israelis
Urban vs. rural	Living in an urban area is associated with migraine	Urban vs. rural residence was not significantly associated with migraine prevalence	Rural residents were diagnosed less often with migraine	Living in an urban area is associated with migraine
Cognitive	Cognitive dysfunction is a frequent manifestation of migraine attacks and may be specific to this disorder	Higher prevalence in those with less than a high school education	Significant differences were found in mean total intelligence quotient and verbal intelligence quotient scores	No significant age- independent relationships were found between migraine and education
Religion	Prayer reduces migraine pain	There is relationship between headache and frequent religious attendes	Migraine increased the odds of frequently attending religious activities	The prevalence of frequent headaches was higher in Jewish adolescents than in Arab adolescents
Socioeconomic status	Association of migraine with low socioeconomic status has been demonstrated	Migraine prevalence was strongly associated with low household income	Low socioeconomic status is associated with increased migraine prevalence	Migraine prevalence is associated with low household income

DALYs = disability adjusted life years, YLD = years of life lived with disability

decline. However, cognitive dysfunction is a frequent manifestation of migraine attacks and may be specific to this disorder. This attack-related cognitive dysfunction is clinically relevant, contributes to disability, and should be considered as a therapeutic target [23]. Although there is no consensus, it seems that migraine affects certain cognitive domains.

### **SOCIOECONOMIC STATUS**

When comparing the two socioeconomic status (SES) proxies, income, and education, the predominant contributor to the observed relationship between SES status, headache prevalence, and migraine attack frequency was income [24]. Higher incidence was found in lower household income groups for both females and males. Interestingly, after migraine onset, the duration that an individual had migraine did not appear to be altered by income

[25]. Migraine prevalence was strongly associated with household income in the United States, with prev-

KNOWLEDGE OF THE SOCIO-DEMOGRAPHIC RISK FACTORS MAY HELP IDENTIFY AT-RISK INDIVIDUALS

alence in the lowest income group more than 60% higher than in the two higher income groups. Females between the ages of 30 and 49 years from lower-income households had an especially high risk of having migraines [26]. In adolescents with no family

history of migraine, lower household income was associated with a higher prevalence of migraine. In contrast, in those with a family history, income did not have a significant effect [27]. Women with low SES had an increased risk for all headache forms [24], and this result was echoed in the results of a univariate analysis (not independent) demonstrating the same relationship in the United States, Brazil, the Republic of Georgia, and Norway [28].

Low socioeconomic status is associated with an increased prevalence of all headache forms and higher migraine attack frequency.

# RELIGION

In a prospective study from the Nord-Trøndelag health study [29], migraine slightly increased the odds of frequently participating in religious activities 11 years later. These religious activities includ-

ed attending a church/house of prayer at least once in a month during the last six months [29]. According to

an Israeli study by Genizi and co-authors [30], the prevalence of frequent headaches was significantly higher in Jewish than Arab adolescents. The well-known sex difference remained within each ethnic group; that is, females reported more frequent headaches

than males [30]. In an Iranian study prayer was found to have a positive effect and reduce migraine pain. Prayer was suggested as a non-pharmacological method for coping with migraine [31].

Based on the small amount of data on this factor, it seems that religion affects migraine burden.

#### **COUNTRY OF ORIGIN**

The 1-year prevalence of migraine in Asia-Pacific countries

(Hong Kong, Taiwan, Singapore, Japan, South Korea, China, and India) was similar to that found in North America

IT IS IMPORTANT TO IDENTIFY SOCIO-DEMOGRAPHIC
CHARACTERISTICS OF MIGRAINEURS IN ISRAEL, AND COMPARE
THEM TO OTHER GLOBAL POPULATIONS

(8.5–14.7%, average 11.1%) and Europe (9.6-24.6%, average 14.8%). Migraine was reported as most prevalent in women of reproductive age (peak 20–60 years) in European, North American, and most Asian studies. The peak age in men was given less attention in these studies [32].

The burden of headache was generally higher than the global average in the Eastern Mediterranean Region (EMR). Higher rates of risk factors for progression of episodic migraine to chronic migraine, such as depression, anxiety, and stressful life events, that were found in the EMR may partially explain the higher burden of headache. All countries of the EMR (except Somalia and Djibouti) had higher age standardized YLD rates for migraine compared to the global rates. Libya and Saudi Arabia had the highest increase in age standardized YLD rates of migraine. Since 1990, the burden of primary headache disorders has been higher in EMR than in the rest of the world [33]. Research from 2015 using statistics from national survey studies, showed that migraine prevalence was highest among Native Americans, followed by Caucasians, and followed closely by Hispanics and Blacks. Among the major racial or ethnic groups in the United States, Asians had the lowest prevalence of severe, frequent headache or migraine [34]. According to research from the United Kingdom, the prevalence of migraine in non-Caucasians (Black, Asian, Bangladeshi, Chinese, and other races) was about half that in Caucasians in both males and females [35].

In an Israeli study on sources of health gaps between Jewish immigrants and native-born Israelis using the illness severity index, migraine was among the 20 illnesses examined. Three distinct groups of immigrants were included: those from the former Soviet Union, Western Europeans or Americans (mostly Ashkenazim), and Asians or North Africans (mostly Sephardim). The health status of all immigrant groups was poorer than the native-born Israelis [36]. More frequent headaches were reported in Israeli adults born during the Holocaust [37].

Migraine is caused by a combination of genetic, environmental, and lifestyle factors. They are affected by social, cultural, psychological (e.g., coping, mood), and biological characteristics. Therefore, place of birth and ethnicity may influence migraine prevalence and burden.

#### **URBAN OR RURAL DWELLING**

Globally, urban residents had more lifestyle-related disorders such as obesity and hypertension than rural dwellers. These disorders were also risk factors for migraine [38]. Urban residents were 1.3 times more likely to have migraine than rural residents [8]. In the United States this fact was not altered by geographic region, population density, or household income [16]. Urban vs. rural residence (population density) was not significantly asso-

ciated with migraine prevalence [26].

Access to specialized healthcare is more limited in rural regions in Germany

and the management of headache disorders may be too complex for primary care providers without special training [39]. In Israel unlike other countries, rural areas, such as a kibbutz or a moshav, are considered places with a high quality of life compared to some urban areas, especially those communities that are far from the center. In Israel, urban dwelling and recent immigration were significantly associated with migraine [40]. As with other lifestyle-related diseases, there is a higher prevalence of migraine in rural regions.

#### **CONCLUSIONS**

We summarized the prevalence, burden, and the socio-demographic characteristics of migraine worldwide, with a specific focus on Israel. The factors reviewed included prevalence and incidence, origin, urban vs. rural factors, sex differences, age distribution and the effects of cognitive factors. One specific limitation of this review is the lack of reliable, high quality original socio-demographic migraine-related data in Israel. The methodological tools currently available for this epidemiological study may present a distorted picture of the prevalence of migraine in Israel vs. other countries. Despite this fact, there is value in presenting the available socio-demographic data related to migraine in different parts of the world (including Israel). More advanced information collection techniques regarding the socio-demographic characteristics of migraineurs in Israel are needed to improve future comparisons and publications.

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#### References

- 1. Schwedt TJ. Chronic migraine. BMJ 2014; 348: g1416.
- Headache Classification Committee of the International Headache Society (IHS)
   The International Classification of Headache Disorders, 3rd edition. *Cephalalgia* 2018; 38 (1): 1-211.

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- GBD 2016 Headache Collaborators. Global, regional, and national burden of migraine and tension-type headache, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Neurol* 2018; 17 (11): 954-76.
- GBD 2017 US Neurological Disorders Collaborators; Feigin VL, Vos T, Alahdab F, et al. Burden of neurological disorders across the US from 1990-2017: a global burden of disease study. *JAMA Neurol* 2021; 78 (2): 165-76.
- Steiner TJ, Stovner LJ, Katsarava Z, et al. The impact of headache in Europe: principal results of the Eurolight project. J Headache Pain 2014; 15 (1): 31.
- Burch R, Rizzoli P, Loder E. The prevalence and impact of migraine and severe headache in the United States: updated age, sex, and socioeconomic-specific estimates from government health surveys. *Headache* 2021; 61 (1): 60-68.
- Dueland AN, Leira R, Burke TA, Hillyer EV, Bolge S. The impact of migraine on work, family, and leisure among young women–a multinational study. *Curr Med Res Opin* 2004; 20 (10): 1595-604.
- 8. Woldeamanuel YW, Cowan RP. Migraine affects 1 in 10 people worldwide featuring recent rise: A systematic review and meta-analysis of community-based studies involving 6 million participants. *J Neurol Sci* 2017; 372: 307-15.
- Benhaddi H, Zeidman R, Verena RC, McCabe S. Burden of migraine across China, Israel, Russia, South Korea, and Turkey: results from a systematic literature review. J Neurol Sci 2019; 405: 62.
- Hayek S, Ifrah A, Enav T, Shohat T. Prevalence, correlates, and time trends of multiple chronic conditions among israeli adults: estimates from the Israeli National Health Interview Survey, 2014-2015. Prev Chronic Dis 2017; 14: E64.
- 11. Neville A, Peleg R, Singer Y, Sherf M, Shvartzman P. Chronic pain: a population-based study. *IMAJ* 2008; 10 (10): 676-80.
- Buse DC, Loder EW, Gorman JA, et al. Sex differences in the prevalence, symptoms, and associated features of migraine, probable migraine and other severe headache: results of the American Migraine Prevalence and Prevention (AMPP) Study. *Headache* 2013; 53 (8): 1278-99.
- Neumeier MS, Pohl H, Sandor PS, Gut H, Merki-Feld GS, Andrée C. Dealing with headache: sex differences in the burden of migraine- and tension-type headache. *Brain Sci* 2021; 11 (10): 1323.
- Granek L, Nakash O, Carmi R. Women and health in Israel. *Lancet* 2017; 389 (10088): 2575-8.
- Amiri P, Kazeminasab S, Nejadghaderi SA, et al. Migraine: a review on its history, global epidemiology, risk factors, and comorbidities. Front Neurol 2022; 12: 800605.
- Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, Stewart WF; AMPP Advisory Group. Migraine prevalence, disease burden, and the need for preventive therapy. *Neurology* 2007; 68 (5): 343-9.
- Stewart WF, Wood C, Reed ML, Roy J, Lipton RB; AMPP Advisory Group. Cumulative lifetime migraine incidence in women and men. *Cephalalgia* 2008; 28 (11): 1170-8
- Peles I, Asla M, Abayev M, et al. Migraine epidemiology and comorbidities in Southern Israel: a clinical database study in a universal health coverage setting. J Headache Pain 2022; 23 (1): 160.
- de Araújo CM, Barbosa IG, Lemos SMA, Domingues RB, Teixeira AL. Cognitive impairment in migraine: a systematic review. *Dement Neuropsychol* 2012; 6 (2): 74-9.
- Scher AI, Stewart WF, Liberman J, Lipton RB. Prevalence of frequent headache in a population sample. *Headache* 1998; 38 (7): 497-506.
- 21. Chiappedi M, Mensi M, Antonaci E, etal. Intellectual profile of adolescents with headache: a case-control study using the WISC-IV. Front Neurol 2018; 9: 128.

- Parisi P, Verrotti A, Paolino MC, Urbano A, Bernabucci M, Castaldo R, Villa MP. Headache and cognitive profile in children: a cross-sectional controlled study. J Headache Pain 2010; 11 (1): 45-51.
- Gil-Gouveia R, Martins IP. Cognition and cognitive impairment in migraine. Curr Pain Headache Rep 2019; 23 (11): 84.
- Winter AC, Berger K, Buring JE, Kurth T. Associations of socioeconomic status with migraine and non-migraine headache. *Cephalalgia* 2012; 32 (2): 159-70.
- Stewart WF, Roy J, Lipton RB. Migraine prevalence, socioeconomic status, and social causation. Neurology 2013; 81 (11): 948-55.
- Stewart WF, Lipton RB, Celentano DD, Reed ML. Prevalence of migraine headache in the United States. Relation to age, income, race, and other sociodemographic factors. JAMA 1992; 267 (1): 64-9.
- 27. Bigal ME, Lipton RB, Winner P, Reed ML, Diamond S, Stewart WF; AMPP advisory group. Migraine in adolescents: association with socioeconomic status and family history. *Neurology* 2007; 69 (1): 16-25.
- Ayzenberg I, Katsarava Z, Sborowski A, et al; Lifting the burden. the prevalence of primary headache disorders in Russia: a countrywide survey. *Cephalalgia* 2012; 32 (5): 373-81.
- Tronvik E, Sørensen T, Linde M, et al. The relationship between headache and religious attendance (the Nord-Trøndelag health study-HUNT). J Headache Pain 2014; 15 (1): 1.
- Genizi J, Srugo I, Kerem NC. The cross- ethnic variations in the prevalence of headache and other somatic complaints among adolescents in Northern Israel. J Headache Pain 2013; 14 (1): 21.
- Tajadini H, Zangiabadi N, Divsalar K, Safizadeh H, Esmaili Z, Rafiei H. Effect of prayer on intensity of migraine headache: a randomized clinical trial. J Evid Based Complementary Altern Med 2017; 22 (1): 37-40.
- 32. Peng KP, Wang SJ. Epidemiology of headache disorders in the Asia-pacific region. *Headache* 2014; 54 (4): 610-8.
- Vosoughi K, Stovner LJ, Steiner TJ, et al. The burden of headache disorders in the Eastern Mediterranean Region, 1990-2016: findings from the Global Burden of Disease study 2016. J Headache Pain 2019; 20 (1): 40.
- Loder S, Sheikh HU, Loder E. The prevalence, burden, and treatment of severe, frequent, and migraine headaches in US minority populations: statistics from National Survey studies. *Headache* 2015; 55 (2): 214-28.
- Steiner TJ, Scher AI, Stewart WF, Kolodner K, Liberman J, Lipton RB. The prevalence and disability burden of adult migraine in England and their relationships to age, gender and ethnicity. *Cephalalgia* 2003; 23 (7): 519-27.
- Semyonov-Tal K, Maskileyson D. Unhealthy immigrants: sources for health gaps between immigrants and natives in Israel. Front Sociol 2021; 6: 686306.
- Bercovich E, Keinan-Boker L, Shasha SM. Long-term health effects in adults born during the Holocaust. IMAJ 2014; 16 (4): 203-7.
- 38. Woldeamanuel YW. Headache in resource-limited settings. *Curr Pain Headache Rep* 2017; 21 (12): 51.
- Thiele A, Strauß S, Angermaier A, et al. Treatment realities of headache disorders in rural Germany by the example of the region of Western Pomerania. *Brain Sci* 2021: 11 (7): 839.
- Graif Y, Shohat T, Machluf Y, Farkash R, Chaiter Y. Association between asthma and migraine: a cross-sectional study of over 110 000 adolescents. *Clin Respir J* 2018; 12 (10): 2491-6.

The principal goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done; men and women who are creative, inventive, and discoverers, who can be critical and verify, and not accept, everything they are offered.

Jean Piaget (1896-1980), Swiss psychologist known for his work on child development

You think your pains and heartbreaks are unprecedented in the history of the world, but then you read. It was books that taught me that the things that tormented me were the very things that connected me with all the people who were alive, or who have ever been alive.

James Baldwin (1924-1987), American novelist, playwright, essayist, poet, and activist