Social support and mental well-being following the economic collapse in Iceland 2008: A prospective cohort study

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Thesis for the degree of Master of Public Health Sciences

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HÁSKÓLI ÍSLANDS

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Félagslegur stuðningur og andleg líðan í kjölfar efnahagsþrenginganna á Íslandi 2008: Framsýn ferilrannsókn

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Abstract

An economic crisis has the potential to affect multiple aspects of well-being: financial, physical, psycho-social. Few studies have used individual-level data to prospectively investigate changes in social support in the aftermath of economic crises. This study investigated levels of perceived social support before and after the economic collapse in Iceland in 2008 and its potential modifying role on the association between the economic collapse and mental well-being. A nationally representative prospective cohort of 3621 Icelanders answered the health related questionnaire *Health and Well-being of Icelanders* in both 2007 and 2009. Perceived social support was measured with two four-item questions on perceived trust and available help from others. Psychological stress was measured with the Perceived Stress Scale 4 (PSS-4) and depressive symptoms with the WHO-five Well-being Index (WHO-5). Results indicated that perceived social support generally increased between 2007 and 2009 [trust: 41.29 - 44.32%; p=0.021 | help: 45.04 - 48.91%; p=0.001]. Individuals experiencing a decrease in social support between 2007 and 2009 had increased odds of psychological stress [trust: adjusted odds ratio (aOR) = 1.81; 95% CI 1.15 – 2.85 | help: aOR = 3.13; 95% CI 2.01 – 4.86] and depression [trust: aOR = 1.73; 95% CI 1.27 – 2.35 | help: aOR = 2.05; 95% CI 1.48 – 2.82] in 2009. A similar trend in depressive symptoms was seen for individuals reporting low social support in both 2007 and 2009. Individuals reporting high social support in both 2007 and 2009 (trust) had increased odds of psychological stress. On the other hand, individuals reporting an increase in social support (help) between 2007 and 2009 had reduced odds of depressive symptoms [aOR= 0.71; 95% CI 0.53 – 0.96] but not in symptoms of psychological stress. Our findings incidate that alterations in perceived social support at times of national economic hardship is an important determinant of mental health, particularly depressive symptoms. Further research is needed to advance knowledge of mental health consequences of economic downturns in the long run and to characterize the modifying role of social support.

Ágrip

Efnahagsþrengingar geta haft fjölþættar afleiðingar fyrir einstaklinga, fjárhagslegar, líkamlegar, andlegar og félagslegar. Lítið er vitað um áhrif félagslegs stuðnings á samband efnahagsþrenginga og andlegrar heilsu. Markmið þessarar rannsóknar var að kanna breytingar á félagslegum stuðningi frá árinu 2007 (fyrir efnahagsþrengingarnar á Íslandi 2008) til ársins 2009 (í efnahagsþrengingunum) og einnig hugsanlega víxlhrif félagslegs stuðnings á samband efnahagshrunsins á streitu og þunglyndiseinkenni. Rannsóknin var framsýn ferilrannsókn sem náði til 3621 einstaklings sem svaraði spurningalistanum *Heilsa og líðan Íslendinga* bæði árið 2007 og 2009 um margvíslega heilsutengda þætti, s.s. félagslegan stuðning, streitu og einkenni þunglyndis. Félagslegur stuðningur, bæði traust til annarra og aðgengi að aðstoð frá öðrum, var metinn með frumsömdum spurningum. Streita var metin með streitukvarðanum PSS-4 (Perceived Stress Scale) og einkenni þunglyndis með WHO-5 kvarðanum (WHO-five Well-being Index). Félagslegur stuðningur jókst milli 2007 og 2009 [traust: 41.29 - 44.32%; p=0.021 | hjálp: 45.04 - 48.91%; p=0.001]. Streita [traust: aOR = 1.81; 95% CI 1.15 – 2.85 | hjálp: aOR = 3.13; 95% CI 2.01 – 4.86] og þunglyndiseinkenni [traust: aOR = 1.73; 95% CI 1.27 – 2.35 | hjálp: aOR = 2.05; 95% CI 1.48 – 2.82] jukust marktækt meðal þeirra einstaklinga sem höfðu minni félagslegan stuðning árið 2009 samanborið við árið 2007. Þunglyndiseinkenni jukust einnig meðal þess hóps sem hafði lítinn félagslegan stuðning bæði árið 2007 og 2009. Streita jókst einnig meðal þess hóps sem hafði góðan félagslegan stuðning (traust) bæði árið 2007 og 2009. Á hinn bóginn þá var gagnlíkindahlutfall (odds ratio) á þunglyndiseinkennum hærra hjá þeim sem höfðu aukinn félagslegan stuðning (hjálp) milli ára [aOR= 0.71; 95% CI 0.53 – 0.96] en samsvarandi niðurstöður varðandi streitu reyndust ekki marktækar. Niðurstöður þessar benda til þess að félagslegur stuðningur hafi aukist í kjölfar efnahagshrunsins á Íslandi árið 2008. Niðurstöðurnar benda einnig til þess að breytingar á félagslegum stuðningi í efnahagsþrengingum hafi áhrif á þróun andlegrar vanheilsu, þá sérstaklega þunglyndiseinkenna. Frekari rannsókna er þörf til að kanna langtímaafleiðingar efnahagsþrenginga á andlega heilsu og einnig þátt félagslegs stuðnings í þessu sambandi.

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Introduction

1 Mental health

1.1 Psychological stress – Definition and conceptualization

Various definitions of psychological stress are found in the scientific literature. Definitions concerning psychological stress date back to the 1930s with Hans Selye's definition of psychological stress as a synchronized set of physical defenses against any form of unfavorable stressors in life.[1] Later, Lazarus and Folkman have defined psychological stress as an exchangeable process rising from either real or perceived environmental demands which the individual experiences as threatening or nonthreatening.[2] How the individual experiences this process depends largely on the available adapting coping resources at hand, which emphasizes individual differences in coping with stressful circumstances and events.[2] More recently the Allostatic Load model was proposed by Bruce McEwen and coworkers. The definition of Allostatic load is the process of wear-and-tear on the body and brain promoting detrimental consequences when reacting to overwhelming and/or long-term psychological stress and contrasts healthy responses in terms of sustaining the body's homeostasis (allostasis),[3] a concept first defined by Cannon in 1932.[4] The Allostatic Load model incorporates dynamic responses of the brain to external stressors.[3, 5, 6]

Psychological stress takes on both an acute and chronic form. Acute psychological stress is the most common form of stress resulting from demands and pressures of the recent past and near future, it may even be exciting, however only in small doses, too much stress may result in exhaustion and even chronic stress.[7]

1.1.1 Main sources of stress

Stressors can be of any nature, both internal (e.g. fear) and external (e.g. financial problems) and take various forms, such as physical (e.g. injury, noise), chemical (e.g. smoke, alcohol) or biological (e.g. high blood pressure). Others may have either a psychological (e.g. loss of a family member, demanding job) or social (e.g. lack of friendship, low social position) nature.[8] However, stressors can be categorized by several different approaches. Elliot and Eisdorfer's (1982) classification differentiates stressors either by duration or course, and includes five categories: (1) acute time-limited stressors (e.g. laboratory challenges), (2) brief naturalistic stressors (e.g. real-life short term challenge), (3) chronic stressors (e.g. caring for

a spouse with dementia), (4) distant stressors (e.g. experienced sexual assault as a child) and (5) stressful event sequences (e.g. loss of a spouse, major natural disaster).[9]

1.1.2 Pathways linking psychological stress to health

Allostasis is a process that involves maintaining stability (i.e. homeostasis), through change.[5] However, stressful stimuli set this stability out of balance by causing the sympathetic–adrenal–medullary (SAM) axis to release catecholamines (e.g. epinephrine and norepinephrine) and the hypothalamic–pituitary–adrenal (HPA) axis to release glucocorticoids (e.g. cortisol),[10] commonly used biomarkers of stress. These hormones promote adaptation and are beneficial for a healthy fight-and-flight response.[5] Short-term increases in cortisol and epinephrine are believed to be normal reactions to stressors; however the secretion of both cortisol and epinephrine is turned off when the stress is over. Excessive or prolonged psychological stress affects a multitude of physiological systems and behavior which may leave the individuals vulnerable to ill health. Under persistent stress (i.e. chronic stress) these hormones result in cumulative changes that lead to a wear-and-tear, called allostatic load or overload, on the body and brain.[5] Individual differences and the variation in the nature of stressors may stimulate such responses, and can in addition lead to either hyper- or hypo-responsiveness of cortisol, i.e. low or high cortisol response, to stress. Both hyper- and hypo-responsive cortisol levels to stress have been reported to be indicative of wear and tear of the HPA axis, i.e. symptomatic of a dysregulated HPA response to stress.[5, 11]

Psychological stress has frequently been associated with musculoskeletal disorders, particularly in the head and neck region,[12, 13] believed to be due to elevated muscle activity.[14, 15] Furthermore, stressful events and psychological stress have consistently been associated with increased risk of various psychiatric disorders,[16-18] diabetes and cardiovascular disorders,[19-21] and various infections.[9, 22] In addition, psychological stress is well known to result in psychological burnout, post-traumatic stress disorder (PTSD) in all age groups, as well as cognitive impairment in late life and depression.[23]

1.1.3 Measuring psychological stress

Prolonged short-term stress may lead to distress, with both physical and psychological symptoms. Short term stress is however not believed to cause extensive damage to the body and minds of people as chronic psychological stress is believed to do.[7] Chronic stress

manifests itself in a range of symptoms, both physical and psychological. Common physical symptoms include: headaches, gastrointestinal symptoms, muscle tension, rapid heartbeat, insomnia, chest pain and loss of sexual desire.[7] Psychological symptoms of stress include: anxiety, depression / low mood, aggression, mood swings, and feeling overwhelmed.[7, 24]

Assessment of psychological stress is in general based on three leading approaches: 1) The environmental approach, which focuses on the stimulus model of stress and the assessment of stressors,[25] 2) the psychological approach, based on the transactional model of stress, focusing on the individuals' assessment and perceived evaluation of his capabilities to handle demands posed by particular events and/or the measurement of the person's individual emotional response to the demands,[2] and finally 3) the biological approach, which is based on Selye's[1] stress model and focuses on the assessment of the activation of particular physiological systems that are involved in the stress response. Throughout recent years more emphasis has been placed on the usefulness of stress assessment instruments that focus primarily on self-perceived stress experiences.[26, 27] Within the realm of the environmental approach, self-report and investigator-based instruments for the assessment of acute and chronic exposure to stressors, including assessment of major life events, have been developed, such as Survey of Recent Life Experiences (SRLE),[28] Job Content Questionnaire (JCQ),[29] the Stockholm Marital Stress Scale (SMSS),[30] the Bergen Social Relationships Scale (BSRS),[31] and the Social Readjustment Rating Scale.[25] Regarding the psychological approach to stress assessment, self-report questionnaires have been developed, such as the Depression-Anxiety-Stress Scale, DASS,[32] the Brief Stress and Coping Inventory (BSCI),[33] and the Perceived Stress Scale (PSS).[26] In epidemiological studies, shortened stress measures are frequently used as studies have revealed that short questionnaires may be as robust as longer ones,[34] with obvious benefits of both reduced cost and ease of interpretation.[35] One such example is the Perceived Stress Scale (PSS-4),[26] a shortened and validated version of the original 14 item scale.[36] It measures the degree to which situations in one's life are considered unpredictable, uncontrollable and overloaded during the last month with higher score indicating more perceived stress.[37] Previous studies indicate that the PSS-4 has good reliability, with a coefficient alpha reliability of 0.73.[38]

1.2 Depression - Definition and epidemiology

According to The World Health Organization (WHO) it is estimated that around 350 million people are affected by depressive disorders worldwide which highpoints that depressive disorders are highly prevalent among adults both worldwide and in Europe[39] with the global disease burden on a rise.[39] A World Health Assembly resolution in May 2012 called for a coordinated response to mental disorders at country level.[39]

Depressive disorders are one of the most common diagnosed psychological disorders among adults worldwide;[39, 40] WHO has even demonstrated that depressive disorders are one of the leading causes of disease worldwide.[39] The overall approximation of the prevalence of life-time depression has revealed mixed results; the main cause may be due to differential methodologies. Prevalence of worldwide depressive episodes has been reported to be 16 per 100,000 per year for males and 25 per 100,000 per year for females.[41] In a European meta-analysis, including Icelandic data, the 12 month prevalence of depression was approximately 5% among men and 11% among women, with little variation between countries.[42] A cross-sectional community study including data from Ireland, Spain, the U.K., Norway, and Finland reported a 12-month prevalence of depressive disorder of 8.6%.[43]

In the past, depression was assumed to be an acute and self-limiting disorder. However, during the past 20 years there has been an increased understanding of the disorder with a growing clarity that depression is a chronic disorder.[40] Depression is different from usual mood swings to challenges in everyday life and occurs within all age groups.[44] Depression displays as a combination of sadness, loneliness, irritability and agitation, worthlessness, hopelessness and guilt, accompanied by a range of physical symptoms.[45] Depending on the number and severity of symptoms, a depressive episode can be categorized as mild, moderate, or severe.[39]

The two prevailing categories of depression are unipolar depression and bipolar mood disorder. Unipolar depression is characterized by depressed mood, loss of interest, reduced energy leading to diminished activity for at least two weeks. People suffering from depression may also suffer from anxiety symptoms, appetite disruption as well as sleep disturbance. They may have feelings of low self-worth and guilt, poor concentration and even symptoms that cannot be explained medically.[39] Bipolar mood disorder is a type of depression that normally consists of both manic and depressive episodes parted by periods of normal mood. During manic episodes the individuals´ mood is either raised, irritated, over-activated, inflated by self-esteem and there is a diminished need for sleep.[39]

Depression may become a serious health disorder, particularly when it is ongoing with moderate to severe intensity. It may cause the affected individual suffering, e.g. functioning poorly at work or within the family net, and may at its worst lead to suicide.[46] Recognizing depression may be particularly challenging for the fact that people rarely, especially men, freely describe emotional difficulties.[47]

1.2.1 Main sources of depression

Depression is believed to be caused by multiple factors, for instance biological, cognitive and social.[48] In a review by Levinson on the genetics of depression, it is argued that those who consent to the biological explanation verify their view based on the fact that depression can be treated with medication that affects neurotransmitters. Furthermore, as with numerous physical illnesses, depression often appears in phases. Finally it has been shown that depression runs in families and is therefore thought to be hereditary, for example there is a greater association between depression in identical twins compared to non-identical twins and the risk of developing depression is 1.5 to 3 times increased if a family member of the first generation has suffered from depression during his/her life time.[48]

Cognitive theories of depression postulate that people's thoughts, attitudes, and understandings, can increase their risk for depression. Three mechanisms have been implicated in the relationship between biased cognitive processing and the dysregulation of emotion in depression: shortfalls in working memory, ruminative responses to both negative mood states and negative life events, resulting in psychological stress,[23] and the incapability to use positive and rewarding stimuli to regulate negative mood.[49]

Furthermore, the onset of depression among younger age groups and recurrence throughout adulthood has gotten attention within the scientific community.[50] In a study by Kessler and coworkers in USA on 9282 individuals, there was an increase in the prevalence of depression at ages 15-18; however, speculations suggest that this increase is more likely due to puberty than age.[51] In addition, depression ranks higher among the leading causes of disease burden for women than for men.[41] Recent research on gender differences regarding depression suggests that the differences are most likely due to a shared interplay of biological, hormonal and psychological along with social factors.[52] Kornstein presented an overview of plausible factors contributing to gender differences in depression (**figure 1**).[53]

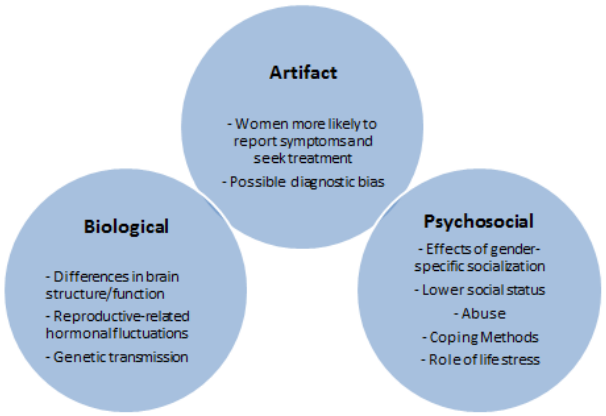

Figure 1. Plausible factors that may contribute to gender differences in depression

1.2.2 Measuring depression

Several screening measures have been specifically designed to detect depression and provide an indication of the severity of symptoms and assess the severity within a given period of time. Most screening measures have a statistically predetermined cutoff score at which depression symptoms are considered significant and should be further assessed in a clinical diagnostic interview using depressive disorders criteria found in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision (DSM-IV-TR).[45] A clinical evaluation is critical in excluding possible conditions that may present with symptoms of depression, such as hypothyroidism.[44] The clinical indicators of depression may differ by age, gender, or ethnic background.[44] In addition, screening measures do not address important analytical features such as duration of symptoms, degree of impairment, and co-morbid psychiatric disorders. They are however useful and effective for detecting depressive symptoms or signs of depression in large scale studies.

The most commonly used depression screening measures for adults include the Beck Depression Inventory Scale (BDI-II),[54] and Beck Depression Inventory for Primary Care BDI-PC,[55] the Center for Epidemiological Studies Depression Scale, revised (CES-DR),[56] the Patient Health Questionnaire (PHQ),[57] the Zung Self-Rating Depression Scale,[58] and the Geriatric Depression Scale.[59] When selecting screening measurement tools, there are multiple features that should be taken into account, e.g. the characteristics of the population to be tested, psychometric properties of the instrument, time required to complete and score the measure, simplicity of use, and cost of attaining the measure.[44]

The majority of screening measures for depression may be time consuming and contain a variety of items. Often a shorter screening instrument may be preferred, one example is the WHO 5-item Well-Being Index (WHO-5).[60, 61] The WHO-5 is a short screening measure for the detection of poor well-being in the general population which includes five positively worded items, covering positive mood, vitality, and overall interests.[60, 61] The WHO-5 questionnaire has proven useful for detecting depression in primary care, both having good sensitivity and negative predictive value, in addition to having excellent internal and external consistency and good criterion validity.[62-64] It has in addition been found to have significantly lower ceiling effect than for instance the health status questionnaire (SF-36).[65] Scores below 13 (of 25 possible) indicate depressive symptoms.[66]

2 Social support

Even though most people experience distress after being exposed to a negative life-event,[67] certain individuals and/or subgroups seem to be more susceptible to psychological morbidity compared to others. In a systematic review, Lock and coworkers postulate that people with good psychosocial resilience and access to social support may be relatively resilient to distress. They report that people begin the process of adaptation more easily with the help of supporting relationships. Furthermore, they discuss a number of factors that might increase the risk of developing mental disorders following a negative life event, e.g. former mental health problems and demographic factors, but a number of studies indicate the importance of receiving satisfactory social support.[67-72]

2.1 Definitions and conceptualizations

Social support, a well-known factor influencing both physical[73] and psychological health,[74] has been extensively studied within the scientific community during the last decade. However, there are still open issues in current empirical research regarding the measurement of the concept in different contexts, as well as the association between different types of social support along with different dimensions of health. Due to different definitions and conceptualizations of social support, comparisons between studies are subject to certain difficulties.

Social support is, as stated above, a complex concept lacking a universal definition and therefore variably defined by multiple disciplines within the scientific community. A commonly known definition by Cobb outlines social support as information that lead people to believe that they are members of a network of joint obligation, that they are appreciated, loved and cared for.[75] Later House conceptualized social support as an interpersonal transaction that involves any number of the following: (a) emotional support: by encouraging, loving, caring and trusting and providing empathy and understanding; (b) instrumental support: by providing direct help, i.e. helping people financially; (c) informational support: guide or inform people in ways of adjusting to changes in their lives; and (d) appraisal support: which relates to self-evaluation, accepting that one´s beliefs and interpretations of circumstances are appropriate.[76]

Social support can be measured in terms of structural support or functional support.[77] Structural support refers to the extent to which a recipient is connected within a social

network, such as the number of social ties or how integrated a person is within his/her social network.[78] Functional social support looks at the specific functions that members in this social network can provide, such as the emotional, instrumental, informational, and appraisal support, as listed previously.[79]

Researchers have commonly made a distinction between received and perceived social support.[80] Received support refers to a particular supportive action offered by providers during times of need.[81] Perceived social support indicates a recipient´s subjective judgment that sources, such as family, friends and schoolmates/coworkers, will offer help during times of need.[81] In addition, these different types of social support have different patterns of correlations with health.[74, 82] For example, perceived support is believed to be more strongly and consistently linked to mental health than received support and social integration. [73, 74]

2.2 Perceived social support and physical health

Perceived social support is one of the most well documented psychosocial factors influencing physical health outcomes.[83-86] In a systematic review and meta-analysis by Barth and coworkers on over 1700 papers regarding the relevance of low perceived social support on the development and course of coronary heart disease (CHD), results consistently show that low perceived functional social support negatively affects cardiac and all-cause mortality.[87] There is also evidence linking satisfactory perceived social support to lower cancer mortality, as outlined in a meta-analysis by Pinquart and coworkers on perceived social support and cancer mortality.[84] Studies have also reported evidence linking social support to infectious disease mortality,[88] in addition to various other cardiovascular morbidity.[89] Some of the most compelling evidence to date regarding the health effects of social support, was conducted in a meta-analysis of over 300,000 individuals. The authors found out that perceived social support was related to significantly lower risk for all-cause mortality.[85] Across the 148 studies, the random effects weighted average effect size was OR = 1.50 (95% CI 1.42 - 1.59), which indicates a 50% increased likelihood of survival for participants with stronger perceived social relationships. These findings remained consistent across age, sex, initial health status, cause of death, and follow-up period. This effect size is believed to be larger than standard medical factors such as exercise and obesity.[90]

2.3 Perceived social support and mental health

Previous research has suggested that perceived social support may be more strongly related to psychological health than received social support.[91-93] In other words, both the perceived quality and quantity of social interactions may be more important than the actual support received by the individual.[94] The effects of perceived social support in comparison to received social support are stronger and consistently beneficial for mental health and physical health, and in addition believed to be a more sensitive measure of the ability to cope with mental health challenges.[73, 79, 89, 95]

Perceived social support has been consistently linked to good psychological health, including low rates of major depression[96] and low levels of non-specific psychological distress.[74, 97 98] The current literature suggests that psychological distress may be reduced if the individual perceives that others, such as family and friends, will be available to offer help (i.e. perceived social support) during times of stress, for instance by reducing the time spent worrying about life problems[99] as well as increasing sense of control and minimizing feelings of isolation and distrust.[100, 101] In addition, perceived support may improve emotional and cognitive functioning by encouraging less threatening interpretations of stressful events and more effective coping strategies[97] as well as possibly influencing physiological factors known to be associated with psychological distress including stress hormones, e.g. cortisol.[102, 103]

Previous research has consistently suggested that people with low perceived social support report more symptoms of adverse psychological health. Results from studies on perceived social support and mental and physical health indicate that low perceived social support associates with increased prevalence of depressive disorder[89, 93, 104] and generalized anxiety disorder.[104, 105]

2.4 The link between social support and health – possible pathways and theoretical models

Various mechanisms have been suggested regarding the link between social support and physical health. Accordingly, structural and functional measures of support may eventually influence morbidity and mortality through two different pathways, however not necessarily independent pathways. One pathway involves **behavioral processes** which includes health behaviors and adherence to medical treatments as proposed by social control and social identity theorists.[106, 107] This view refers to social support being beneficial for health by promoting healthier behaviors such as exercising, not smoking, healthy diet, in addition to

greater adherence to medical treatments, directly or indirectly.[108] However, it should be taken into account that not necessarily all supportive interactions encourage healthier behaviors, network ties may in fact set a negative example by endorsing risky health behaviors such as increasing alcohol intake or encouraging smoking.[109] The other major pathway involves **psychological processes** associated with appraisals, emotions or moods, such as depression, in addition to feelings of control.[110, 111] This view proposes that social support may be beneficial to health in the fact that it may decrease how stressful an individual finds an event to be, e.g. a person who has supportive networks or perceives having good social support may experience less stress for the fact that others provide him/her with support. This decreased stress appraisal is believed to influence psychological processes, e.g. negative mood or self-esteem. Furthermore, both these processes are believed to influence cardiovascular, endocrine and immune systems.[112] There is strong evidence connecting social support with these processes,[113] although direct evidence for their mediational role on health outcomes is lacking.[114] Behavioral and psychological pathways are also believed to be connected as each has been shown to have an influence over the other. Feelings of stress may thus harmfully impact the practice of health behaviors,[115] while health behaviors such as exercise can have beneficial effects on feelings of stress.[116] In addition, psychological and behavioral pathways may have bi-directional influence on social support processes. For instance, psychological distress may influence perceptions of support and contribute to negative social interactions.[117, 118]

Numerous theories have in addition been proposed to explain the link between social support and health. There are two dominant hypotheses that address the relationship between social support and health, **the main effect model** and **the buffering model**.[97] The main difference between these two hypotheses is that the main effect model predicts that social support is beneficial at any given time, while the buffering hypothesis predicts that social support is mainly beneficial during stressful times.[97]

The main effect model, proposes that social resources have beneficial effects regardless of whether the individuals are under stress or not, i.e. there is a direct relationship between social support and disease. Furthermore, the model proposes that beneficial effects occur because large social networks provide regular positive experiences and a set of socially satisfying roles in the community, providing positive influences, a sense of confidence and stability, and recognition of self-worth. Social interaction may also help to avoid negative experiences.[97, 119]

The buffering model[97] proposes that social support is related to health at stressful times in the person‘s life and that social support protects individuals from the potentially harmful influence of stressful events by influencing how people think about and cope with the events.[75, 97] The buffering model has dominated social support research and is based upon the stress and coping social support theory.[74, 97, 120] Stress buffering is more likely to be detected for perceived support than for received support.[74]

2.5 Predictive factors for social support

The need and effectiveness for social support differs between individuals but also by gender, race, and age.[121] Gender has been proposed to be the most important facet of social status influencing social support. The literature on gender differences in levels of perceived social support is limited and the results are mixed, some reporting poorer perceived social support among men in comparison to women,[121-123] others indicating that perceived social support is higher among men than women[124] and finally studies reporting no gender differences.[125] However the majority of studies show that women both give and receive more support than men[126, 127] but for men the favorable effects of support are believed to be stronger.[128-130] Researchers have claimed that the support functions that are effective buffers for women may not be effective for men and vice versa.[97] Also, it has been proposed that women may have a greater skill both to provide support and greater dependence upon social support for psychological well-being,[131] and overall women are believed to experience greater support than men do.[121] On the other hand the literature on gender differences in terms of received social support is more robust, previous research on received social support indicate that that women both give and receive more support than men.[126] A recent meta-analysis found that women report and seek more social support that men.[132]

Differences in social support have also been seen between age groups or stages in life. Even though some aspects of social support may decrease across the adulthood,[121] previous research has however indicated that perceived social support increases with age.[133] Specifically, older and retired individuals begin to need more practical support than younger adults.[134] It has been postulated that older adults may be better at adapting their emotions than younger adults,[135] they are also believed to use more optimistic reappraisal than younger individuals.[136, 137] This may in fact contribute to the older generation perceiving having better social support both in terms of trust and available help.

Perceived social support has previously been known to be associated with socio-economic status, (SES), i.e. individuals in higher SES groups (a measure on salary, level of responsibility at work, and educational level)[138, 139] are more likely to report higher levels of social support.[140, 141] A recent study by Gecková et al. found strong socioeconomic differences in social support among adolescents. Adolescents from lower socio-economic groups (measured by their parents' education and occupational level) more frequently reported lower social support than those of higher socio-economic groups. Researchers have proposed that different availability of social support between SES groups is one mechanism through which socioeconomic circumstances influence health.[140, 142-145] Long-term unemployment has also been shown to cause increased social isolation, i.e. social deterioration.[146] This is in line with a fairly recent meta-analysis by McKee-Ryan et al. They highlight that the level of social support reduces with the duration of unemployment.[147]

However, few studies have attempted to assess social support in relation to socioeconomic differences, both regarding overall estimation of social support mobilization between different socio-demographic groups and in terms of health, and those that have done so have produced inconsistent results.[144]

3 Economic recessions and health

The association between negative life-events, such as loss of a significant other or other psychological trauma, and psychological morbidity has been thoroughly investigated throughout recent years, suggesting an increase in psychological morbidity following negative life-events. A number of studies on bereavement have supported this.[16-20] In an early review by Mazure, case-control studies showed that depressed individuals were 2.5 times more likely to have experienced a negative stressful event than those who were not depressed. In addition, the likelihood of developing depression during the six-month period following a negative event was six times higher compared to the six-month period preceding the negative event.[148, 149] In addition, both chronic and recurrent depression has been shown to be significantly higher among those with prior childhood negative life-events.[150, 151]

Regarding trauma of a broader social scope, psychological morbidity following exposure to natural disasters has also been investigated. In two studies on the prevalence of PTSD among survivors one year following the Wenchuan (year 2008) earthquake in China, post-earthquake levels of depression, anxiety and PTSD were high, compared with rates of PTSD in previous studies among the survivors of the hard-hit regions.[68, 72] In addition, post hurricane prevalence for PTSD of 3.6% and 6.1% for major depressive episode was found six to nine months after the 2004 Florida hurricanes (n=1452).[152]

Global economics generally vary between cycles of growth and recession of variable length. In its most exaggerated forms, global and national economic crisis may even be characterized as social trauma. Historically, financial factors and their influence on public health indices have been subject to scientific research.[153] In a review by Stuckler and coworkers it is postulated that the comparatively smooth financial cycles of growth and recession may become interrupted by periods of economic crisis, which consist of bursting of financial bubbles, bankruptcies, declines in international trade, currency crisis or an inability of national governments to repay their debts.[154] In the 20th century, three major international economic crisis occurred: The Great Depression in 1929, and the post-Communist recession in the former Soviet Union countries and the East Asian financial crisis both occurring in the 1990s.[154] Each crisis saw a rise in unemployment rates, inflation occurred and loss of savings. The most recent example occurred with the global economic crisis in 2008. The economic impact was similar to that of the above-mentioned economic crises, with severe declines in international trade, government budget constraints, collapse of financial institutions and

rising unemployment rates. The effect of the current economic crisis, the longest since the Great Depression,[155] originating from the U.S.A., has spread around the world, leading to significant decreases of the gross domestic product in advanced economies, collapsing global trade, and contractions in the developing economies.[156]

3.1 Economic hardships and physical health

Economic recessions may affect populations in other ways than purely financially. Former research has linked financial stress with increased mortality rates, and declining physical health.[157] A review on national economic crises and mortality by Falagas and coworkers in 2009 included 11 studies from Russia, South Korea, as well as from South or Central American, African and European countries.[158] Periods of economic crises were associated with an increase in all-cause mortality in seven out of eight studies that reported specific relevant data and increase in cardiovascular mortality in six out of seven studies.[158] Khang and coworkers investigated whether the massive economic changes affected trends in all-cause and cause-specific mortality in South Korea. The results showed that all-cause mortality decrease for both genders and all age groups during the crisis.[159] Kondo and coworkers investigated whether socioeconomic related inequality in self-rated health widened after the economic crisis of the over 10 year economic recession in Japan in the 1990s. The two surveys consisted of 168,801 and 150,016 people, respectively, with about an 80% response rate and indicated that poor health declined across all socioeconomic groups following the crisis.[160] Unemployed people were twice as likely to report poor health compared with the highest class workers throughout the period. Self-rated health of middle and high income groups deteriorated in relative terms following the crisis compared with lower income people. Self-rated health improved in absolute terms for all occupational groups even after the economic recession. However, the relative diversity increased between the top and middle occupational groups in men.[160] In addition, in a review from 2011 including 37 studies, evidence was found for worse infectious disease outcomes during the recession, possibly due to higher rates of infectious contact under poorer living circumstances.[161] Falagas and coworkers proposed that economic crisis in less affluent countries was believed to be accompanied with increase in all-cause mortality but that further data were needed to establish the effect of economic crisis on mortality in more affluent countries.[158]

Recent research on the effects of economic recessions on physical health and mortality have however yielded mixed results, with the majority of studies agreeing on improved physical health and decreased mortality rates but on the other hand increase in suicides.[162, 163] Furthermore, macro-economic studies have shown that mortality seems to decrease during economic downturns, and increase in upturns.[164, 165]

We are only aware of one published study on the physical health effects of the economic crisis in Iceland in 2008. The study found that during the first days of the Icelandic crisis (marked distinctively by the Prime Minister´s address on October 6 2008) the total number of visits to the cardiac emergency department increased in general due to ischemic heart disease. However, this effect was only observed for females and not sustained over time, indicating a short-term stress reaction.[166]

3.2 Economic hardships and mental health

The most common outcome resulting from economic crisis is financial stress, a self-perceived, unpleasant feeling that one is incapable of making ends meet. Financial stress tends to be chronic, and often perceived as uncontrollable[167] known to result in distress, e.g. depression.[67] A number of studies show that during hard economic periods, levels of psychological morbidity increase and quality of life decrease.[168-170] This point arises from firstly observational studies conducted in the 1930s,[171] secondly from analysis of yearly population data,[172] and thirdly from surveys of individuals going through financial hardships.[173] In addition, some studies indicate that psychological health may deteriorate more than physical health during economic downturns.[163, 174] Even though those who become unemployed during recessions may have worse health than those employed, those who remain employed may also be affected by recessions through loss of income, investments or job security.[175] Viinamaki and coworkers investigated the prevalence of mental disorder during the economic recession in Finland in the 1990s. Between 1993 and 1995 the prevalence of mental disorders increased among Finnish men from 15.6 to 19.2% and among women from 21.0 to 24.5%. Mental disorder increased each year, both among men and women, more so for women. Mental disorder was more common among the unemployed than among other respondents and subjective poor health, suicidal thoughts and poor economic situation were associated with mental disorder for both genders every year.[168] The results of more recent studies are in line with Viinamaki and coworkers, consistently showing that both

economic recessions and overall economic contraction predict both the development of depression[169, 170, 176-180] and anxiety.[169, 177-179, 181]

A recent study in Iceland on stress levels of Icelanders (measured with PSS-4) was conducted in a prospective cohort study of 3,755 individuals aged 18-79, comparing two time points, before the recession (2007) and during the recession (2009). Assessment using binary logistic regression of stress levels above the 90th percentile (high stress levels) revealed that high stress levels were significantly increased between the years for women (OR=1.37; CI 1.16-1.61) but not for men (OR=1.13; 0.92-1.99).[182]

3.3 Economic hardships and mental health – potentially vulnerable subgroups

Research on mental health following economic crises indicates the vulnerability of certain subgroups. Results from studies, although mixed, have shown gender differences, i.e. some indicating higher prevalence of mental problems in men[176, 178] and some showing no gender differences.[88, 177] However in a previous study on the impact of the current economic crisis on stress levels of Icelanders, as stated above, high stress levels were significantly increased between 2007 and 2009 for women but not for men.[182] Less educated individuals may also be vulnerable to mental health problems following an economic collapse. Dalgard and coworkers reported differences in mental health across education levels, revealing that individuals with low education levels report the most mental health problems.[183] Yet other studies have also shown no relationship between individual´s education level and mental health.[184] Studies have indicated that older individuals may be more vulnerable to psychological morbidity (e.g. depression) following an economic collapse. In a study by Lee and coworkers[170] individuals within the oldest age group (55-65) had the highest rates of major depressive disorder, on the contrary Katikireddi and coworkers found no association between age and mental health.[178]

There are a number of explanations that make it more likely for people to develop mental disorders following an economic crisis, such as former mental health problems and personal features such as gender, age or income. The most important factors are however believed to be whether or not people receive satisfactory social support and whether or not they perceive it as such.[67] Even though social support has the primary role of "buffering" the effects of stressful life-events such as an economic crisis, it is also an important source of

strength for overcoming stressful life-events. The knowledge that we are accepted, respected, supported, loved and cared for affects self-esteem and self-image. These features help us to more easily adapt to changed circumstances and the unfavorable effects that stressful life-events may have on mental health.

3.4 Social support in times of crisis in a society

The literature on social support alteration and extent following a crisis and disasters is very limited, especially in relation to an economic crisis. An early study, from a positive perspective, found that there may initially be increased closeness and familial cohesion immediately following disasters.[185] However, a study by McFarlane[186] indicated increased levels of closeness and shared goals reported in families 26 months after a traumatic event, but not at eight months. Early studies have in addition found that strong external social links that individuals already have prior a traumatic event are often further strengthened in the aftermath of the event, while those that were weak are often further weakened.[187] More recently Kaniasty and Norris proposed two distinct and at times conflicting processes which seem to consistently emerge following natural disasters.[188-190] Initially following the impact there is a strong *mobilization of social support* (helping behavior). However, the affected communities soon realize that the need for help goes beyond the available resources at hand and the mobilization of social support period initially is left behind with a *deterioration of social support*. What may seem as an inconsistency can be easily explained with the definition and conceptualization of the social support concept, i.e. received support, perceived support and social embeddedness. It could be said that the sudden mobilization of help following traumatic events is in the field of received support, whereas a sense of deterioration occurs in the field of perceived support.[191] Numerous explanations have been suggested to explain the post disaster deterioration in social support and social functioning, e.g. significant others are removed from the victims' supportive environments (relocation, job loss, and death of loved ones). Victims may abandon their usual social activities resulting in fewer opportunities for companionship, as social networks may be overtaken by discussion referring to the stressful event. Eventually though, it is assumed that perceptions of social support bounce back to pre-event levels as the individuals and the whole community recover. In addition the deterioration of social support appears to occur at multiple levels, e.g. family and friendship networks to communities.[192]

The trauma experiences by disaster survivors have both personal and community related features.[193] In a study by Kaniasty and Norris in 1993 on ten counties of the Kentucky floods, personal loss was more related to decrease in perceived kin support, but community destruction was more strongly related to decreases in non-kin support and social participation.[194]

Social capital, a fairly new concept in social sciences, referring to both cognitive (trust towards institutions and trust towards others) and structural (informal and formal social capital) aspects has been linked to gross domestic product (GDP) per capita, i.e. there is a positive correlation between interpersonal trust and levels of per capita GDP, i.e. levels of trust are higher in more wealthier societies than less wealthier.[195] Positive economic development is believed to promote trust and well-being; however an economic collapse turns this in the reverse direction. According to Putnam, social capital, especially civic involvement, is expected to decline during economic crisis.[196] Notably, prior to the economic collapse in Iceland 2008, the Icelandic society was among the most trustworthy societies in Europe.[197] It would be fair to assume that social capital in Iceland would take a steep swift downturn due to the economic crisis. Unfortunately, the literature on perceived social support or informal social capital following the economic crisis both worldwide and within Iceland is very limited to our knowledge. Nevertheless, in new unpublished and preliminary results in a study by Growiec, comparing social capital among university students in Iceland in 2005 and 2010, it was reported that Icelandic university students were meeting less frequently with their next of kin, but on the other hand their social networks expanded in terms of being active in voluntary organizations during the crisis. The results in terms of social participation in voluntary organizations were contrary to what was expected, that is to say that an economic crisis would hamper Icelandic social capital, however the students were meeting less frequently which is in line with previous studies.[198] In a very recent MPH thesis by Eyjólfsdóttir, where she investigated the relationship of four different indicators of social capital; informal and formal social capital, trust towards institutions and trust towards others, with self-perceived physical and mental health in Iceland following the economic collapse in 2008, the results revealed among other things an increase in informal social capital following the economic crisis.[199] These results of Growiec and Eyjólfsdóttir propose that social capital (in terms of participation in voluntary organizations and informal social capital) has become more important in Iceland since the economic crisis in 2008. However, before the economic crisis in Iceland, Icelanders were among the most trustworthy nations, according to the European Social Survey (2004), rates of trust between associates was in the higher categories

among European countries.[197] Therefore this expanded social support (participation in voluntary organizations) may not just be a consequence of the crisis.

3.5 The economic recession in Iceland

The apparently flourishing economy of Iceland suffered a major collapse during the first days of October 2008, when three of the largest Icelandic banks collapsed and became nationalized. October 6th has been viewed as the beginning of the economic crisis in Iceland when Geir Haarde, Prime Minister, announced to the country a real danger of national bankruptcy. Hundreds of firms in the country declared bankruptcy in the following months. The Icelandic population (320,000), having just days/weeks before believed they lived in one of the wealthiest countries in the World, was now facing rising unemployment rates in addition to growing private and national debt. More unexpected consequences of the global economic crisis hit Iceland, the United Kingdom invoked anti-terrorism legislation to among other things freeze the assets of one of the three largest banks in Iceland at the time, i.e. Landsbanki. This sudden shock undeniably affected the entire population, particularly when exchange rates and prices were suddenly altered, the main reason being that Iceland is a small open economy with its own currency, Icelandic króna. A shock of this nature has the potential to affect multiple aspects of well-being, not only financial, but also physical and psychological. Thus, it is fair to assume that the economic collapse may have resulted in an increased risk of psychological stress and depressive symptoms in the Icelandic population, and is in addition an interesting avenue for investigating the potential modifying role of social support in this context, in addition to estimating social support alteration following an economic crisis.

Aim

Using a nationally-representative prospective cohort of Icelanders, the overall aim of this study was to investigate the possible modifying role of social support on self-reported mental health following the economic collapse in Iceland 2008.

The specific aims were to:

a) Assess potential change in perceived trust towards others (spouse, family members, friends, coworkers/schoolmates) and perceived available help from others between 2007 and 2009.
b) Investigate whether there is an association between levels of social support before and after the economic collapse in relation to self-reported mental health.

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Article

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Social support and mental well-being following the economic collapse in Iceland 2008: A prospective cohort study

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Abstract

Objectives: This study investigated levels of perceived social support before and after the economic collapse in Iceland in 2008 and its potential modifying role on the association between the economic collapse and mental well-being.

Methods: A nationally representative prospective cohort of 3621 Icelanders answered a health related questionnaire in both 2007 and 2009. Perceived social support was measured with two four-item questions on perceived trust and available help from others. Psychological stress was measured with the Perceived Stress Scale 4 (PSS-4) and depressive symptoms with the WHO-five Well-being Index (WHO-5).

Results: Perceived social support generally increased between 2007 and 2009 [trust: 41.29% to 44.32%; p=0.021 | help: 45.04% to 48.91%; p=0.001]. Individuals experiencing a decrease in social support between 2007 and 2009 had increased odds of psychological stress [trust: adjusted odds ratio (aOR) = 1.81; 95% CI 1.15 – 2.85 | help: aOR = 3.13; 95% CI 2.01 – 4.86] and depression [trust: aOR = 1.73; 95% CI 1.27 – 2.35 | help: aOR = 2.05; 95% CI 1.48 – 2.82] in 2009. A similar trend in depressive symptoms was seen for individuals reporting low social support in both 2007 and 2009. Individuals reporting high social support in both 2007 and 2009 (trust) had increased odds of psychological stress while individuals reporting an increase in social support (help) between 2007 and 2009 had reduced odds of depressive symptoms [aOR= 0.71; 95% CI 0.53 – 0.96] but not symptoms of psychological stress.

Conclusions: Our findings incidate that alterations in perceived social support at times of national economic hardship may be an important determinant of mental health, particularly depressive symptoms. Further research is needed to understand social determinants of long-term mental health consequences of economic downturns and to characterize the modifying role of social support.

Keywords: cohort study; economic crisis; Iceland; mental health; social support

Introduction

The apparently prosperous economy of Iceland underwent a major breakdown due to the global economic crises in 2008. The Icelandic population previously believing they lived in one of the richest countries in the World, was now facing a swift increase in unemployment and national and household debt, followed by political and social turmoil.

An economic shock of this magnitude has the potential to affect multiple aspects of well-being, not only financial, but also physical and psychological. Previous literature on the effects of economic crises on population health generally points towards improved physical health indicators in terms of overall mortality,[1, 2] while increased suicide rates have been found.[1, 2] Studies on mental health have indicated increased mental health problems following economic recessions, such as depression[3-7] and anxiety.[4-6] Recent research on the health consequences of the Icelandic economic crisis has both shown adverse impacts on cardiovascular symptoms[8] and perceived stress[9] among women.

Certain subgroups may be more susceptible than others to mental health problems. For example, a recent systematic review on 32 studies reported that individuals with high social support may be comparatively resilient to distress and begin the process of adaptation following a disaster more easily than those with low social support.[10] It has been postulated that having strong social networks and social relationships may help minimize negative effects of rapid macro-economic changes on mental health.[11] Social support is thus believed to act as a "buffer" to mental health problems in the aftermath of crises.[12-14] Studies have indicated that an economic collapse may result in deterioration of interpersonal trust[15] and social capital.[16] Few studies, however, have used individual-level data to prospectively investigate changes in social support in the aftermath of economic crises. Thus, in the present study, using data collected in 2007 and 2009 from a nationally representative prospective cohort, we studied the possible modifying role of social support on both psychological stress and depressive symptoms following the economic collapse.

Materials and Methods

Study population

Data for this cohort study was derived from a mail health survey conducted by the Public Health Institute in Iceland between October and December 2007 and again in 2009: "*Health and well-being in Iceland".* The survey was originally based on a random sample of the Icelandic national population of 9,807 adults (18-79 years old) which was stratified into 12 strata, consisting of two geographic regions and further stratified by six age groups wherein the target population was randomly selected. A total of 9,711 individuals received the mailed questionnaire (the addresses of 96 persons could not be found). The response rate was 60.3% (5,909 individuals). Between November and December 2009, 5,294 individuals, still eligible for participation, were contacted to participate again with a modified version of the original questionnaire, 4,092 responded with a response rate of 77.3%. Thus, this is a cohort study comparing reports on psychological stress and mental well-being in 2007 to those in 2009 who responded to the measures of stress (PSS-4) and depressive symptoms (WHO-5) on both occasions (n=3621). Figure 1 shows the cohort attrition over questionnaire waves.

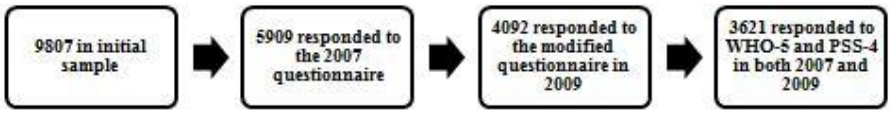

Figure 1. The cohort of the ´Health and well-being´ study

Measures

Mental health - Outcome assessment

Main outcome variables were perceived psychological stress and depressive symptoms. Perceived stress was assessed by using the four-item Perceived Stress Scale (PSS-4),[17] a 4-item and validated version of the original 14 item scale.[18] It measures the degree to which situations in one's life are appraised as unpredictable, uncontrollable and overloaded during the last month, higher PSS score indicate more perceived stress.[19] Depressive symptoms were assessed by using the WHO-Five Well-being Index (WHO-5), which includes five positively worded items, covering positive mood, vitality, and general interests.[20, 21] The WHO-5

questionnaire has proven useful for detecting depression in primary care, both having good sensitivity and negative predictive value, in addition to having excellent internal and external consistency and good criterion validity.[22, 23] Scores below 13 (of 25 possible) have found to be predictive of depressive symptoms.[24]

Explanatory variable

Representing the extensive macroeconomic changes that occurred following the economic collapse in 2008, the exposure variable is a proxy of time and corresponding waves of assessment, i.e. 2007 and 2009.

Social support – modifying variable

Social support was measured as perceived trust and access to support from four sources, see **table 1.**

Table 1 - Social support measures in the Health and Wellbeing study

Measurement	Questions	Response alternatives
Social support - trust	How easy or difficult is it for you to trust the following with your personal affairs? - Spouse - Family - Friends - Schoolmates/coworkers	- Not relevant - Very hard - Quite hard - Neither hard or easy - Quite easy - Very easy
Social support - help	How easy or difficult is it for you to get help from the following regarding problem solving? - Spouse - Family - Friends - Schoolmates/coworkers	- Not relevant - Very hard - Quite hard - Neither hard or easy - Quite easy - Very easy

The answers from each support source were dichotomized, (1) hard to trust or get help from (not relevant, very hard, quite hard and neither hard or easy) and (2) easy to trust or get help from (quite easy and very easy) and responders then categorized into five groups, depending on the number of supportive sources they indicated; (0 none) finds it difficult to trust or get help from each of the four support sources, (1 little) finds it difficult to trust or get help from

three support sources, (2 some) finds it difficult to trust or get help from two support sources, (3 much) finds it easy to trust or get help from three support sources, (4 very much) finds it easy to trust or get help from all four sources of social support. Responders were then further categorized into groups depending on the degree of social support in 2007 and 2009. Into the category *low social support* fell those who reported either having none (0), little (1) or some (2) social support whereas *high social support* was constituted of those reported having much (3) or very much (4) social support.

Potential covariates

A variety of demographic questions were included in the analyses: age, gender, relationship status, educational status, employment status, individual income, residency and number of children. Age was categorized into (1) 18-29 years old, (2) 30-39 years old, (3) 40-49 years old, (4) 50-59 years old, (5) 60-69 years old and (6) over 70 years old. Relationship status was categorized into (1) single or divorced, (2) committed and not cohabiting, (3) married and/or cohabiting, and (4) widowed. Educational status was classified as (1) basic (completed primary school or less), (2) middle (completed high school or equivalent), and (3) high (a completed university degree). Employment status was categorized into (1) employed, (2) unemployed, (3) student, (4) retired, (5) disabled (greater than 50% disability), and (6) homemaker or parental leave. Income responses were categorized into groups coded from yearly income ranges of (in terms of Icelandic currency) (1) low (≤2.4 million), (2) middle (2.5-7.4 million) and (3) high (≥7.5 million). Residency area was operationalized into categories of (1) city (more than 5,000 inhabitants), (2) town (1000 - 4,999), (3) village (200 – 999) and (4) farm (less than 200). Number of children in the household was categorized by 0, 1, 2 and 3 or more children.

Statistical analyses

Statistical analyses were conducted with SAS Enterprise Guide 4.3. Descriptive statistics were calculated for all demographic variables and social support as well as for the two psychological outcomes, stress and depressive symptoms, contrasting frequencies in 2007 and 2009. Differences in characteristics in 2007 and 2009 were explored using the McNemar´s Chi-square test for repeated measures of categorical variables. Characteristics of

those reporting high social support in 2007 on one hand and high social support in 2009 on the other hand were explored with the Chi-square test.

When exploring differences in depressive symptoms between 2007 and 2009 with the WHO-5 questionnaire, a binary variable was created representing individuals responding with a score of 13-25 (normal) and 0-12 (depressive symptoms).[24] When exploring differences in high stress levels between 2007 and 2009, a binary variable was created with a cut-off point, using factor scoring, representing ten percent highest reports of perceived stress in 2007. The factor score approach is common when extracting a summary score from a set of items that measures the same underlying construct (see Hauksdóttir et al. for details). The results from the factor score approach provide a scale with over 600 unique values, instead of only 17, that are suitable for binary coding for a specific percentile.

With reports in 2007 as reference category, we used Proc Genmod, which is a procedure that fits generalized linear models with GEE analyses for marginal models, to estimate the overall odds ratios, adjusted odds ratios and 95% confidence intervals of (a) high stress levels in 2009 and (b) depressive symptoms in 2009 by levels (high or low) of social support (trust and help) in 2007 and 2009 (low 2007 and low 2009, low 2007 and high 2009, high 2007 and low 2009, high 2007 and high 2009).

To assess if there were possible modifying effects regarding social support levels, before and after the economic collapse, in terms of high stress levels and depressive symptoms in 2009 compared to 2007, interactions between time points (2007 and 2009) and the four groups of levels (high or low) of social support (trust/help) in 2008 and 2009 were analyzed with adding the interaction term to the Proc Genmod model (time*social support categories).

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

Results

Baseline characteristics in 2007 and 2009

In 2007, the cohort (N=3621) was 53% female and 47% male, with a mean age of 52.0 (SD 15.98). In 2009 (**table 2**), the cohort had slightly higher education level, higher proportion of unemployed and retired individuals, lower proportion of married/cohabiting individuals, higher proportion of widowed individuals, and higher proportion of individuals reporting having more than three children and fewer childless individuals, compared to 2007 (all p-values <.0001). No difference was observed with respect to residential status. Perceived trust towards others (spouse, family, friends and coworkers/schoolmates) was significantly higher in 2009 (41.3% in 2007 and 44.3% in 2009, p=0.021); similar increase was found regarding perceived available help from others (45.0% in 2007 and 48.9% in 2009, p=0.001). The results also showed a significant increase in high stress levels (10.36% in 2007 and 12.34% in 2009, p=0.001) along with depressive symptoms (18.03% in 2007 and 20.44% in 2009, p=0.001) between the two waves of assessment.

External attrition analysis

In 2007, individuals not answering questions regarding stress and depressive symptoms were older, more likely to be less educated, having lower income, more likely to have more children, less likely to be employed and more likely to be retired, disabled and homemaker or on parental leave (all p-values<0.0001). There was no difference in reported trust towards others or perceived available help from others between responders and non-responders. In 2009, the group not answering questions regarding stress and depressive symptoms had higher proportion of females (p=0.0044), was older (p<0.0001), more likley to be less educated (p<0.0001), having lower income (p<0.0001), more likely to have four or more children (p=0.0016), more likely to be widowed (p<0.0001), less likely to be employed and more likely to be retired and homemaker or on parental leave (p<0.0001), compared to others. There was no difference between responders and non-responders in perceived trust towards others and perceived available help from others.

Demographic differences in high social support between 2007 and 2009

Demographic characteristics of those reporting high social support (help or trust) in 2007 and 2009 are reported in **table 3**. We found that a lower proportion of younger individuals reported high levels of trust and help from others in 2009 compared to 2007 while trust and help among older individuals had increased between the two time points (trust; p=0.004 | help; p=0.005). Those with basic education were less likely to report high trust or help from others in 2009 compared to 2007 and individuals with middle or high level education were more likely to report high trust and help in 2009 (trust; p=0.011 | help; p=0.001). A lower proportion of employed individuals reported high trust or help from others in 2009 contrary to unemployed and retired individuals who had an increase in reported high trust and help in 2009 (trust; p<.0001 | help; p<.0001). Individuals with high income were more likely to report higher trust in 2009 compared to 2007 and a lower proportion of low income individuals reported high trust and help (trust; p=0.011 | help; p=0.031). No differences were seen between the two waves of assessment within strata of gender, relationship status or number of children.

Relative differences in mental well-being by categories of social support levels in 2007 and 2009

Depressive symptoms

The proportion reporting depressive symptoms and high stress levels in 2007 and 2009 by changes in social support, i.e. trust in others and help from others are presented in **figure 2**. Adjusted odds ratios (aOR) for depressive symptoms in 2009, with measures in 2007 as reference, show that depressive symptoms increased significantly for both social support outcomes (trust/help) within the groups experiencing low social support in 2009, firstly the group with low social support in both years (trust; aOR 1.23 CI 1.07-1.43| help; aOR 1.25 CI 1.08-1.46), and secondly the group with a decrease in social support between the years (trust; aOR 1.73 95% CI 1.27-2.35 | help; aOR 2.05 95% CI 1.48-2.82) **(Tables 4a and 4b).** The opposite was found within the group reporting an increase in social support (help) between years (help; OR 0.71 95% CI 0.53-0.96). Similar results were found regarding trust towards others in crude models, however after adjustments the results were no longer statistically significant. We further investigated whether OR's of depressive symptoms following the economic collapse, by change in perceived trust and perceived available help between 2007

and 2009, were different between strata of age, gender or education. There was a statistically significant increase in depressive symtoms among women reporting 1) low social support (trust/help) at both time points (trust; OR 1.40 95% CI 1.09 – 1.80 | help; OR 1.36 95% CI 1.05-1.76) and 2) decreased social support (trust/help) between 2007 and 2009 (trust; OR 1.78 95% CI 1.07 – 2.98 | help; OR 2.55 95% CI 1.59-4.08). The same tendency for an increase in depressive symptoms was observed among individuals with basic education in the same categories, i.e. 1) low social support in 2007 and 2009 (trust; OR 1.54 95% CI 1.17 – 2.03 | help; OR 2.26 95% CI 1.12-4.58) and 2) high social support in 2007 and low social support in 2009 (trust; OR 1.43 95% CI 1.08-1.89 | help; OR 2.49 95% CI 1.38-4.51). No association between perceived trust/help and depressive symptoms were found for men or those with higher education. We analyzed interactions between time points and the four groups of levels of social support (trust/help) in 2007 and 2009 in relation to depressive symptoms. Interactions for both crude and adjusted models were all significant (trust; p=0.003 | help; p<0.000; [adjusted for age, gender, education, relationship status, employment status, number of children and income]), indicating a clear difference in terms of depressive symptoms by levels of social support in 2007 and 2009.

High stress levels

Adjusted odds ratios (aOR) for high stress levels in 2009, with measures in 2007 as reference (**table 5a and table 5b**), show that high stress levels increased significantly for both social support outcomes (trust/help) within the groups experiencing a decrease in social support between the two measures (trust; aOR 1.81 95% CI 1.15-2.85 | help; aOR 3.13 95% CI 2.01-4.86), and also in the group reporting high social support (trust) in both 2007 and 2009 (trust; aOR 1.70 95% CI 1.17-2.45). We further investigated whether OR's of high stress levels following the economic collapse, by change in perceived trust and perceived available help between 2007 and 2009, were different between strata of age, gender or education. There was a statistically significant increase in high stress level among men (help; OR 3.11 95% CI 1.27-7.61) and women (help; OR 3.16 95% CI 1.75-5.71) reporting high social support (help) in 2007 and low in 2009, and basic (help; OR 2.98 95% CI 1.37-6.48), middle (help; OR 3.52 95% CI 1.53-8.08) and high (trust; OR 3.21 95% CI 1.14-9.04 | help; OR 3.10 95% CI 1.13 – 8.48) education within the same group. We analyzed interactions between time points and the four groups of levels of social support (trust/help) in 2007 and 2009 in relation to high stress levels. Interactions for both crude and adjusted models were all significant (trust; p=0.035 |

help; p=0.000; [adjusted for age, gender, education, relationship status, employment status, number of children and income]), indicating a clear difference in terms of high stress levels by levels of social support in 2007 and 2009.

Discussion

Our findings indicate an increase in perceived social support after the economic crisis in Iceland, both with respect to trust in others for one‘s personal affairs and having access to help from others, particularly among older individuals, the middle and highly educated, unemployed and retired, and middle and high income individuals. We further found that levels of social support modify effects on mental health; low social support at both time points increased risk of depressive symptoms in 2009, decreased social support between the two waves increased risk of both high stress levels and depressive symptoms in 2009, high social support (trust) at both time points increased risk of high stress levels in 2009 and increased social support (help) between the two waves of assessment decreased risk of depressive symptoms in 2009.

Social support and economic crises

To our knowledge, longitudinal studies on changes in perceived social support before and after economic crises are scarce. Studies related to this particular field have indicated that an economic collapse may result in deterioration of interpersonal trust[15] and social capital.[16] Our results are contrary to the aforementioned studies and indicate that social support increased following the economic collapse in Iceland 2008. Notably, prior to the economic collapse in Iceland 2008, the Icelanders were one of the European nations that reported most trust in fellow citizens and institutions according to the European Social Survey in 2004.[25] Results from the survey indicated that prior to the economic crisis Icelanders were actively involved in social activities and perceived having good access to trustworthy friends who could provide support in times of need.[25] An earlier study found that strong external social links prior to a traumatic event are often further strengthened in the aftermath of an event, while those that were weak are often further weakened.[26] Our conclusions suggest that the economic collapse in 2008 may have increased intimacy and unity by bringing people closer together despite uncertainty regarding growing unemployment rates and economic instability.

High social support following the economic collapse was observed among the older generation. To our knowledge no published studies exists regarding social support among the elderly population in relation to economic crises. However, previous research has indicated that perceived social support increases with age,[27] older adults may thus be better at adapting their emotions than younger adults,[28] and are believed to endore using more optimistic

reappraisal than younger adults.[29, 30] This may in fact contribute to the older generation perceiving having better social support both in terms of trust and available help.

An increase in reported high social support was found among unemployed individuals and retired. Unemployment is without a doubt one of the most common consequences of financial crisis, i.e. the unemployment rates in Iceland rose steadily following the economic collapse, from an average of just 2.3% in 2007 up to 7.6% in 2010.[31] Our results are contrary to earlier studies which have indicated that long-term unemployment increases social isolation and that level of social support reduces with the duration of unemployment.[32] Previous studies have pointed out that Icelanders have historically strong family ties and a high degree of social cohesion[33, 34] and therefore may be open to seeking help and comfort from their next of kin and closest network at times of difficulties.

People with basic education and low income were less likely to report high social support in 2009 compared to 2007. Lower socio-economic groups have previously been shown to report lower social support than those of higher socio-economic groups.[35] Different availability of social support between socio-economic groups in times of crisis may thus be one mechanism through which socioeconomic circumstances influence health.[36]

Mental health and social support following an economic crisis

Our previous studies indicate that high stress levels and depressive symptoms increased significantly following the 2008 economic collapse.[9, 37] However, certain subgroups seem to be more susceptible to mental health problems than others.[10]

The strongest association for increased stress and symptoms of depression following the economic crisis in Iceland was found within the group experiencing a decline in social support between 2007 and 2009 and within the group experiencing low social support in both 2007 and 2009 in terms of depressive symptoms. Our findings are largely in keeping with a number of earlier studies, that have consistently linked low perceived social support both directly[38-40] and in terms of natural disasters[12, 41] to more symptoms of adverse psychological health, however, not all previous studies have found a link between low social support and increased mental health problems in relation to negative life-events.[42, 43]

Studies have also linked high perceived social support to good psychological health,[44, 45] serving as a buffering mechanism.[46] In our study within the group reporting an increase in perceived social support (help) between the two measures of assessment there was a

statistically significant decrease in depressive symptoms between 2007 and 2009. The results indicate that an increase in perceived social support may act as a "buffer" to depression following the economic collapse in Iceland in 2008. Our results are in line with Meyer and Lobao, whereas social support was associated with both lower stress and depression during an economic crisis due to the midwestern farm crisis.[47] Another study found that having both well-functioning social networks and social relationships protected against negative effects of rapid macro-economic changes on mental health.[11]

Probably, the most surprising finding in the current study, and contrary to previous studies on stress buffering, is that high social support (trust) both prior and after the economic collapse predicted high stress levels in 2009. One possibility may be that high social support may also involve high social engagement and contact, resulting in negative consequences of social relationships, that the individuals feel overwhelmed by the problems that their relatives and friends may have been experiencing following the economic collapse. Worrying of others may thus exceed the benefits of being socially active, possibly resulting in higher stress levels. In a systematic review on 32 studies, Lock and coworkers proposed that one person's problems can cause stress for relatives and friends due to social interaction. It is important that families support each other, however, the burden of support may lead to mental problems within the supporters.[10]

Stratified gender analyzes revealed statistically significant increase in depressive symptoms for women reporting low social support in both 2007 and 2009 and decreased social support between 2007 and 2009. However, there were no gender differences in terms of high stress levels between different groups of social support. Studies on mental health following economic crisis have revealed mixed results, some showing gender differences, i.e. higher prevalence of mental problems in men,[3, 5] and some showing no gender differences.[4, 48] Our previous results on the impact of the current economic crisis on stress levels however revealed that high stress levels were significantly increased between 2007 and 2009 for women but not for men.[9]

Strengths and limitations

The strength of our study lies in the large, prospective, and representative cohort of the Icelandic population included in the survey. This allowed us to investigate prospectively changes in mental health between 2007 and 2009 within subgroups of levels of social support, before and after the economic collapse in Iceland 2008. The prospective and longitudinal nature of this particular study enabled us to draw conclusions regarding the directionality of the studied association.

Some limitations of our study should be noted. Firstly, the questions used for assessment of social support are not a validated psychometric measure and hence the results of our study must be interpreted with caution. However, there is no consensus in the literature about the definition of social support, with a variety of widely accepted definitions. Since our aim was to measure the perceived trust and availability of help from others it is the individuals' perception of social support which is of most importance. Secondly, the self-reported measurements of mental health could be subject to bias. In epidemiological studies, shortened stress measures are frequently used as studies have revealed that short questionnaires may be as robust in measuring the construct under study as longer ones,[49] in addition the obvious benefits are reduced burden of cost and ease of interpretation.[50] This study uses the four-item Perceived Stress Scale (PSS-4), a shortened and validated version of the original 14 item scale.[19] In addition, studies have found the WHO-5 questionnaire as being useful for detecting depressive symptoms in primary care, both having good sensitivity and negative predictive value, in addition to having good internal and external validity.[22, 23, 51]

Lastly, as in other studies, attrition may threaten the external validity of the study by making it hard to generalize to the whole population. An analysis of the external attrition revealed that those who did not respond to the questions regarding the outcomes of interest both in 2007 and 2009 had substantial similarities to the group experiencing mental health problems following the economic crisis. It is unlikely that attrition would explain our results, rather that mental health problems may be underreported in our study.

Conclusion

Our findings indicate that perceived social support generally increased in the aftermath of the economic collapse in Iceland 2008, particularly among the older generation, middle and highly educated, unemployed and retired, and middle and high income individuals. Depressive symptoms and stress levels increased most sharply among individuals with decreased social support between 2007 and 2009. However, individuals reporting an increase in social support (help) between 2007 and 2009 were less likely to report depressive symptoms in 2009 compared to 2007. The second assessment point of this study took place only a year after the economic collapse hit Iceland, indicating short-term effects of the economic crisis on both alterations in perceived social support along with indicators of mental health problems. Further research is needed for increased understanding of mental health consequences of economic downturns in the long run and to characterize the modifying role of social support on this association.

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Table 2 - Demographic characteristics and well-being of individuals answering the ***WHO-5 and PSS-4*** measures in the Health and Wellbeing study in both 2007 & 2009

Characteristics	**Category of characteristics**	**2007 (n=3621) n (%)**	**2009 (n=3621) n= (%)**	**$X^{2\ test}$ (*p-value*)***
Education	Basic	1420 (39.22)	1285 (35.49)	<,0001
	Middle	1384 (38.22)	1448 (39.99)	
	High	798 (22.04)	869 (24.00)	
	Not stated	19 (0.52)	19 (0.52)	
Relationship status	Single / divorced	534 (14.75)	514 (14.19)	<,0001
	In relationship but not cohabitating	132 (3.65)	136 (3.76)	
	Cohabitating / married	2762 (76.28)	2720 (75.12)	
	Widowed	171 (4.72)	190 (5.25)	
	Missing	22 (0.61)	61 (1.68)	
Children	Childless	504 (13.92)	452 (12.48)	<,0001
	1 child	361 (9.97)	358 (9.89)	
	2 children	900 (24.86)	876 (24.19)	
	3 or more children	1833 (50.62)	1894 (52.31)	
	Not stated	23 (0.64)	41 (1.13)	
Employment status*	Employed	2694 (74.40)	2453 (67.74)	<,0001
	Unemployed	85 (2.35)	157 (4.34)	
	Student	97 (2.68)	94 (2.60)	
	Retired	451 (12.46)	689 (19.03)	
	Disabled	126 (3.48)	134 (3.70)	
	Homemaker / parental leave	51 (1.41)	35 (0.97)	
	Not stated	117 (3.23)	59 (1.63)	
Individual income (ISK)	Low <=200.000	1423 (39.30)	1339 (36.98)	<,0001
	Average 200-619.000	1843 (50.90)	1874 (51.75)	
	High >=620.000	212 (5.85)	261 (7.21)	
	Not stated	143 (3.95)	147 (4.06)	

Table 2 – continued

Size of residency	City	2278 (62.91)	2271 (62.72)	0.661
	Town	689 (19.03)	686 (18.95)	
	Village	263 (7.26)	257 (7.10)	
	Farm	353 (9.75)	345 (9.53)	
	Not stated	38 (1.05)	62 (1.71)	
Perceived trust towards others	High	1495 (41.29)	1605 (44.32)	0.021
	Low	1784 (49.27)	1809 (49.96)	
	Not stated	342 (9.44)	207 (5.72)	
Perceived available help from others	High	1631 (45.04)	1771 (48.91)	0.001
	Low	1653 (45.65)	1632 (45.07)	
	Not stated	337 (9.31)	218 (6.02)	
Depressive symptoms	Not present (score of 13-25)	2968 (81.97)	2881 (79.56)	0.001
	Present (0-12)	653 (18.03)	740 (20.44)	
High stress levels	Normal stress level	3246 (89.64)	3174 (87.66)	0.001
	High stress level**	375 (10.36)	447 (12.34)	

**p-values* are based on McNemar's Chi-square test

* Responses to employment status were non-exclusive, meaning individuals could belong to more than one category (e.g. employed and disabled). The variable was recoded in a way that each individual could only belong to one category, in return the overall n remains the same as for other variables, or 3621

**High stress levels >=90th percentile

Table 3 - Demographic characteristics among those who reported high perceived trust towards others and high perceived available help from others in 2007 & 2009

Characteristics	Categories	High trust 2007 n (%)	High trust 2009 n (%)	$X^{2\ test}$ (*p*-value)*	High help 2007 n (%)	High help 2009 n (%)	$X^{2\ test}$ (*p-value*)*
Overall		1495 (45.59)	1605 (47.01)	0,021	1631 (49.67)	1771 (52.04)	0,001
Gender	Male	645 (43.1)	704 (43.9)	0,654	741 (45.4)	837 (47.3)	0,291
	Female	850 (56.86)	901 (56.1)		890 (54.6)	934 (52.7)	
Age	18-29	205 (13.7)	170 (10.6)	0,004	212 (13.0)	177 (10.0)	0,005
	30-39	257 (17.2)	274 (17.1)		289 (17.7)	313 (17.7)	
	40-49	298 (19.9)	320 (19.9)		325 (19.9)	355 (20.1)	
	50-59	332 (22.2)	336 (20.9)		359 (22.0)	367 (20.7)	
	60-69	283 (18.9)	318 (19.8)		312 (19.1)	355 (20.1)	
	>70	120 (8.0)	187 (11.7)		134 (8.2)	204 (11.5)	
Education	Basic	477 (32.1)	442 (27.6)	0,011	532 (32.7)	475 (27.0)	0,001
	Middle	587 (39.5)	640 (40.0)		631 (38.8)	735 (41.7)	
	High	423 (28.5)	518 (32.4)		462 (28.4)	552 (31.3)	
Individual income (ISK)	Low <=200.000	507 (35.1)	476 (30.7)	0,011	529 (33.4)	516 (30.1)	0,031
	Average 200-619.000	834 (57.8)	935 (60.2)		937 (59.2)	1036 (60.4)	
	High >=620.000	102 (7.1)	141 (9.1)		118 (7.5)	162 (9.5)	
Relationship status	Single / divorced	116 (7.8)	114 (7.2)	0,930	140 (8.6)	147 (8.4)	0,908
	In relationship	75 (5.0)	78 (4.9)		75 (4.6)	74 (4.2)	
	Cohabiting / married	1277 (85.7)	1372 (86.4)		1391 (85.4)	1512 (86.2)	
	Widowed	23 (1.5)	24 (1.5)		22 (1.35)	21 (1.2)	

Table 3 – continued

Employment status*	Employed	1248 (85.7)	1249 (78.9)	<,0001	1381 (86.4)	1385 (79.3)	<,0001
	Unemployed	22 (1.5)	53 (3.4)		23 (1.4)	58 (3.3)	
	Student	59 (4.1)	55 (3.5)		56 (3.5)	57 (3.3)	
	Retired	82 (5.6)	170 (10.7)		93 (5.8)	184 (10.5)	
	Disabled	28 (1.9)	38 (2.4)		32 (2.0)	44 (2.5)	
	Homemaker/parental leave	17 (1.2)	19 (1.2)		14 (0.9)	18 (1.03)	
Children	Childless	200 (13.4)	182 (11.5)	0,415	225 (13.8)	206 (11.7)	0,138
	1 child	163 (10.9)	170 (10.7)		185 (11.4)	177 (10.1)	
	2 children	396 (26.6)	434 (27.4)		427 (26.3)	482 (27.5)	
	3 or more children	732 (49.1)	801 (50.5)		789 (48.5)	890 (50.7)	

*****P-values based on the chi-square test

*****Responses to employment status were non-exclusive, meaning individuals could belong to more than one category (e.g. employed and disabled). The variable was recoded in a way that each individual could only belong to one category, in return the overall n remains the same as for other variables, or 3621.

¥Differences in denominator are due to missing internal

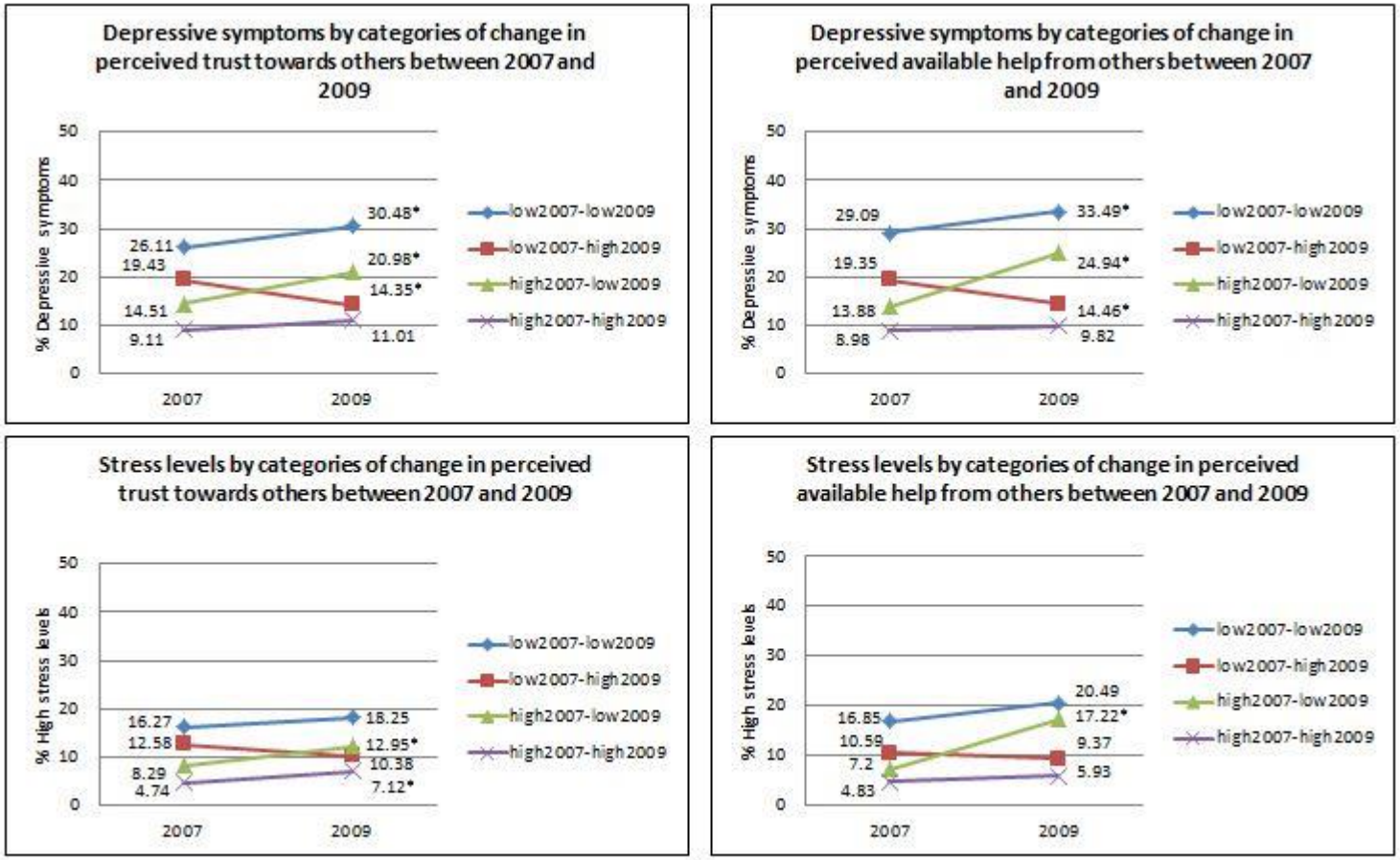

Figure 2. Depressive symptoms and high stress levels by groups of social support levels between 2007 and 2009
*Change in depressive symptoms/high stress levels within group between 2007 and 2009 significant ($p<0.05$)

Table 4a - Depressive symptoms in 2009 compared to 2007 by categories of change in perceived trust towards others

Characteristics	Crude OR (95% CL)	Model 1* OR (95% CL)	Model 2** OR (95% CL)	Model 3*** OR (95% CL)
Low trust 2007 - Low trust 2009	1.24 (1.09 - 1.41)	1.28 (1.12 - 1.46)	1.24 (1.08 - 1.43)	1.23 (1.07 - 1.43)
Low trust 2007 - High trust 2009	0.69 (0.52 - 0.92)	0.73 (0.54 - 0.98)	0.72 (0.53 - 0.98)	0.74 (0.54 - 1.02)
High trust 2007 - Low trust 2009	1.57 (1.18 - 2.07)	1.66 (1.24 - 2.22)	1.71 (1.27 - 2.31)	1.73 (1.27 - 2.35)
High trust 2007 - High trust 2009	1.23 (0.98 - 1.55)	1.26 (1.01 - 1.59)	1.23 (0.98 - 1.55)	1.19 (0.94 - 1.51)

*adjusted for age and gender

**adjusted for age, gender, education, relationship status and employment status

***adjusted for age, gender, education, relationship status, employment status, number of children and income

Table 4b - Depressive symptoms in 2009 compared to 2007 by categories of change in perceived available help from others

Characteristics	Crude OR (95% CL)	Model 1* OR (95% CL)	Model 2** OR (95% CL)	Model 3*** OR (95% CL)
Low help 2007 - Low help 2009	1.23 (1.08 - 1.40)	1.27 (1.11 - 1.46)	1.25 (1.08 - 1.45)	1.25 (1.08 - 1.46)
Low help 2007 - High help 2009	0.70 (0.54 - 0.93)	0.73 (0.55 - 0.96)	0.72 (0.54 - 0.96)	0.71 (0.53 - 0.96)
High help 2007 - Low help 2009	2.06 (1.52 - 2.79)	2.17 (1.60 - 2.95)	2.10 (1.52 - 2.89)	2.05 (1.48 - 2.82)
High help 2007 - High help 2009	1.10 (0.89 - 1.37)	1.15 (0.92 - 1.42)	1.12 (0.89 - 1.40)	1.09 (0.87 - 1.38)

*adjusted for age and gender

**adjusted for age, gender, education, relationship status and employment status

***adjusted for age, gender, education, relationship status, employment status, number of children and income

Table 5a - Stress levels in 2009 compared to 2007 by categories of change in perceived trust towards others

Characteristics	Crude OR (95% CL)	Model 1* OR (95% CL)	Model 2** OR (95% CL)	Model 3*** OR (95% CL)
Low trust 2007 - Low trust 2009	1.15 (0.98 - 1.35)	1.21 (1.02 - 1.43)	1.17 (0.98 - 1.40)	1.18 (0.98 - 1.42)
Low trust 2007 - High trust 2009	0.80 (0.56 - 1.15)	0.85 (0.59 - 1.23)	0.87 (0.59 - 1.28)	0.88 (0.59 - 1.32)
High trust 2007 - Low 2009	1.65 (1.10 - 2.47)	1.70 (1.12 - 2.59)	1.70 (1.10 - 2.64)	1.81 (1.15 - 2.85)
High trust 2007 - High trust 2009	1.54 (1.09 - 2.18)	1.62 (1.14 - 2.31)	1.68 (1.17 - 2.42)	1.70 (1.17 - 2.45)

*adjusted for age and gender

**adjusted for age, gender, education, relationship status and employment status

***adjusted for age, gender, education, relationship status, employment status, number of children and income

Table 5b - Stress levels in 2009 compared to 2007 by categories of change in perceived available help from others

Characteristics	Crude OR (95% CL)	Model 1* OR (95% CL)	Model 2** OR (95% CL)	Model 3*** OR (95% CL)
Low help 2007 - Low help 2009	1.11 (0.94 - 1.31)	1.16 (0.98 - 1.38)	1.13 (0.94 - 1.36)	1.15 (0.94 - 1.39)
Low help 2007 - High help 2009	0.87 (0.61 - 1.25)	0.91 (0.63 - 1.33)	0.92 (0.63 - 1.35)	0.91 (0.62 - 1.35)
High help 2007 - Low help 2009	2.68 (1.79 - 4.02)	2.93 (1.94 - 4.42)	3.05 (1.99 - 4.68)	3.13 (2.01 - 4.86)
High help 2007 - High help 2009	1.24 (0.89 - 1.74)	1.31 (0.93 - 1.85)	1.33 (0.93 - 1.90)	1.35 (0.94 - 1.95)

*adjusted for age and gender

**adjusted for age, gender, education, relationship status and employment status

***adjusted for age, gender, education, relationship status, employment status, number of children and income