



**Psychological stress and experience of pain following a
national economic collapse
– A prospective cohort study**

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**Ritgerð til meistara­gráðu
Háskóli Íslands
Læknadeild
Námsbraut í lýðheilsuvísindum
Heilbrigðisvísindasvið**



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Ritgerð til meistaragráðu í lýðheilsuvísindum

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collapse – A prospective cohort study**

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Thesis for the degree of Master of Public Health Sciences

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Abstract

Objectives: Changes in economic conditions can impact people's lives in various ways and affect both physical and mental health. The aim of our study was to investigate potential changes in reported pain (back-/shoulder pain, frequent headaches and abdominal pain) in association with the economic recession in Iceland 2008. In addition, we investigated potential predictors for these changes, such as stress levels, mental well-being and other variables.

Methods: A prospective, nationally representative cohort of 3,503 Icelanders answered a questionnaire on health and well-being in 2007, prior to the onset of the economic crisis in Iceland, and again in 2009, one year after the onset. Three items from the questionnaire regarding different types of pain that disturbed daily life were used. Perceived stress levels and mental well-being were measured by the PSS-4 and WHO-5 scales. Binary logistic regression was applied to study possible changes in reported pain as well as to measure odds ratios of reported pain in 2009 with respect to changes in perceived stress, mental well-being and other variables between the two waves of assessment.

Results: Overall prevalence of experienced pain that disturbed daily life did not change significantly between the years 2007 and 2009. Those who reported higher stress levels after the onset of the economic crisis than before it had significantly higher likelihood of experiencing back-/shoulder pain and frequent headaches, (aORs 2.24 [CI 1.29-3.88] and 4.55 [CI 2.54-8.13], respectively), than those reporting low stress levels at both time points. Participants who reported worse mental well-being in 2009 than 2007 were at higher risk to report pain in all three pain categories (back-/shoulder pain, frequent headaches, abdominal pain) as compared to those who had good mental well-being in both years (aORs 1.42 [CI 1.09-1.84], 1.90 [CI 1.34-2.69] and 1.98 [CI 1.42-2.77], respectively). This was also true for those who had low mental well-being scores at both time points, using the same comparison group; aOR=2.20 (CI 1.69-2.85) for back-/shoulder pain, aOR=3.23 (CI 2.36-4.42) for headaches and aOR=2.57 (CI 1.89-3.50) for abdominal pain.

Conclusions: The findings indicate that although overall prevalence of experienced pain did not change significantly between 2007 and 2009, experiencing pain that disturbed daily life in 2009 was more likely among individuals with increased stress

levels or worse mental well-being after the economic collapse as compared to before. Future studies should focus on long-term consequences that economic crisis can have on health, taking psychological well-being into account.

Ágrip

Markmið/tilgangur: Breytingar á efnahag þjóðfélaga geta haft margvísleg áhrif á líf fólks, þar á meðal líkamlega og andlega heilsu. Markmið rannsóknarinnar var að kanna mögulega breytingar á verkjum (bak-/herðaverkir, tíðir höfuðverkir og kviðverkir) í kjölfar efnahagskreppunnar á Íslandi 2008. Að auki voru tengsl streitu og andlegrar líðanar við verkjaupplifun skoðuð sérstaklega.

Efniviður og aðferðir: Rannsóknin er framsýn ferilrannsókn, notast var við svör 3.503 Íslendinga úr spurningalista sem sneri að fjölmörgum þáttum heilsu. Spurningalistinn var lagður fyrir árið 2007 áður en efnahagskreppan reið yfir og svo aftur árið 2009. Spurningar varðandi þrjár mismunandi gerðir verkja sem höfðu truflandi áhrif á daglegt líf voru notaðar. Streita og andleg líðan voru metin með PSS-4 og WHO-5 kvörðum. Tvíkosta lógistískri aðhvarfsgreiningu var beitt til að kanna gagnlíkindahlutfallið (Odds ratio) á mögulegum breytingum á verkjum og til að meta líkur á verkjum árið 2009 að teknu tilliti til breytinga á streitu, andlegrar líðanar auk fleiri breyta á milli mælipunktanna tveggja.

Niðurstöður: Heildartíðni verkja breyttist ekki marktækt milli áranna 2007 og 2009. Þeir sem upplifðu meiri streitu í kjölfar efnahagskreppunnar en fyrir hana voru marktækt líklegri til að hafa verki í baki og/eða herðum (OR 2.24 [CI 1.29-3.88]) og tíða höfuðverki (4.55 [CI 2.54-8.13]) en þeir sem upplifðu litla streitu á báðum tímapunktum. Þátttakendur sem bjuggu við lélegri andlega líðan árið 2009 en árið 2007 voru líklegri til að upplifa verkjagerðirnar þrjár samanborið við þá sem voru við góða andlega heilsu bæði árin (OR 1.42 [CI 1.09-1.84] fyrir bak-/herðaverki, 1.90 [CI 1.34-2.69] fyrir tíða höfuðverki og 1.98 [CI 1.42-2.77] fyrir kviðverki). Það átti einnig við um þá sem upplifðu lélega andlega líðan bæði árin í samanburði við sama viðmiðunarhóp: OR=2.20 (CI 1.69-2.85) fyrir bak-/herðaverki, OR=3.23 (CI 2.36-4.42) fyrir tíða höfuðverki og OR=2.57 (CI 1.89-3.50) fyrir kviðverki.

Ályktanir: Þó ekki sé um að ræða breytingu milli tímapunkta á heildartíðni þeirra verkja sem kannaðir voru, benda niðurstöðurnar til þess að þeir einstaklingar sem upplifðu meiri streitu eða verri andlegri líðan í kjölfar efnahagskreppunnar voru í aukinni áhættu að finna til verkja sem trufluðu daglegt líf árið 2009. Frekari rannsóknir ættu að beinast að þeim langtímaáhrifum sem efnahagskreppur geta haft á heilsufar og taka tillit til sálrænnar líðanar.

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Background

1 Pain

According to the International Association for the Study of Pain, pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain is always subjective [1].

The nature and experience of pain is complex. Biological processes, cognition and emotions that in turn are affected by psychosocial and cultural influences come together in a complicated process which influences the combined responses of the body and brain [2]. Research has shown that the experience of pain is multidimensional and influenced by a wide range of factors, such as gender, age, psychological factors such as past experience, anxiety degree, distraction, emotional state and more [3-5]. The pain mechanism, how it is experienced and reported, therefore differs between individuals and is always a subjective experience as there are no objective biological markers to measure pain by [2].

Pain can range from being minor, short lived and at one specific site, to be intense, widespread and chronic. Pain is common in the general population although studies differ regarding e.g. type of pain, duration of pain, intensity and the period under study. Overall six months prevalence for any pain, regardless of duration and intensity has thus been reported as being 79% [6], four week prevalence of any pain as 72% [7] and in a four year longitudinal study, only 17% did not report musculoskeletal pain in the previous month in any of the measurements performed at three different times during the study period [8]. It can therefore be concluded that pain, regardless of source, intensity or duration, is a highly common symptom experienced in the general population.

1.1 Types of pain under study

Among the most common sources of pain experienced by the general population are back pain, shoulder pain, abdominal pain and headaches - all common reasons for people seeking medical help. They can have widespread effects on physical health, wellbeing, general functioning and quality of life. As these pain disorders affect a significant proportion of the population, the consequences in form of medical expenses and lost work hours are considerable for the community. The focus of this thesis will therefore be on these most common sources.

1.1.1 Back- and shoulder pain

Back pain is the most common musculoskeletal pain in a number of studies with reported prevalence ranging from 23-56% [6, 9-12] and 14-31% prevalence range specifically for low back pain) [13]. Throughout the years, prevalence of back pain has been increasing, as reported in a UK study which found a rise in prevalence from 36% in 1988 to 49% a decade later. Less disabling back pain was found to increase to a higher extent, compared to severe pain [14].

Regarding shoulder pain, substantial differences in prevalence have been found. Two review studies found the prevalence for shoulder disorders to range between 5 and 51% [15, 16], but annual prevalence of consulting for such condition in UK primary care was reported to be 2.4% [17]. Shoulder pain can be persistent with reported recovering rate of 32%-59% at 12 month follow up [18, 19].

1.1.1 Headaches

Headaches are classified according to The International Classification of Headache Disorders, ICHD-II [20]. Primary headache disorders include migraine, tension-type headache and cluster headache but headaches can also be secondary to other conditions. According to the World Health Organization (WHO), headache disorders are among the most common disorders of the nervous system [21]. One-year prevalence of overall headaches has been found to be 38% [22] and 51% prevalence was found in an elderly population [23]. In a review study including 107 studies, 46% of the general adult population worldwide was estimated to have active headache disorder of some kind [24] while the prevalence of frequent headaches (more than 180 episodes per year) of any type has been found to be 4% [25].

Tension type headache (TTH) is the most common primary headache disorder. The mechanism of TTH is mostly considered as being stress-related or associated with musculoskeletal problems in the neck [21] although the exact causes are not known. The most common theories now support interference ("mixed signals") involving nerve pathways to the brain, which is thought to be demonstrated by high pain sensitivity in people who have tension [26]. Several factors may also contribute to the development of tension headaches, among potential triggers being stress, anxiety and depression, poor posture and working positions [26]. One-year-period prevalence of episodic tension-type headaches has been found to be 38% [27], chronic tension-type

headache just over 2% [25, 27] and incidence of frequent tension-type headache has been found to be 14.2 per 1,000 person-years in a 12 year follow-up study [28].

Migraine can have attack frequency between once a year up to a few days apart [21]. The causes are not fully understood but both genetics and environmental factors seemingly play a role. Imbalances of brain chemicals, including serotonin, are thought to be involved and attacks can be triggered by number of things such as certain food intake, stress, sensory stimuli, changes in wake-sleep pattern and intense physical exertion [29]. Migraine has shown to have prevalence of 10-12% [22, 23, 30] and a 12 year follow-up study found the incidence of migraine to be 8.1 per 1,000 person-years [28].

1.1.2 Abdominal pain

Abdominal pain is pain and discomfort that occurs in the section of the torso between the chest and the pelvis. Abdominal pain is a common symptom with many potential causes, both benign and serious ones and can be mild or severe, short-lived or chronic [31].

A multinational survey on the prevalence of regular abdominal cramping or pain found it to vary considerably between the nine countries under study, ranging from 10%-46% [32], lowest in Japan and highest in Mexico. Abdominal pain that had persisted for 24 hours or more the previous month was reported by 8% of participants in another study [33]. The same study showed new onset rate at 12 month follow-up by participants free of abdominal pain at baseline to be 5% [33]. Abdominal pain from the gastrointestinal system can be organic (with traceable and identifiable cause) and functional. Functional gastrointestinal disorders are variable combination of gastrointestinal symptoms that are not explained by structural or biochemical abnormalities [34]. Such disorders have been acknowledged as the results of complex interactions between psychological, biological and social factors in a review study [35]. In a US study, abdominal pain was found to be the most common symptom of gastrointestinal disease as a reason for outpatient clinic visits [36]. In another study, abdominal complaints were diagnosed as functional gastrointestinal disorder in 43% of patients, organic disease in 37% but no diagnosis was made in 20% of the cases [37].

1.1.3 Chronic pain

Chronic pain is by definition any type of pain that lasts for at least three months and past the normal expected healing time [38]. Chronic pain affects most aspects of an individual's life, including physical, mental and social function, employment and daily life [39, 40].

Several epidemiological studies have estimated prevalence of chronic pain in different populations but results vary greatly because of different methodological aspects, such as the criteria of definition for chronic pain, duration of pain symptoms and methods of data collection. Prevalence for any chronic pain has been reported being close to 46% [40, 41] and a review study including 13 studies from 9 countries found that prevalence ranged from 10% to 55% [42] while a prevalence of 19% was reported in a Danish study excluding cancer pain [43]. Further, a large-scale study in Europe (n=46,394) found that 19% of people had chronic pain of moderate to severe intensity for at least six months duration, and at least twice the last week [39]. Average annual incidence of chronic pain has been measured being 8.3% [41] and it has been found to be persistent with low recovery rate; a prospective study of 2184 persons found 79% of those with chronic pain at baseline still had it at four-year follow up [41].

Chronic pain can be widespread and previous studies on widespread chronic pain have shown prevalence of 11%-13% [44-46]. It has relatively low recovery rate; being pain free has been reported as being 11% in a 12 month follow-up [45] and 15% at seven year follow-up [44].

1.2 Background factors

Several demographical factors predict and are associated with pain; among them are gender, age and socioeconomic status.

1.2.1 Pain from a gender perspective

Several studies indicate that gender plays a role regarding pain experience. Prevalence studies on most common forms of pain thus show that women are generally more likely to report pain: any type of pain [6], musculoskeletal pain [9, 10, 47], migraine and tension type headaches [27, 28, 43], abdominal pain [48, 49] and chronic pain [42, 43, 50]. A review article found women to be more likely than men to experience a variety of recurrent pains and in most of the studies they reported more severe pain,

more frequent pain and of longer duration [51]. Many studies on different types of experimentally induced pain have also reported women having lower pain threshold, less pain tolerance and reporting more pain than men [50, 52-56], but a review article on studies on laboratory-induced pain over 10 year period did not find a clear and consistent pattern of gender differences in pain sensitivity [57].

Studies have further reported gender differences on various other aspects of pain. For example, females have been seen having more tendency than males to report pain to health care providers [58] and gender differences have been detected in response to pain therapy [59]. Also, the effects pain coping instructions had on the experience of pain have been found to affect males and females differently [60] and women have been found to be more likely to develop chronicity for different types of pain than men [61].

Many possible explanatory and affecting factors in gender differences in the experience and reporting of pain have been studied. Among findings are that several psychosocial, psychological and biological factors may possibly be affecting factors. For example, self-efficacy regarding pain - the expectations about one's capabilities to deal with pain - has been found to be a mediating factor in the gender differences in reactions to painful stimulation [56] and societal influences have in turn been found to affect self-efficacy beliefs regarding pain and pain expression [62]. In addition, gender role expectations of pain [55] with men being expected to tolerate more pain as well as not report much pain [55, 62] may also play a role. Pain-related catastrophizing (an exaggerated negative "mental set" towards actual or anticipated pain experience, expecting the worst) [63] has also been found to be a possible factor in the gender differences in the experience of pain. Researchers found women to report greater levels of catastrophizing which in turn mediated gender differences in reported recent daily pain. On the other hand it did not mediate the gender differences in pain threshold and pain tolerance [64]. Also, evidence from a review study show that gender differences in the experience and processing of emotions appear to influence the experience of pain [65] and sex hormones have been found to influence pain sensitivity as both pain threshold and pain tolerance vary with different stages of women's menstrual cycle [66, 67].

1.2.2 Pain and age

Although overall pain prevalence does generally seem to increase with older age, previous studies show somewhat mixed results and different pattern is seen for different types of pain.

Studies on different chronic pain conditions have reported increased prevalence with rising age [43, 46, 68] in developing and developed countries [68]. Musculoskeletal pain was found to increase up to 65 years of age but reach a stable level after that [9] and a study on an older population (≥ 50 years old) found that overall prevalence of any pain did not change with increased age but the pattern of pain prevalence in different body regions did [7]. A recent literature review indicated that severe back pain increases with older age while less severe pain reaches a peak around age 50 but decreases after that [69]. Further, a Spanish study found a trend of decrease in overall pain prevalence with increased age [6]. Headache disorders have been found to mainly affect young and middle-aged adults, reaching a peak in fourth or fifth decade of life but declining after that [27, 70].

Pain studies in experimental settings have provided evidence for pain perception changing with increased age. Stimulus-specific changes have been reported in the elderly as pressure pain thresholds were seen to decrease while heat pain thresholds did not show age related changes which points towards muscle nociception being differently affected by age than skin nociception [52, 71]. Older age has also been associated with impaired pain perception in the gastrointestinal tract [72].

As pathological load increases with older age the likely outcome would be that pain would continually increase with age but some pain studies find it plateauing after 65 years of age. Many possible explanations for that have been mentioned. Besides impairments of the nociceptive function of the nervous system [71], underreporting due to many reasons such as stoicism, concerns about the meaning of pain, difficulties in communication, difficulties using some assessment tools and cultural changes with time have been named [73, 74].

1.2.3 Pain and socioeconomic status

Studies on socioeconomic status and reported pain have indicated that less advantaged people have higher prevalence of pain than other groups. A US study (N=1,335) found that socioeconomic disadvantage - mainly lower income, less education and lack of employment - predicted disabling pain [75]. Musculoskeletal pain, especially

in the back, has further been reported to more extent by those living in socially deprived areas in the UK [9]. In a large Swedish study (N=43,770), subjects with frequent economic problems had almost twice the risk of recurrent headaches or migraine as compared with subjects with no economic problems [70]. People with low educational level have reported more general pain [70], more severe and significant chronic pain [40] and more frequent headaches [25] but prevalence of episodic tension-type headaches has also been seen to increase with higher educational levels [27]. Socioeconomic status is therefore of great importance when investigating prevalence and changes of pain over time.

2 The complex relationship between stress and pain

Through extensive research, it is generally accepted that stress is a major contributor to psychosocial as well as physical pathological conditions [76]. Allostasis – the activation of neural, neuroendocrine and neuroendocrine-immune mechanisms to adapt to stressful challenges and maintain homeostasis is a normal part of how the body copes with stress. It affects the body's function in many ways, and is a normal way for the body to cope with and react to challenging situations, at least temporarily. However, if stressful conditions, external or the way an individual responds to and perceives the situation, leads to the allostatic system getting overworked (allostatic load), it can have detrimental effects on health [77]. Among the illnesses that have been associated with stress are cardiovascular diseases, metabolic disorders, headaches, sleep disorders, gastrointestinal disorders, muscle tension, low back pain, anxiety and depression [33, 76-79].

Acute stress, such as negative life events, spousal bereavement [80, 81] or natural or manmade disasters [82, 83] have been shown to negatively affect the health of people. In addition, minor stressors in form of daily hassles can also have detrimental effects on both mental and physical health [84-86].

Many previous studies show association between the development and prevalence of pain and psychopathology. The association seems to be working both ways, that is psychological problems can predict pain onset or pain development and those with pain are more likely to develop psychological problems.

Pain is a difficult symptom that may affect psychological well-being in many ways. Two review studies found patients with functional gastrointestinal disorders to show elevated rates of psychopathology [34, 35], particularly depression and anxiety [34]. Psychiatric co-morbidity has also been found for different types of headaches; 90% of people with chronic daily headache were also found to suffer from psychiatric disorders, most frequently anxiety and mood disorders [87], which was further supported in a study on people with tension type headaches [88]. Evidence for association in form of comorbidity between migraine and tension type headaches and psychiatric disorders, especially depression and anxiety were also reported in a literature review [89]. In a prospective study, headaches and back pain were among health problems found to occur in relation to daily stress [84] and aggravated pain

levels have been associated with the mood disturbances related to spousal bereavement in older people [80]. Consequently, people free from musculoskeletal pain over a four year period have been found to report lower levels of psychological distress than those who did report pain [8].

Studies have also found evidence for the opposite direction; stress or other kinds of psychological morbidity may affect the onset or development of pain. A prospective study (N=5,781) showed that psychological distress at age 23 more than doubled the risk of low back pain incidence several years later [78] and worrying has been associated with poor prognosis at 12 month follow up for people with neck or shoulder symptoms [19]. In another prospective study, baseline levels of psychological distress, illness behavior, health anxiety and fatigue predicted new onset of abdominal pain (n=1,551) [33]. Presence of psychiatric co-morbidity at baseline has further been associated with worsening or unchanged situation regarding headaches at follow up eight years later [90]. Among factors found to be related to the development and persistence of chronic pain are psychological distress, fatigue, a pattern of illness behavior [45] and depressive disorders [91]. That is in accordance with a systematic review of 25 prospective cohort studies examining psychological factors as predictors of chronicity of low back pain, indicating mainly distress but also somatization to be involved in the transition from acute to chronic low back pain [79].

2.1 Financial stress and health

Studies on the effects of financial stress on physical and mental health have generally found that financial stress increases morbidity. Studies on the effects of negative life events and other stressors on health, have thus found that financial stress predicts worse self-rated health [81], higher levels of illness and physical impairments [92]. Accumulated financial strain has been associated with rapid decline in women's health during middle and later life [93] and indications for gender differences regarding how financial stress affects health have been reported [94]. Although both men and women can be negatively affected, financial stress has especially been detected as a strong predictor for poor health among women, like psychological distress and musculoskeletal disorders [94]. In a Swedish study, adolescents who frequently worried about their families finances perceived their health worse than those who seldom or never experienced such worries [95]. Other studies have also reported evidence of financial stress negatively affecting psychological health [96-98]

as well as physical, with frequent headaches and stomach aches being among the physical symptoms [98]. Also, a study on 250 women with osteoarthritis and/or fibromyalgia found participants with greater levels of financial stress to have more pain than their counterparts with little or no financial stress [99].

3 Economic crisis and its effect on health

Economic crisis are known to affect societies and individuals in number of ways. Increases in unemployment, inflation, loss of savings, less income and possible cuts in the welfare system can alter many aspects of people's lives. Such changes can in turn affect the wellbeing of individuals on different levels; financially, psychologically, psychosocially and physically.

3.1.1 Mortality

Several studies have been conducted to investigate the connection between economic development and health by using mortality rates as a marker. A systematic review by Falagas et al. found an increase in all-cause mortality during an economic crisis in seven out of eight less affluent countries [100]. Also, the economic crisis in Mexico in 1995-96 has been linked to increased mortality among children and the elderly [101]. Indicating other findings, two US studies showed an inverse relationship between macroeconomic conditions and total mortality, that is, in blooming economy, mortality increases [103]. In addition, decrease in mortality rates was detected in eight out of ten sources of fatalities during an economic recession and rise in unemployment rate [102]. In accordance with this, results from a study on data from 23 OECD countries indicated a rise in total mortality and deaths from several common causes with strengthening labor markets [104]. Other European studies point into the same direction although a rise is detected in certain mortality categories [105-107].

Even though most studies indicate that total mortality rates lower during recessions in affluent countries, studies that examine specific death causes reveal that decrease in mortality following economic crisis is found only for certain types of mortality while others increase.

Although many studies show a decrease in total mortality with economic downturns, death resulting from suicides show increased occurrence with recession in most of them [102, 103, 105]. Following the 1997-1998 economic crisis in East and Southeast Asia a sharp increase in suicide rates was observed for four out of six countries examined, with indications that some of the male suicides were attributable to increases in unemployment rates. In the two remaining countries, showing no effect, the crisis had had smaller impact on unemployment [108]. A recent English

study linked the 2008 financial crisis to increased suicides rates, highest increase was found in those regions in England with largest rises in unemployment, especially among men [109]. Other studies have found opposite pattern in the association between suicide rates and economic changes, however not associated with unemployment [106, 110].

An empirical analysis on how economic changes had affected mortality rates between 1970 and 2007 in 26 European countries using data from the WHO „European Health for All“ database revealed that rises in unemployment were associated with significant short-term increase in deaths from intentional violence and alcohol abuse, while reducing traffic fatalities. Specifically, rapid and large rises in unemployment were associated with the pattern seen [105]. Another study observed that decrease in unemployment rates for 23 OECD countries between 1960 and 1997 resulted in increase in deaths from cardiovascular disease, influenza/pneumonia, liver disease, motor vehicle fatalities and other accidents (0.4, 1.1, 1.8, 2.1 and 0.8% increase respectively for one percentage point decrease in national unemployment rate) [104]. Similar patterns have also been seen in other studies from US [102] and Germany [106]. However, the literature has been mixed regarding cardiovascular disease; an analysis on data from the WHO Global Mortality Database ranging from 1960-2002 found male mortality rates for heart disease to rise during banking crisis both in high and low income countries although the effects were more profound in low income countries [111]. Also, an immediate short term increase in female attendance at the cardiac emergency department in Iceland was detected in the week of the economic collapse in 2008 [112].

3.1.2 Physical morbidity

Some somatic symptoms, other than those examined in connection to mortality, have been found to be affected by changes in economic surroundings.

The 1997-98 East Asian economic crisis negatively affected health status in Indonesia as an increase was found in self-reported disruptive morbidity [113]. A Swedish study furthermore found that more somatic symptoms were reported during an economic recession than economic boom, especially among women [114]. On the other hand, an examination of data from the 1972–1981 National Health Interview Surveys revealed an association between economic expansion and worsening physical

health, especially pronounced for individuals of prime-working age, employed persons and males. A one percentage point fall in unemployment was estimated to raise the prevalence of medical problems by 1.5% and acute morbidities by 3.9%. The negative health effects of economic expansions were found to persist or accumulate over time and be larger for acute than chronic morbidity [115].

3.1.3 Pain and economic crisis

Pain is a physical symptom that has been repeatedly associated with psychological stress [80, 84, 85] and is therefore an outcome of interest when studying the effects of an economic crisis (that may be highly stressful) on health. However, studies specifically on experienced pain during economic changes are scarce or non-existing. Still, some researchers do include questions on pain in their research when physical health is being examined in connection to economic situation. For example, a study on two groups of employed young people in Sweden at two different time points (during an economic recession and during economic boom) included a questionnaire on 31 symptoms of somatic health such as cough, cold, allergy, headaches, gastric complaints, shoulder and back pain. Results only reported average score but not for specific symptoms. More somatic symptoms were reported during recession than economic boom and recession was found to be associated with more ill health among women than men [114].

3.2 Economic crisis and mental health

Experiencing an economic crisis can have widespread effects on an individual, both due to acute conditions (sudden economic change, loss of employment) and more long-term conditions (economic deprivation, development of mental disorders etc.). Contrary to general findings of declines in total mortality and many aspects of physical health improving during economic crisis, evidence from many previous studies show an association between economic recessions and worsening mental health [115, 116]. Evidence from a longitudinal study from 1993-2000 in Indonesia, showed not only elevated psychological distress during economic crisis but also that those levels persisted after the economy returned to pre-crisis level [117]. Further, in a review of studies prior to the 2008 economic crisis, a significant relationship was detected between economic crises and psychopathology, including onset or

exacerbation of mood disorders, distress and help seeking for mental health problems [118]. However, evidence indicating no such association has also been found [119].

Until now, few studies have investigated the effects on the 2008 crisis on mental health. An increase in the 12 month prevalence of major depressive disorder was detected in two studies examining data from Hong-Kong and Canada in 2007 and 2009 [120, 121]. In Hong-Kong, the prevalence went from 8.5% to 12.5% [121] and in Canada from 5.1% to 7.6%. The Canadian study did not detect changes in the 12 month prevalence of generalized anxiety disorder during the period [120]. Also, results from an Icelandic study on a prospective cohort showed increased stress levels in the Icelandic population following the economic collapse in 2008. The total prevalence of high stress level went from 10.5% to 12.5% between 2007 and 2009 [122]. However, an overall decreasing trend was found for the prevalence of psychological distress in Australia during the same crisis although anxiety increased [123].

Subgroups at health risk during economic downturns

Although worse mental health has been detected among the overall population during economic downturns, including the employed [118, 124], certain subgroups have been detected as being more sensitive than others for depressive and psychological distress during economic recession, such as the poor and less educated [118] and the unemployed [118, 121, 124, 125].

Through number of studies, unemployment per se has been associated with worsening mental health with the unemployed having higher risk of mental health problems such as depression, anxiety, psychological wellbeing and alcohol related problems [126-128]. In a longitudinal study, subjective economic situation has further been found to be strongly associated with mental disorder for both genders [116]: almost 50% of those who considered their economic situations poor also suffered from some mental disorder [116]. Results from a study on the recent economic crisis in Iceland indicated that income and unemployment did not predict happiness but financial difficulties did, those who found it difficult to make ends meet were less happy than those who found it easy or neither easy nor difficult [129]. Also, some studies have reported sleep disturbances in subgroups during economic recession, linking it to worry over financial matters [130, 131].

As for gender, not many studies have seen gender specific effects. A repeated cross-sectional analysis found increase of poor mental health among men during the 2008 crisis in England while such changes were not seen in women [132]. Findings from the Icelandic prospective cohort study mentioned above indicated that women were more likely than men to experience high stress levels following the economic crisis in Iceland, especially unemployed women [122].

Taken together, evidence show a trend towards overall increase in psychological morbidity during economic recession but further investigations on long-term effects and subgroups at risk is left up for speculation.

3.3 Economic cycles and health behavior

Economic difficulties may force altered lifestyle, e.g. because of changes in time spent at work and reduced income. Changes in health habits during difficult economic times have been studied indicating somewhat mixed results.

A decrease in alcohol consumption during an economic recession was reported by Ruhm and Black but it was mainly heavy consumers that decreased their intake while light drinking actually increased somewhat [133] and in an Icelandic prospective study, less heavy drinking following the recent economic crisis was also reported [134]. On the other hand, contrasting results have been found. In one study the prevalence of binge drinking was found to increase during an economic downturn, even among those who remained employed [135]. However, prevalence of binge drinking decreased among employed people in economic crisis although no overall change in binge drinking was detected as observed in an Icelandic study [136]. Poverty and unemployment in general has further been linked to changes in alcohol consumption, recent unemployment was linked to decreased alcohol use but more longstanding unemployment to increased consumption [126].

As for smoking, a trend of reduced smoking during economic downturns has been reported [102, 137] and the decreased smoking in recessions has been detected mainly among those who smoke a lot [102]. Less smoking was also recorded in studies on health behaviors of the Icelandic population following the 2008 economic crisis [134, 138].

Diet has been reported getting healthier during economic downturns [102] but opposite results were detected by Dave and Kelly while examining the effect of the

business cycle on eating habits. Higher risk of unemployment was associated with increased consumption of unhealthy food such as snacks and fast food but reduced fruit and vegetable consumption [139]. Icelandic data show both health-compromising and health-promoting changes in diet during the recent economic crisis; consumption of sugared soft drinks, sweets and fast food decreased and consumption of fish oil increased, however consumption of fruits and vegetables decreased [134].

Previous studies have reported association between economic downturns and increased physical activity mainly reflecting increase in exercise among those who were completely inactive. These changes were associated with decreases in work hours [140] which is in line with a study that found a reduction in physical activity during economic expansion among a population of low-educated people [137]. Contrary to these findings, a study on US data ranging from 1990-2009 found deteriorating labor market conditions to predict decrease in physical activity [141]. A 1 % increase in monthly unemployment rate was on average associated with a reduction in monthly moderate-intensity physical activity of 0.18 hours [141]. Also, recreational exercise has been found to increase with decreasing employment but as the increase did not compensate for the decrease in work-related exertion due to job-loss the total physical exertion declined [142].

3.4 What explains different outcomes in different countries during economic difficulties?

Even though there are similarities among many countries regarding the consequences that economic crisis has on public health, the local effect depends heavily upon numerous determinants that are specific for each country. Among important factors are the form of government, culture and what actions authorities take to respond to the situation [143-145]. Thus, for each community, the effects of a changed economic situation depends on this interaction [143].

An example of how unique local situations dramatically affect outcomes is the markedly different health responses of Cuba and Russia in the wake of the fall of the Soviet Union in 1989. Although both countries suffered similar economic condition, mortality rates in Russia increased substantially while hardly any such changes were detected in Cuba. The main reasons for that were the social, political and cultural differences in the two countries [144].

Further effort in trying to understand the connection between health and economic crisis was undertaken by Stuckler et al. [145] where they reviewed evidence from previous studies on three major economic crises in the 20th century. Their main conclusions were that the rapidity of the economic change is of more importance to the effect on health than the direction of the change. Also, they found predictive factors being social cohesion, social protection and how people are protected from harm in form of exposure to risk factors (e.g. alcohol and fast food). Further, a study comparing data from several OECD countries indicated that in the countries that spent the most on social insurance the increase in mortality during economic expansion was to a lesser extent [104].

In the large context, health is severely connected to economic status of countries: poor countries where essential needs like access to clean water, food, housing and health service may not be readily available, would be considered likely to gain better health with economic growth that would make these essentials better available [146]. But the gain of better health, at least in form of declined mortality rates and longer life expectancy only reaches a certain point. The relation between economic growth and health progress in Sweden shows that while declined mortality and increased life expectancy came with general economic growth through the 19th and into the 20th century [147], there seems to be a roof for how improving economy supports better health. Mortality rates generally decline while this roof is being reached but after that the rate is procyclical with economic cycles, increasing with economic expansion but decreasing in recessions [146, 147].

4 The economic crisis in Iceland

Following world-wide economic recession in 2008, the Icelandic community was hit abruptly and harshly by a total bank collapse in October that year. The economic effects were severe. The nation's currency fell sharply in value, inflation rate increased drastically, the Icelandic stock exchange fell by more than 90% [148] and unemployment increased rapidly. During a two month period, the unemployment rate went from 2.6% (Sept. 2008) to 4.8% (Dec. 2008) and by the end of 2009, unemployment had almost tripled since before the beginning of the collapse [149]. Many individuals and families were affected in various ways, e.g. by unforeseen unemployment, salary reduction, severely increased debts, higher mortgage payments and other financial problems. Stress and anxiety regarding personal finance matters, uncertainty and hopelessness about the future, getting used to changes in everyday life e.g. being unemployed, having less money to spend etc. seem thus likely consequences.

Studies on the effects that the economic crisis in 2008 had in Iceland have found evidence for it affecting several aspects that are relevant to public health. The immediate shock of the dramatic onset of the crisis was associated with immediate short-term surge of female attendance at the cardiac emergency department [112], stress levels have been found to increase, specifically among females in economically vulnerable groups [122] and a short-term increase in the incidence of low birth weight was observed following the economic collapse [150]. Also, changes in health behavior regarding diet were detected, some health-promoting but other health-compromising [134].

As studies have shown, the experience of pain is related to stress and as the economic collapse in Iceland was undoubtedly stress-evoking for many it is of interest to study the development and association between pain and psychological well-being in the wake of the economic crisis.

5 Psychological stress and experience of debilitating pain following a national economic collapse – a prospective cohort study

Aim

The aim of the study was to investigate possible changes in reported pain (back-shoulder pain, frequent headaches and abdominal pain) of magnitude enough to disturb daily life in association with the economic recession in Iceland in 2008, using a prospective, nationally representative cohort of Icelanders. Also, reported pain in 2009 was specifically analyzed with regard to stress and mental well-being development as well as other factors.

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Psychological stress and experience of debilitating pain following a national economic collapse – a prospective cohort study

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Abstract

Objectives: Changes in economic conditions can impact people's lives in various ways and affect both physical and mental health. The aim of our study was to investigate potential changes in reported pain (back-/shoulder pain, frequent headaches and abdominal pain) in association with the economic recession in Iceland 2008. In addition, we investigated potential predictors for these changes, such as stress levels, mental well-being and other variables.

Methods: A prospective, nationally representative cohort of 3,503 Icelanders answered a questionnaire on health and well-being in 2007, prior to the onset of the economic crisis in Iceland, and again in 2009, one year after the onset. Three items from the questionnaire regarding different types of pain that disturbed daily life were used. Perceived stress levels and mental well-being were measured by the PSS-4 and WHO-5 scales. Binary logistic regression was applied to study possible changes in reported pain as well as to measure odds ratios of reported pain in 2009 with respect to changes in perceived stress, mental well-being and other variables between the two waves of assessment.

Results: Overall prevalence of experienced pain that disturbed daily life did not change significantly between the years 2007 and 2009. Those who reported higher stress levels after the onset of the economic crisis than before it had significantly higher likelihood of experiencing back-/shoulder pain and frequent headaches, (aORs 2.24 [CI 1.29-3.88] and 4.55 [CI 2.54-8.13], respectively), than those reporting low stress levels at both time points. Participants who reported worse mental well-being in 2009 than 2007 were at higher risk to report pain in all three pain categories (back-/shoulder pain, frequent headaches, abdominal pain) as compared to those who had good mental well-being in both years (aORs 1.42 [CI 1.09-1.84], 1.90 [CI 1.34-2.69] and 1.98 [CI 1.42-2.77], respectively). This was also true for those who had low mental well-being scores at both time points, using the same comparison group; aOR=2.20 (CI 1.69-2.85) for back-/shoulder pain, aOR=3.23 (CI 2.36-4.42) for headaches and aOR=2.57 (CI 1.89-3.50) for abdominal pain.

Conclusions: The findings indicate that although overall prevalence of experienced pain did not change significantly between 2007 and 2009, experiencing pain that disturbed daily life in 2009 was more likely among individuals with increased stress levels or worse mental well-being after the economic collapse as compared to before.

Future studies should focus on long-term consequences that economic crisis can have on health, taking psychological well-being into account.

Introduction

The global economic crisis in 2008 hit Iceland in October in an unusually sudden economic collapse, rendering persistent speculations on its effect on the population's health.

Previous studies have found economic crises to affect many health indicators. Most previous investigations have reported detrimental effects of economic downturns on mental health [115-117, 120-122] while others have found contrary evidence [119, 123]. Most studies have found total mortality as well as several cause-specific mortality rates to decrease during economic crisis in well-off countries [102-104, 106]. Studies on other somatic morbidities have reported inconsistent findings, some have found increase [113, 114], others have found a decrease during economic downturns [115].

Physical health [80-82, 84, 86], including the experience of pain [33, 45, 78, 80, 90] has been reported to be negatively affected by psychological stress. Financial stress, such as debts and lack of cash reserves, has specifically been found to predict higher levels of illness and physical impairments [92, 94, 98]. Data are scarce on the potential influence of macroeconomic conditions and the experience of pain.

High levels of psychological stress increased following the economic crisis 2008 in Iceland, particularly among women [122]. Physical morbidities, such as debilitating pain, remain to a large extent unexplored. Using a prospective cohort of the Icelandic population before and after the economic collapse, the aim of this study was to study possible changes in reported pain experience as well as the association between development in changes in stress-levels and mental well-being and pain experience.

Methods

Study design, study population

In this prospective cohort study, data was collected through the questionnaire survey “Health and Well-being of Icelanders” by the Icelandic Public Health Institute in the fall 2007 and again in the fall 2009. Randomly selected sample (N=9,807) of the Icelandic national population aged 18-79 in 2007 received the survey by mail, response rate in 2007 was 60.3% (N=5,906); 92% of that group signed an informed consent to be contacted again. In 2009, 5,439 persons received a similar questionnaire and response rate was 77.3% (N=4,204). For our analyses, we included those who responded to three specific questions on pain (back- /shoulder pain, frequent head ache and abdominal pain) both in 2007 and 2009 (N=3,503).

Background characteristics of individuals that participated only in 2007 and those who responded to both waves of the questionnaires has been reported before and indicated that the cohort answering only in 2007 was slightly younger, was more likely to be single and less likely to have finished university education (see details elsewhere [122]).

Measures

Exposure and outcome

Between the two points of assessment, a massive and sudden economic collapse took place in Iceland in October 2008. The time between the two points of assessment is thus here used as exposure, indicating a significant social change from national economic prosperity to economic downturn.

Pain was assessed by a question on several types of pain and other mental and physical distress that might interrupt the participants’ daily life (“Has any of the following conditions interrupted your daily life?”). Three items were used; concerning back-/shoulder pain, frequent headaches and abdominal pain. Response alternatives were: “Yes, in the last 12 months”, “Yes, but not in the last 12 months” and “No, never”. The answers were classified into two categories: “Yes” (in the last 12 months) and “No” (not in the last 12 months or never).

Covariates

Several demographic questions were included in the analyses, such as gender, age, educational status, marital status, employment status, size of residency and number of children.

Educational level was classified as: a) primary school or less, b) high school or equivalent and c) university level. Marital status was categorized into four groups: a) married/cohabitating, b) committed but not cohabitating, c) single/divorced and d) widowed. Employment status was classified as being a) employed, b) unemployed, c) student, d) homemaker/at parental leave, e) disabled, f) retired, and g) on a sick leave/temporarily unable to work. The question on employment was non-exclusive and thus each respondent could belong to more than one category (e.g. student and employed). Size of residency was categorized into: a) city (≥ 5000 inhabitants), b) village (200 – 5000 inhabitants), and c) farming (< 200 inhabitants). Number of children was categorized into having: a) no children, b) one child, c) two children, d) three children or more.

In addition, measurements on perceived stress level and mental well-being were included. Perceived stress was assessed with the 4-item Perceived Stress Scale (PSS-4), a short version of the original PSS-14 item scale which was designed to measure levels of stress in a person's life [151]. The PSS-4 is considered adequately reliable for brief measure of stress perception [152].

Each item of the PSS-4 was re-coded into two categories: low stress score (0) (score 3 through 5 for positively stated questions and score 1 through 3 for negatively stated questions) and high stress score (1) (score 1 through 2 for positively stated questions and score 4 through 5 for negatively stated questions). A total score was then compiled for all four questions, those with 0-2 points were classified as "low stress level group" and those with 3-4 points classified as "high stress level group". For investigating if the stress level had changed between the two measuring points, four groups were formed: a) low stress level in both 2007 and 2009, b) high stress level in 2007 but low in 2009, c) low stress level in 2007 but high in 2009 and d) high stress levels in both years.

Psychological well-being was assessed with the WHO-five Well-being Index (WBI-5) which is a well-established screening questionnaire that evaluates well-being and quality of life and may be used for screening depressive symptoms [153, 154]. Total scores were summed up and reverted to a 0-100 scale. Two groups were formed: a) those with <50 points were considered with poor well-being, b) those with 50 points or more as having good mental well-being. When the index is used as a screening tool, those who get <50 are tested further in order to detect possible depression as well as severity.

Physical activity was measured by: a) utilization of open natural areas or outdoor recreational areas, b) physical exertion at work/school and c) estimated physical endurance as compared to people of same gender and age. Utilization of open natural areas or outdoor recreational areas was categorized into a) High utilization (once a week – daily) and b) Low utilization (<once a month – 3 times a month). Physical exertion at work/school was categorized into a) sedentary, b) walking/standing, c) walking/standing and carrying things, d) hard physical labor. Estimated physical endurance (compared to people of same gender and age) was re-coded into three categories: a) better, b) similar and c) worse.

Lastly, as measurements of potential effects of the financial crisis on pain, we included a question in our analyses on self-estimated financial standing as compared to other families (“How do you estimate your family’s financial standing as compared to other families in Iceland?”) and a question regarding standard of living in 2009 compared to before the financial collapse (“How is your standard of living now as compared to before the financial collapse in October 2008?”) with the response alternatives a) better, b) similar, c) worse for both questions.

Statistical analyses

Frequency measures were used for describing background characteristics of the cohort. Binary logistic regression was applied to study possible changes in reported pain stratified by background characteristics with adjustments made for gender, age, education level and marital status. Binary logistic regression was also used to measure odds ratios (CI 95%) of reported pain in 2009 with respect to changes in perceived stress, mental well-being, financial standing, living conditions and outdoor activities between the two waves of assessment. Statistical models included: age, gender,

marital status, educational level and reported pain in 2007. Statistical analyses were conducted by the SPSS statistical software, version 17.

The study was approved by the Ethics Review Board (09-094) and the Data Protection Authority (S4455).

Results

Background characteristics

Characteristics of respondents in 2007 and 2009 (N=3503) are shown in table 1.

Most background characteristics were similar at the two measuring points. More females than males responded both years, most participants were married or cohabitating, had three or more children, lived in a community of ≥ 5000 and had more than basic education. Half of the respondents estimated their financial standing similar to other families. Almost a third (31%) of the participants had sedentary working conditions in both years ($p < 0.001$) and half (50% in 2007 and 49% in 2009) of the participants estimated their physical endurance similar to others of same sex and age ($p = 0.952$) (not shown in table). Regarding employment, there were 74.7% employed in 2007 as compared to 68.9% in 2009 ($p < 0.001$) and unemployment changed from 2.9% in 2007 to 4.6% in 2009 ($p < 0.001$). Utilization of open natural areas or outdoor recreational areas increased, with 44% going once a week to daily in 2007 but 51% in 2009 ($p < 0.001$) (not shown in table).

Individuals reporting pain that interrupted daily life in 2007 and 2009

No overall changes in prevalence of pain were noted between 2007 and 2009 (adjusting for age, sex, education and marital status; see table 4 in appendix). The odds ratio and confidence interval for each type of pain, with 2007 serving as reference were: Back-/shoulder pain; OR 1.0 (CI 0.91-1.10), frequent headaches; OR 1.04 (CI 0.91-1.19) and abdominal pain; OR 1.09 (CI 0.94-1.25).

Predictors for pain in 2009

Table 2 shows reported pain in 2009 with respect to general demographic characteristics (sex, age, marital status and education), levels of stress, mental well-being, financial standing in comparison to others, estimated living conditions and outdoor activities.

Compared to men, we found that women were more likely to report all three types of pain that disturbed daily life (adjusted odds ratio 1.48 [CI 1.27-1.72] for back-/shoulder pain, 1.67 [CI 1.32-2.10] for frequent headaches and 1.36 [CI 1.09-1.70] for

abdominal pain). As for age, we found that older groups were less likely to report abdominal pain and frequent headaches compared to the youngest group. Back-/shoulder pain on the other hand was reported more frequently by those aged 30-59 than the comparison group while the two oldest groups reported less frequently such pain.

Compared to those with basic levels of education, those with high educational level reported pain less frequently; adjusted odds ratio for back-/shoulder pain was 0.72 (CI 0.58-0.88), 0.62 (CI 0.46-0.85) for abdominal pain and 0.74 (CI 0.54-1.00) for frequent headaches. No significant effects were found with respect to marital status.

Changes in perceived stress and mental well-being

Using those with low stress levels in both 2007 and 2009 as a reference group (low-low group), the group that reported high stress levels in 2009 only (low-high) had significantly higher likelihood of experiencing back-/shoulder pain and frequent headaches (aORs 2.24 [CI 1.29-3.88] and 4.55 [CI 2.54-8.13], respectively). Those reporting high levels of stress in both 2007 and 2009 (high-high) also reported significantly higher odds of abdominal pain, aOR=3.70 (CI 1.18-11.60).

As for mental well-being, measured by the WHO-5 scale, those reporting low mental well-being at both time points (low-low) or decreased mental well-being from 2007 to 2009 (high-low) reported pain to a higher extend in every pain category as compared to the reference group of the participants that had high mental well-being score at both time points (high-high). Those with low mental well-being at both time points presented the highest risk of reporting pain; aOR=2.20 (CI 1.69-2.85) for back-/shoulder pain, aOR=3.23 (CI 2.36-4.42) for headaches and aOR=2.57 (CI 1.89-3.50) for abdominal pain. Individuals with decreased mental well-being between 2007 and 2009 also reported higher odds of pain in 2009 than the reference group; back-/shoulder pain (OR=1.42; CI 1.09-1.84), headache (OR=1.90; CI 1.34-2.69) and abdominal pain (OR=1.98; CI 1.42-2.77).

Those who considered themselves as having worse financial situation than other families in 2009, reported significantly higher odds of pain in all pain categories, compared to those estimating themselves as having better financial standing than other families (OR=1.35 [CI 1.06-1.72] for pain in back/shoulders; 1.76 [CI 1.27-2.44] for headaches and 1.49 [1.07-2.09]) for abdominal pain). When comparing those

estimating living conditions as worse compared to before the collapse, higher prevalence of headaches (OR=2.10; CI 1.06-4.20) was observed among those who experienced that their standard of living had worsened since the collapse.

Prevalence of pain that disturbed daily life was furthermore analyzed with regard to outdoor recreation. Using much outdoor recreation in both 2007 and 2009 (high-high) as a reference point, participants reporting little outdoor recreation in both years (low-low) had increased likelihood of experiencing back-/shoulder pain (OR=1.26; CI 1.05-1.51) as well as headaches (OR=1.47; CI 1.12-1.93). The same applied for those with increased outdoor recreation in 2009 (low-high) regarding back-/shoulder pain (OR=1.39; CI 1.11-1.73) and (OR=1.44; CI 1.04-1.99) for abdominal pain.

Gender specific analyses

Gender specific analyses showed that women with increased levels of stress between 2007 and 2009 (low-high) were more likely to have back-/shoulder pain and frequent headaches, compared to women with low levels of stress at both time points (aOR 3.32 (CI of 1.5-7.11) and 4.11 (CI 1.98-8.52), respectively). More women that had high levels of stress in both years (high-high) reported abdominal pain than in the reference group (low-low), OR=4.76 (CI 1.13-20.17). When comparing men with low levels of stress in both years (low-low) with men with high levels of stress in both 2007 and 2009 (high-high) as well as those with higher levels of stress only in 2009 (low-high) higher odds of frequent headaches were observed, OR=4.68(CI 1.74-12.60) and OR=8.96(1.60-50.21), respectively.

Regarding the analysis for mental well-being, both men and women with low scores on the mental well-being scale in both years (low-low) reported significantly higher odds of having pain than those with high mental well-being scores both in 2007 and 2009 (high-high). This was true for all three types of pain; OR=2.05 (CI 1.38-3.05) and 2.27 (1.60-3.21) for back-/shoulder pain, OR=4.62 (CI 2.72-7.85) and 2.57 (CI 1.74-3.80) for frequent headaches and OR=2.70 (CI 1.60-4.54) and 2.39 (CI 1.62-3.51) for abdominal pain, respectively. The same applied to men and women that only reported low mental well-being score in 2009 (high-low). They were significantly more likely to report all three types of pain than the reference groups (high-high) with the exception of back-/shoulder pain among men. For men and women the OR=2.34(CI 1.28-4.26) and 1.68 (CI 1.10-2.58) for frequent headaches

and OR=1.95 (CI 1.12-3.42) and 2.39 (CI 1.62-3.51) for abdominal pain, respectively. Women in the high-low group also reported higher odds of back-shoulder pain than the comparison group (high-high) with an OR=1.91 (CI 1.35-2.70).

Discussion

The findings indicate little or no overall change in the 12-month prevalence of reported back-/shoulder pain, frequent headaches or abdominal pain following the 2008 economic collapse in Iceland. However, findings indicate that increased levels of stress or lower mental well-being following the financial recession may be associated with increased risk of having pain related symptoms in 2009.

Previous studies on pain related experiences during economic crisis are scarce or non-existing. However, other measures of physical health during economic difficulties have found it to be associated with increased somatic symptoms [114] and increased disruptive morbidity in form of illness or injury that kept individuals from carrying out normal activities [113]. Evidence for worsening physical health being associated with economic expansion has also been reported [115].

In our study, those who considered themselves having worse financial standing as compared to other families were significantly more likely to report all three types of pain than those who considered themselves having better financial standing than other families. Also, those who reported worse living conditions after the economic crash than before, reported significantly more often frequent headaches than the comparison group. Previous studies have found low income to be a predicting factor for disabling pain [75] and individuals with frequent economic problems to be almost twice as likely to have certain types of headaches as people with no economic problems [70]. Also, evidence suggests long term economic hardships, especially in form of financial stress, to predict poor health outcomes, including musculoskeletal disorders, especially among women [94].

We observed that being a female was a significant predictor for reporting any of the studied pain types interrupting daily life in 2009. This is in accordance with many prevalence studies on back- and/or shoulder pain [9, 10], headaches [27, 155], abdominal pain [48, 49] and chronic pain [40, 42, 43]. We observed certain age trends where the prevalence of abdominal pain and frequent headaches decreased with increasing age. This is somewhat contrary to most studies on pain prevalence which report that pain increases with older age [43, 46, 68, 69] although a plateau seems often to be reached around certain age point [9, 69]. However, there are some studies that find a decrease in pain prevalence with increased age. Bassols et al found prevalence for any type of pain to decrease with older age [6] and episodic tension-

type headache prevalence has furthermore been found to decline among people of ≥ 40 years old [27]. Educational level also predicted pain experience as those with a university degree reported significantly less frequently all three types of pain than those only with basic education. This is in accordance with many previous studies; low education levels have been found to predict different types of pain [6, 25, 40, 75], but certain types of headaches have on the other hand been associated with increased education [27]. Increased outdoor recreation over the observation period predicted more back- and/or shoulder pain as well as abdominal pain and did not engage in outdoor recreation in either 2007 or 2009 predicted back- /shoulder pain and frequent headaches.

Increased utilization of open natural areas or outdoor recreational areas was noted between 2007 and 2009; the percentage of those going at least once a week increased from 44% to 51%. Other studies on health habits and economic changes have found somewhat similar patterns of recreational and physical activities increasing with increasing unemployment status [142] and fewer working hours [140].

Increased levels of stress and worsening mental health between 2007 and 2009 predicted higher prevalence of frequent headaches (significant for both men and women) as well as back- and/or shoulder pain (significant for women only). Also, worsening mental health predicted higher prevalence of abdominal pain (significant for both men and women). Further, low mental well-being both at baseline and follow-up predicted more pain of all three studied pain types, significant for men and women.

Numerous studies have revealed psychological stress of various kinds ranging from major traumatic events to negative life events like bereavement or unemployment as well as daily hassles as a contributing factor to many physical pathological conditions [76, 77, 156] including back- and shoulder pain [78, 138], abdominal pain [33] and headaches [90].

Studies have found the economic recession in 2008 to have negatively affected mental health [120, 121] and a study on stress levels of Icelanders [122] before and after the economic collapse found increased stress levels, particularly among women. Many individuals and families were undoubtedly affected in various ways. Besides the initial shock of the unusually sudden onset of the crisis, unforeseen unemployment, salary reduction, severely increased debt, higher mortgage payments

and other financial problems may have been stress and anxiety evoking. Possibly, increased stress in relation to the economic crisis may lead to an overload to the body's normal mechanism that adapts to stressful challenges and maintains homeostasis (allostasis). Studies have shown that such overload to the allostatic system can lead to morbidities [77].

Strengths and limitations

The main strengths of this study are the prospective design and the size of the well-defined, population-based cohort. Among limitations is that those who did not answer the questionnaire in 2009 may have had different pain experience than those who responded on both occasions. Thus, we cannot exclude the possibility that selection bias may affect our results. Also, recalling pain experience 12 months back in time may not be reliable and the pain questions were only one-item questions. But this source of misclassification is likely to be non-differential across exposure categories (2007 vs. 2009; or stable or increasing stress levels). As social and cultural characteristics affect the response of a population to economic recessions the findings may not be generalized to other societies.

Conclusion

The findings from this study indicate that although overall prevalence of experienced pain did not change significantly between 2007 and 2009, individuals with increased stress levels or worse mental well-being after the economic collapse presented, as compared to before, with increased risk of experiencing pain that disturbed daily life in 2009.

As studies on pain experience in connection to economic crisis are scarce the results from this study offer some new evidence regarding how such crisis can affect physical health. Future studies on the subject could bring further knowledge to the growing body of evidence on how economic crisis can affect public health, which in turn can be of use for authorities when planning preventive efforts in such crises.

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Table 1 Background characteristics of the study population (N=3,503).

Characteristics		2007 n(%)	2009 n(%)	χ^2 (P-value)
Gender	Male	1685(48.1)	1674(47.7)	0.000
	Female	1818(51.9)	1796(51.3)	
	Missing	3(0.1)	33(0.9)	
Age (years)	18-29	373(10.6)	289(8.3)	0.000
	30-39	529(15.1)	496(14.2)	
	40-49	604(17.2)	604(17.2)	
	50-59	685(19.6)	668(19.1)	
	60-69	709(20.2)	722(20.6)	
	>70	603(17.2)	724(20.7)	
	Mean age	51.86	53.86	
Marital status	Married/Cohabiting	2682(76.6)	2646(75.5)	0.526
	Committed, not cohabiting	131(3.7)	144(4.1)	
	Single/divorced	516(14.7)	502(14.3)	
	Widowed	154(4.4)	174(5)	
	Missing	20(0.6)	37(1.1)	
Number of children	No children	494(14.1)	445(12.7)	0.270
	One child	369(10.5)	356(10.2)	
	Two children	860(24.6)	840(24)	
	Three or more	1754(50.1)	1813(51.8)	
	Missing	26(0.7)	49(1.4)	
Residency (number of inhabitants)	≥5000	2230(63.7)	2225(63.5)	0.957
	200-4999	910(26)	893(25.5)	
	<200	320(9.1)	318(9.1)	
	Missing	43(1.2)	67(1.9)	
Education	Basic (primary school)	1367(39)	1125(32.1)	0.000
	Middle (college level)	1294(36.9)	1424(40.7)	
	High (university level)	784(22.4)	841(24)	
	Missing	58(1.7)	113(3.2)	
Employment status*	Employed	2615(74.7)	2412(68.9)	0.000
	Unemployed	101(2.9)	161(4.6)	0.000
	Student	405(11.6)	333(9.5)	0.007
	Homemaker/Parental leave	527(15)	404(11.5)	0.000
	Disabled (≥50%)	208(5.9)	218(6.2)	0.604
	Retired	628(17.9)	823(23.5)	0.000
	Sick-leave	142(4.1)	110(3.1)	0.046

Financial standing as compared to other families	Better	1093(31.2)	1153(32.9)	0.220
	Similar	1734(49.5)	1757(50.2)	
	Worse	536(15.3)	496(14.2)	
	Missing	140(4)	97(2.8)	

*As the question on employment was non-exclusive each respondent could belong to more than one category.

Table 2 – Predictors for reporting pain that interrupts daily life in 2009

Gender	Back-/shoulder pain				Frequent headaches				Abdominal pain			
	No pain (n %)	Pain (n %)	OR (CI 95%) ^a	OR(95%) ^b	No pain (n %)	Pain (n%)	OR(95%) ^a	OR(95%) ^b	No pain (n%)	Pain (n%)	OR(95%) ^a	OR(95%) ^b
	Male	Female										
Male	1108(66.2)	566(33.8)	1.0 Ref	1.0 Ref	1529(91.3)	145(8.7)	1.0 Ref	1.0 Ref	1513(90.4)	161(9.6)	1.0 Ref	1.0 Ref
Female	940(52.3)	856(47.7)	1.66(1.45-1.91)*	1.48(1.27-1.72)*	1458(81.2)	338(18.8)	2.17(1.76-2.68)*	1.67(1.32-2.10)*	1512(84.2)	284(15.8)	1.60(1.30-1.97)*	1.36(1.09-1.70)*
Age												
18-29	157(54.3)	132(45.7)	1.0 Ref	1.0 Ref	214(74)	75(26)	1.0 Ref	1.0 Ref	218(75.4)	71(24.6)	1.0 Ref	1.0 Ref
30-39	233(47)	263(53)	1.34(1.00-1.80)*	1.60(1.16-2.21)*	386(77.8)	110(22.2)	0.81(0.58-1.14)	0.82(0.55-1.23)	406(81.9)	90(18.1)	0.68(0.48-0.97)*	0.84(0.57-1.24)
40-49	321(53.1)	283(46.9)	1.05(0.79-1.39)	1.28(0.94-1.75)	494(81.8)	110(18.2)	0.64(0.46-0.89)*	0.74(0.50-1.08)	514(85.1)	90(14.9)	0.54(0.38-0.76)*	0.73(0.49-1.08)
50-59	377(56.4)	291(43.6)	0.92(0.70-1.21)	1.16(0.86-1.58)	576(86.2)	92(13.8)	0.46(0.32-0.64)*	0.61(0.41-0.90)*	591(88.5)	77(11.5)	0.40(0.28-0.57)*	0.50(0.34-0.74)*
60-69	451(62.5)	271(37.5)	0.72(0.54-0.94)	0.89(0.66-1.22)	664(92)	58(8)	0.25(0.17-0.36)*	0.35(0.22-0.53)*	662(91.7)	60(8.3)	0.28(0.19-0.41)*	0.35(0.23-0.54)*
>70	529(73.1)	195(26.9)	0.44(0.33-0.58)*	0.55(0.40-0.76)*	682(94.2)	42(5.8)	0.18(0.12-0.26)*	0.27(0.17-0.43)*	660(91.2)	64(8.8)	0.30(0.21-0.43)*	0.37(0.25-0.57)*
Marital status												
Married/Cohab	1577(59.6)	1069(40.4)	1.0 Ref	1.0 Ref	2286(86.4)	360(13.6)	1.0 Ref	1.0 Ref	2326(87.9)	320(12.1)	1.0 Ref	1.0 Ref
Comitted, not												
cohab.	85(59)	59(41)	0.75(0.53-1.07)	0.73(0.50-1.07)	111(77.1)	33(22.9)	1.12(0.73-1.71)	1.17(0.73-1.88)	114(79.2)	30(20.8)	1.32(0.85-2.04)	1.18(0.73-1.92)
Single/divorced	268(53.4)	234(46.6)	1.14(0.94-1.39)	1.14(0.92-1.42)	425(84.7)	77(15.3)	0.91(0.69-1.20)	0.89(0.65-1.22)	422(84.1)	80(15.9)	1.17(0.89-1.54)	1.07(0.79-1.44)
Widowed	114(65.5)	60(34.5)	1.12(0.80-1.57)	0.78(0.54-1.13)	161(92.5)	13(7.5)	1.01(0.56-1.83)	0.88(0.46-1.67)	160(92)	14(8)	1.02(0.57-1.81)	0.95(0.52-1.74)
Education												
Basic	637(56.6)	488(43.4)	1.0 Ref	1.0 Ref	971(86.3)	154(13.7)	1.0 Ref	1.0 Ref	975(86.7)	150(13.3)	1.0 Ref	1.0 Ref
Middle	865(60.7)	559(39.3)	0.74(0.63-0.87)*	0.86(0.72-1.03)	1227(86.2)	197(13.8)	0.82(0.64-1.03)	1.04(0.80-1.36)	1231(86.4)	193(13.6)	0.87(0.68-1.09)	1.01(0.78-1.31)
High	499(59.3)	342(40.7)	0.65(0.54-0.80)*	0.72(0.58-0.88)*	717(85.3)	124(14.7)	0.68(0.52-0.89)*	0.74(0.54-1.00)*?	739(87.9)	102(12.1)	0.62(0.46-0.82)*	0.62(0.46-0.85)*
Financial standing as compared to other families												
Better	716(62.1)	437(37.9)	1.0 Ref	1.0 Ref	1011(87.7)	142(12.3)	1.0 Ref	1.0 Ref	1020(88.5)	133(11.5)	1.0 Ref	1.0 Ref
Similar	1025(58.3)	732(41.7)	1.27(1.08-1.48)*	1.16(0.98-1.38)	1527(86.9)	230(13.1)	1.22(0.97-1.53)	0.95(0.74-1.23)	1543(87.8)	214(12.2)	1.17(0.93-1.48)	1.09(0.84-1.40)
Worse	260(52.4)	236(47.6)	1.54(1.24-1.91)*	1.35(1.06-1.72)*	384(77.4)	112(22.6)	2.21(1.67-2.93)*	1.76(1.27-2.44)*	402(81)	94(19)	1.86(1.39-2.50)*	1.49(1.07-2.09)*

Current living conditions compared to before oct. 2008												
-Better	65(57.5)	48(42.5)	1.0 Ref	1.0 Ref	101(89.4)	12(10.6)	1.0 Ref	1.0 Ref	93(82.3)	20(17.7)	1.0 Ref	1.0 Ref
-Similar	780(65.5)	410(34.5)	0.90(0.60-1.34)	0.90(0.58-1.39)	1070(89.9)	120(10.1)	1.42(0.75-2.70)	1.34(0.66-2.72)	1072(90.1)	118(9.9)	0.69(0.40-1.16)	0.61(0.34-1.07)
- Worse	1161(55.1)	947(44.9)	1.40(0.95-2.07)	1.41(0.92-2.16)	1758(83.4)	350(16.6)	2.63(1.41-4.91)*	2.10(1.06-4.20)*	1804(85.6)	304(14.4)	1.06(0.64-1.77)	0.91(0.52-1.57)
Outdoor recreation												
-high-high	749(64)	421(36)	1.0 Ref	1.0 Ref	1047(89.5)	123(10.5)	1.0 Ref	1.0 Ref	1051(89.8)	119(10.2)	1.0 Ref	1.0 Ref
-low-high	307(53.4)	268(46.6)	1.41(1.14-1.73)*	1.39(1.11-1.73)*	489(85)	86(15)	1.21(0.90-1.64)	1.22(0.87-1.72)	484(84.2)	91(15.8)	1.41(1.05-1.91)*	1.44(1.04-1.99)*
-high-low	218(63)	128(37)	0.94(0.73-1.21)	0.97(0.74-1.27)	296(85.5)	50(14.5)	1.18(0.82-1.69)	1.41(0.94-2.09)	297(85.8)	49(14.2)	1.25(0.87-1.79)	1.23(0.83-1.83)
-low-low	677(53.6)	586(46.4)	1.35(1.14-1.60)*	1.26(1.05-1.51)*	1043(82.6)	220(17.4)	1.38(1.08-1.76)*	1.47(1.12-1.93)*	1084(85.8)	179(14.2)	1.18(0.92-1.52)	1.09(0.82-1.43)

^a Adjusted for age

^b Adjusted for age, gender, education, marital status and pain '07 (accordingly for each type of pain)

* Significant

Table 3a – Development of stress between 2007 and 2009 of those with pain that interrupts daily life in 2009, all as well as gender stratified

	Stress (PSS4)							
	Low-Low		High-Low		Low-High		High-High	
Back- /Shoulder pain	n(%)	OR	n(%)	OR (CI 95%)	n(%)	OR (CI 95%)	n(%)	OR (CI 95%)
-All	1282(93.9)	Ref.	27(2)	0.92(0.51-1.65)	45(3.3)	2.24(1.29-3.88)*	11(0.8)	3.78(0.96-14.84)
-Male	520(95.6)	Ref.	8(1.5)	0.57(0.21-1.54)	12(2.2)	1.22(0.51-2.96)	4(0.7)	2.96(0.48-18.21)
-Female	754(92.9)	Ref.	19(2.3)	1.16(0.55-2.47)	32(3.9)	3.32(1.55-7.11)*	7(0.9)	5.45(0.61-48.42)
Frequent headaches								
-All	414(88.8)	Ref.	16(3.4)	1.38(0.68-2.83)	31(6.7)	4.55(2.54-8.13)*	5(1.1)	2.12(0.56-8.06)
-Male	124(89.9)	Ref.	3(2.2)	0.80(0.19-3.28)	9(6.5)	4.68(1.74-12.60)*	2(1.4)	8.96(1.60-50.21)*
-Female	287(88.3)	Ref.	13(4.0)	1.57(0.67-3.67)	22(6.8)	4.11(1.98-8.52)*	3(0.9)	0.99(0.21-4.72)
Abdominal pain								
-All	391(90.3)	Ref.	16(3.7)	1.33(0.68-2.62)	20(4.6)	1.63(0.87-3.05)	6(1.4)	3.70(1.18-11.60)*
-Male	146(93.6)	Ref.	3(1.9)	0.56(0.14-2.21)	5(3.2)	1.58(0.52-4.77)	2(1.3)	2.00(0.29-13.62)
-Female	240(88.6)	Ref.	13(4.8)	1.71(0.76-3.85)	14(5.2)	1.52(0.71-3.27)	4(1.5)	4.76(1.13-20.17)*

Adjusted for age, gender (for all), educational level, marital status and pain '07 (accordingly for each type of pain)

*Significant

Table 3b – Development of mental well-being between 2007 and 2009 of those with pain that interrupts daily life in 2009, all as well as gender stratified

	Mental well-being (WHO-5)							
	High-High		Low-High		High-Low		Low-Low	
Back- /Shoulder pain	n(%)	OR	n(%)	OR (CI 95%)	n(%)	OR (CI 95%)	n(%)	OR (CI 95%)
-All	887(64.7)	Ref.	116(8.5)	1.23(0.92-1.66)	164(12)	1.42(1.09-1.84)*	204(14.9)	2.20(1.69-2.85)*
-Male	381(69.9)	Ref.	45(8.3)	1.03(0.65-1.61)	49(9)	0.94(0.62-1.42)	70(12.8)	2.05(1.38-3.05)*
-Female	501(61.4)	Ref.	70(8.6)	1.44(0.96-2.15)	113(13.8)	1.91(1.35-2.70)*	132(16.2)	2.27(1.60-3.21)*
Frequent headaches								
-All	243(52.6)	Ref.	39(8.4)	1.18(0.77-1.81)	70(15.2)	1.90(1.34-2.69)*	110(23.8)	3.23(2.36-4.42)*
-Male	71(51.4)	Ref.	12(8.7)	1.58(0.76-3.29)	20(14.5)	2.34(1.28-4.26)*	35(25.4)	4.62(2.72-7.85)*
-Female	171(53.3)	Ref.	26(8.1)	1.03(0.61-1.74)	49(15.3)	1.68(1.10-2.58)*	75(23.4)	2.57(1.74-3.80)*
Abdominal pain								
-All	237(54.2)	Ref.	38(8.7)	1.33(0.8-1.99)	66(15.1)	1.98(1.42-2.77)*	96(22)	2.57(1.89-3.50)*
-Male	91(58)	Ref.	16(10.2)	1.51(0.80-2.85)	21(13.4)	1.95(1.12-3.42)*	29(18.5)	2.70(1.60-4.54)*
-Female	144(52.6)	Ref.	22(8)	1.19(0.70-2.04)	43(15.7)	1.95(1.28-2.97)*	65(23.7)	2.39(1.62-3.51)*

Adjusted for age, gender (for all), educational level, marital status and pain '07 (accordingly for each type of pain)

*Significant

Appendix

Proportion of individuals reporting pain in 2007 and 2009 (adjusted for age, sex, education, marital status)									
	Back- /shoulder pain		OR(C.I.95%)	Frequent headaches		OR(C.I.95%)	Abdominal pain		OR(C.I.95%)
	2007	2009		2007	2009		2007	2009	
	n(%)	n(%)		n(%)	n(%)		n(%)	n(%)	
Everyone with pain last 12 months	1468(41.9)	1435(41.0)	1.01(0.92-1.12)	500(14.3)	487(13.9)	1.07(0.93-1.24)	440(12.6)	452(12.9)	1.11(0.96-1.28)
Gender									
Male	595(35.3)	566(33.8)	0.99(0.85-1.14)	139(8.2)	145(8.7)	1.13(0.88-1.45)	155(9.2)	161(9.6)	1.15(0.91-1.46)
Female	873(48)	856(47.7)	1.03(0.90-1.18)	361(19.9)	338(18.8)	1.05(0.88-1.25)	285(15.7)	284(15.8)	1.09(0.91-1.31)
Age									
18-29	203(54.4)	132(45.7)	0.68(0.49-0.93)	93(24.9)	75(26)	1.08(0.75-1.56)	94(25.2)	71(24.6)	1.00(0.70-1.44)
30-39	255(48.2)	263(53)	1.22(0.95-1.58)	117(22.1)	110(22.2)	1.02(0.75-1.39)	80(15.1)	90(18.1)	1.34(0.95-1.88)
40-49	292(48.3)	283(46.9)	0.97(0.77-1.21)	120(19.9)	110(18.2)	0.94(0.70-1.26)	82(13.6)	90(14.9)	1.12(0.80-1.55)
50-59	286(41.8)	291(43.6)	1.13(0.90-1.41)	80(11.7)	92(13.8)	1.29(0.98-1.79)	71(10.4)	77(11.5)	1.14(0.81-1.62)
60-69	256(36.1)	271(37.5)	1.08(0.87-1.35)	58(8.2)	58(8)	0.97(0.66-1.44)	62(8.7)	60(8.3)	0.97(0.66-1.41)
≥70	176(29.2)	195(26.9)	0.89(0.69-1.14)	32(5.3)	42(5.8)	1.24(0.75-2.06)	51(8.5)	64(8.8)	1.01(0.67-1.51)
Marital status									
Married/cohabit.	1114(41.5)	1069(40.4)	1.01(0.90-1.13)	375(14)	360(13.6)	1.07(0.91-1.26)	317(11.8)	320(12.1)	1.07(0.91-1.26)
Comitted, not cohab.	57(43.5)	59(41)	0.86(0.52-1.42)	26(19.8)	33(22.9)	1.27(0.69-2.34)	23(17.6)	30(20.8)	1.27(0.69-2.34)
Single/divorced	224(43.4)	234(46.6)	1.15(0.89-1.48)	86(16.7)	77(15.3)	0.95(0.68-1.35)	87(16.9)	80(15.9)	0.95(0.68-1.35)
Widowed	65(42.2)	60(34.5)	0.77(0.48-1.23)	10(6.5)	13(7.5)	1.32(0.53-3.26)	12(7.8)	14(8)	1.32(0.53-3.26)
Number of children									
No children	224(45.3)	179(40.2)	0.80(0.61-1.05)	91(18.4)	77(17.3)	1.01(0.71-1.43)	89(18)	87(19.6)	1.29(0.92-1.81)
1 child	179(48.5)	156(43.8)	0.86(0.63-1.17)	61(16.5)	57(16)	1.11(0.73-1.69)	67(18.2)	56(15.7)	0.90(0.60-1.35)
2 children	384(44.7)	357(42.5)	0.96(0.79-1.18)	138(16)	119(14.2)	0.94(0.71-1.24)	97(11.3)	104(12.4)	1.18(0.87-1.59)
≥ 3 children	672(38.3)	728(40.2)	1.15(1.00-1.32)	208(11.9)	226(12.5)	1.16(0.95-1.44)	186(10.6)	199(11)	1.09(0.88-1.35)
Residence									
≥5000	919(41.2)	914(41.1)	1.03(0.91-1.17)	323(14.5)	318(14.3)	1.06(0.89-1.27)	291(13)	301(13.5)	1.12(0.94-1.34)
200-4999	385(42.3)	372(41.7)	1.04(0.85-1.26)	136(14.9)	131(14.7)	1.13(0.86-1.48)	113(12.4)	114(12.8)	1.12(0.85-1.49)
<200	146(45.6)	130(40.9)	0.86(0.62-1.20)	38(11.9)	29(9.1)	0.82(0.48-1.40)	33(10.3)	30(9.4)	0.95(0.56-1.63)
Education									
Basic	577(42.2)	488(43.4)	1.10(0.93-1.29)	190(13.9)	154(13.7)	1.06(0.84-1.35)	172(12.6)	150(13.3)	1.14(0.90-1.45)
Middle	553(42.7)	559(39.3)	0.92(0.79-1.08)	185(14.3)	197(13.8)	1.10(0.88-1.37)	162(12.5)	193(13.6)	1.16(0.92-1.46)
High	320(40.8)	342(40.7)	1.02(0.83-1.25)	117(14.9)	124(14.7)	1.02(0.77-1.35)	100(12.8)	102(12.1)	0.96(0.71-1.29)

Employment status									
Employed	1134(43.4)	1047(43.4)	1.04(0.93-1.17)	402(15.4)	360(14.9)	1.03(0.88-1.21)	331(12.7)	310(12.9)	1.07(0.91-1.27)
Unemployed	38(37.6)	70(43.5)	1.14(0.65-1.99)	17(16.8)	37(23)	1.42(0.69-2.91)	11(10.9)	32(19.9)	2.24(1.00-5.00)
Student	199(49.1)	158(47.4)	0.95(0.70-1.28)	90(22.2)	73(21.9)	1.01(0.70-1.46)	80(19.8)	78(23.4)	1.35(0.94-1.96)
Homem./parent.leave	233(44.2)	177(43.8)	0.94(0.71-1.24)	80(15.2)	63(15.6)	1.08(0.74-1.58)	77(14.6)	46(11.4)	0.76(0.51-1.13)
Disabled(≥50%)	124(59.6)	128(58.7)	0.92(0.61-1.37)	45(21.6)	52(23.9)	1.14(0.71-1.83)	48(23.1)	51(23.4)	0.99(0.62-1.59)
Retired	187(29.8)	228(27.7)	0.95(0.75-1.20)	37(5.9)	46(5.6)	1.06(0.67-1.67)	52(8.3)	69(8.4)	1.01(0.69-1.49)
Sick-leave	80(56.3)	60(54.5)	0.88(0.51-1.51)	29(20.4)	30(27.3)	1.45(0.79-2.65)	28(19.7)	25(22.7)	1.21(0.65-2.25)
Financial standing as compared to other families									
Better									
Similar	443(40.5)	437(37.9)	0.93(0.78-1.11)	125(11.4)	142(12.3)	1.15(0.88-1.51)	112(10.2)	133(11.5)	1.25(0.95-1.64)
Worse	725(41.8)	732(41.7)	1.08(0.94-1.24)	260(15)	230(13.1)	0.96(0.80-1.19)	222(12.8)	214(12.2)	1.05(0.85-1.29)
	249(46.5)	236(47.6)	1.03(0.79-1.33)	100(18.7)	112(22.6)	1.29(0.94-1.78)	96(17.9)	94(19)	1.01(0.73-1.40)

