Scandinavian Journal of Pain 3 (2012) 62–67

Contents lists available at SciVerse ScienceDirect

Scandinavian Journal of Pain

journal homepage: www.ScandinavianJournalPain.com

Observational studies

Pain among women: Associations with socio-economic factors over time and the mediating role of depressive symptoms

Johanna Thomtén[a,*], Joaquim J.F. Soares[b], Örjan Sundin[a]

[a] Department of Psychology, Division of Social Sciences, Mid Sweden University, Östersund, Sweden
[b] Department of Health Sciences, Mid Sweden University, Sundsvall, Sweden

ARTICLE INFO

Article history:
Received 16 June 2011
Received in revised form
22 December 2011
Accepted 31 December 2011

Keywords:
Pain
Socio-economic status
Depressive symptoms
Educational level
Pain-related disability

ABSTRACT

Background and aims: Lower socioeconomic status (SES), based on economic situation, education and occupation, has been associated with greater morbidity and mortality in a wide range of diseases, and socioeconomic inequalities have been found in several chronic pain populations. Since women are over-represented in several clinical pain conditions, there is a need to understand the influence of SES among women with pain. In a previous cross-sectional study, socioeconomic- and work conditions were associated with pain among women from the general population of Sweden. In the present study, based on baseline and follow-up measures from 2300 of the same sample, we examined associations between pain variables, socioeconomic status and work conditions over time by means of multiple logistic/linear regression analyses. Additionally, a possible mediating role of depressive symptoms on the relationship between SES and pain was examined.
Methods: The study was a prospective panel survey with two measurements 12 months apart among 2300 women with and without pain from the general population in Stockholm (aged 18–64). Logistic and linear regression analyses were used to identify associations between SES and pain outcomes.
Results: Results revealed that pain is a rather stable condition with large impact on daily functioning among many women. Certain SES variables (educational level, financial strain, occupational level) were related to pain and pain related disability prospectively. Financial strain and to be a blue-collar worker were related to the incidence of pain among all women, while educational level was related to worse pain outcomes among women with pain in terms of pain intensity, pain frequency, number of pain locations and pain-related disability. Symptoms of depression were associated with pain incidence and with pain variables (intensity, number of pain locations and pain-related disability) and with lower SES.
Conclusions: Financial strain and occupational level were here identified as risk factors for the incidence of pain, and could be interpreted as increasing both physical and psychological stress and thereby work both as predisposing the individual to pain and to perpetuate the development of a pain condition. Educational level was associated with the course of pain in terms of pain duration and pain-related disability which may indicate that once affected by pain, lower educational level may be related to less functional coping strategies in the adaptation to the pain condition. Depressive symptoms could be understood as a mediator of the relationship between SES and pain among women in terms of limiting the individual's strategies to handle pain in a functional manner by increasing passive behavior patterns such as avoidance.
Implications: The interplay between SES and symptoms of depression should be regarded in preventive interventions and in treatment of pain among women. An overall risk-profile in terms of psychosocial and biological factors needs to be assessed early on within pain treatment for women. Increased knowledge of socioeconomic risk factors for long term pain, e.g. low educational level, is needed on all levels among all professionals within the healthcare system in order to facilitate effective communication in the treatment of women with pain.

DOI of refers to article: 10.1016/j.sjpain.2012.02.006.
* Corresponding author at: Department of Psychology, Division of Social Sciences, Mid Sweden University, Kunskapens väg 1, SE-831 25 Östersund, Sweden. Tel.: +46 63 165342.
E-mail addresses: Johanna.thomten@miun.se (J. Thomtén), Joaquim.soares@miun.se (J.J.F. Soares), orjan.sundin@miun.se (Ö. Sundin).

1877-8860/$ – see front matter © 2012 Scandinavian Association for the Study of Pain. Published by Elsevier B.V. All rights reserved.
doi:10.1016/j.sjpain.2011.12.003

1. Introduction

Lower socioeconomic status (SES) has been linked to greater morbidity and mortality in a wide range of diseases [2–4].

Despite such consistent pattern of findings, the proposed mechanisms underlying this relationship have not yet been clearly elucidated [5]. Lower SES is linked to restricted access to resources (e.g. health care) and individuals of lower SES also tend to live in environments that expose them to stressors to a higher extent than individuals at higher socioeconomic levels [6]. Low SES has also been associated with less healthy lifestyle-behaviors such as smoking [7], over weight and unhealthful food diet [8], and higher levels of alcohol related mortality [9]. Additionally, traumatic and other stressful events are more frequent among individuals of low SES than among their counterpart [10,11]. Finally, individuals at lower socioeconomic levels report fewer psychosocial resources (e.g. social support), which negatively influence their ability to handle stressful life events [5].

In chronic pain populations, stress related to low SES may interact with stress related to living with chronic pain, resulting in negative effects on health and physical functioning, e.g. [5]. Socioeconomic inequalities have been found in several chronic pain populations such as arthritis [12], generalized musculoskeletal conditions and fibromyalgia [13]. Among general population samples, lower SES is associated with higher frequencies of musculoskeletal pain reports [1,14], pain intensity and pain-related disability [15,16].

Due to the potential negative effect of pain and pain-related disability on SES [12], and the overrepresentation of women in several chronic pain conditions [17], there is a need to understand the influence of SES among women living with pain. Also, given that there is a relationship between mental health and low social class and that mental health is associated with pain reporting [18,19], it has been proposed that emotional and cognitive factors might work as mediating variables between social class and pain [5]. Insufficient attention has been paid to the identification of potential sub-groups within the female population that might be at higher risk of developing pain. SES and mental health seem central in the course of pain and might be relevant factors when trying to define the characteristics of such sub-groups. We argue that there is a risk in not analyzing women separately from men since the true role of socioeconomic variables may remain undisclosed, and differences in pain might erroneously be attributed to gender.

By adopting a prospective design, and by including depressive symptoms in the analysis, the current study was conducted as a progression of the results from Jablonska et al. [1]. In the study of Jablonska et al. [1], associations between socio-economic, work variables and pain variables were described cross-sectionally. In the current analyses, we seek to determine: (1) To what extent socioeconomic factors are associated with pain and disability outcome in a female community sample over a 12 months period; and (2) If any relationships observed between pain and socio-economic variables are mediated through depressive symptoms.

2. Methods

2.1. Participants

At the baseline assessment (BL), the participants consisted of 6000 randomly selected women, aged 18–64 years, from the general population living in Stockholm County. (For demographic description of the sample see [20].) Of these, 3616 took part in the study and 2022 declined. In addition, 362 women were excluded because they had moved to unknown addresses or had poor fluency in Swedish. Thus, the final sample at BL consisted of 3616 women (response rate of 64.1%).

At the follow-up measure (FU), the same questionnaire was sent to those who had answered at BL (except for 104 persons who could not be reached). Of the remaining 3512 women, 2300 participated and 1089 declined. In addition 123 women were excluded (121 because of unknown addresses and 2 who had died). Thus, the current study consisted of repeated measures of 2300 women (response rate of 67.8%). An attrition analysis showed no differences (e.g. pain, age) between responders and non-responders at FU.

2.2. Measures

The participants were assessed on various areas (e.g. pain, life style variables). The questionnaire was identical at BL and FU. The present study focused on pain, socioeconomic- and psychosocial work variables and on depressive symptoms.

Pain variables were measured with *The Pain Questionnaire* (PQ; [21,22]), which covers different aspects of pain (e.g. pain intensity 0–10, pain location) and health items. Pain was defined as pain for at least one month duration experienced during the past three months. Pain intensity was measured with a visual analog scale (VAS score 0–10). Pain frequency was measured using a six point scale ('pain almost every week' to 'pain all the time'). Perceived disability was rated using an index consisting of 15 questions (yes/no format), covering different aspects of perceived pain-related disability (e.g. sleep, work/activity level, social life). High scores correspond to high disability. Cronbach α for the disability index was 0.83 at BL and 0.84 at FU.

Job strain/social support at work was assessed using Karasek and colleagues' job demand-control-support model [23]. This scale contains 18 items (score 1–4) of which 6 cover job control, 5 job demands, 7 social support. Job strain is derived from the ratio between job demands and control. Cronbach α for job strain and support were in range of 0.69–0.84 at BL and 0.71–0.85 at FU.

Depressive symptoms were measured with the *General Health Questionnaire* (*GHQ-12*) [24]. It contains 12 items about symptoms of depression. Scores between 0 and 2 indicates no depressive symptoms and scores 3–12 indicate increasing depressive levels. Cronbachs α for the GHQ-12 at BL was 0.81 and at FU 0.83.

Several demographics/socio-economic variables were assessed, such as education, occupational level and current financial support. Financial strain was measured both as financial worry (preoccupation with how to make ends meet) assessed in a "no/sometimes/often always" format, and by problems with daily expenses in the format of a "yes/no" item.

Finally, the presence of chronic diseases (e.g. coronary heart disease) was assessed in a 'yes/no' format and BMI was computed for all participants.

2.3. Design and procedures

The study was a longitudinal panel survey among women in Stockholm with two assessments (BL/FU) one year apart. The data, at both times, were collected during 8 consecutive weeks, with two reminders when necessary. The study was sponsored by Stockholm City Council with the aims of addressing women's experiences of physical and mental health, including pain. The sample was chosen using a random selection program conducted by the AdressKompaniet (AdressKompaniet AB, Stockholm, Sweden), which is a company administering data on the people living in Sweden. At both occasions, each participant was sent a questionnaire to her home address together with a letter providing information regarding the study, and asked to return the questionnaire by mail. All participants were volunteers, returning the

questionnaire was regarded as giving informed consent. Confidentiality was emphasized. Approval for the study was obtained by the Ethical Committee at the Karolinska Institute, Stockholm.

2.4. Statistical analysis

The occurrence of pain at BL and at FU has been calculated previously [20] to estimate the point prevalence and the course of pain during assessment period. To investigate the possible mediating function of depressive symptoms on the associations between SES and pain, the connection between SES variables, pain and depressive symptoms were examined by means of t-tests and spearman's correlation (significance level, $p \leq .001$). A logistic regression analysis was conducted among all women to examine the contribution of baseline socio-economic and psychosocial work variables and the role of depressive symptoms for pain at FU. In a second step linear regression analyses were conducted among women with pain at FU to examine associations between socio-economic and psychosocial factors at BL and pain variables at FU. The same explanatory candidates were used in all regressions, and this selection was based on the descriptive study of the BL sample by Jablonska et al. [1].

Results for the logistic and linear regression analyses were expressed in odds ratios/CI 95% and standardized betas, respectively. All regressions included a measure of explained variance R^2. The significance level for the multiple analyses was set at $p < .05$.

3. Results

3.1. Depressive symptoms, SES and pain

As shown in Table 1, all socio-economic variables were related to depressive symptoms, with lower SES being associated with greater symptoms of depression. Higher levels of depressive symptoms were associated with being single, a blue-collar worker, financially strained, and out of work/studies (e.g. unemployed, sick leave), and with low educational level, and problems with daily expenses. Depressive symptoms were positively correlated with work strain $P = .33, p < .0001$ and negatively with work hours ($P = -20, p < .0001$), and social support at work ($P = -.39, p < .0001$) (Not shown in table format). Finally, women with pain reported more depressive symptoms than women without pain.

Table 1
Depressive symptoms (GHQ) related to SES categories and pain among all women at BL.

Variables	*n*	GHQ[a] Mean	SD	Mean diff[b]	*p*-Value
Marital status					
Single	760	2.62	2.80		
Married/cohabited	1536	1.94	2.39	0.68	.0001
Occupational status					
Blue-collar	513	2.69	2.89		
White collar	1751	2.00	2.42	0.69	.0001
Financial worry					
Yes	900	3.00	2.83		
No	1375	1.62	2.20	1.38	.0001
Problem daily expenses					
Yes	464	3.38	2.89		
No	1810	1.84	2.35	1.53	.0001
Financial support					
Working/studying	1840	1.92	2.92		
Unemployed/sick-leave	449	3.16	3.15	1.24	.0001
Educational level					
Low education	1247	2.39	2.73		
High education	1044	1.89	2.30	0.50	.0001
Pain at BL					
Yes	1465	2.60	2.70		
No	831	1.40	2.05	1.20	.0001

[a] Depressive symptoms.
[b] Mean difference for GHQ within the SES category.

Table 2
Multivariate logistic (odds ratio) regression analyses of the association between socio-economic variables and symptoms of depression at BL and pain in general at FU among all women (adjusted for age, BMI, chronic diseases and pain at BL).

Variables	Pain at FU		
	OR	95% CI	*p*-Value
Pain at BL	6.45	5.23–7.95	.000
Marital status			
Married	.99	0.79–1.23	.90
Single/divorced/widow[a]	1.00		
High education level			
No	1.08	0.87–1.34	.48
Yes[a,b]	1.00		
Occupational status			
Blue-collar worker	1.25	0.57–0.98	.037
White-collar worker[a]	1.00		
Financial support			
Work/study	.99	0.71–1.33	.84
Unemployed/early retirement[a]	1.00		
Financial worry			
Yes	1.25	0.58–0.96	.023
No[a]	1.00		
Problems with daily expenses			
Yes	1.52	1.11–2.08	.008
No[a]	1.00		
Job strain	.94	0.62–1.41	.75
Working hours	.99	0.98–1.00	.08
Social support at work	.83	0.66–1.06	.13
Symptoms of depression	1.09	1.04–1.14	.000

[a] Comparison category.
[b] University/similar.

3.2. Psychosocial predictors of pain at FU

As shown in Table 2, pain at BL was the most important predictor of pain at FU. Additionally, financial strain, problems with daily expenses and being a blue-collar worker were associated with pain at FU. The model explained 27% of the variance in presence of overall pain at FU. Baseline depressive symptoms were independently associated with FU pain, and decreased the regression coefficients for all included SES variables when incorporated in the explanatory model for FU pain.

As shown in Table 3, among women with pain at FU, the same pattern with baseline pain variables as the most significant predictors emerged. Besides these factors, educational level at BL was independently associated with pain variables and pain-related disability at FU. Working hours were associated with number of pain locations and pain-related disability. Baseline symptoms of depression were associated with pain intensity, number of pain locations and pain-related disability at FU and decreased the predictive value of educational level when incorporated in the explanatory models for pain outcomes at FU. The models explained a moderate amount of the variance in the pain variables at FU (18.3% for pain intensity, 25.3% for pain frequency, 42.1% for number of pain locations, and 49.1% for pain related disability).

4. Discussion

In the present analyses, all SES variables were related to higher levels of depressive symptoms. In the predictive models, besides BL pain, educational level, symptoms of depression, occupational status, financial variables and working hours were associated with FU pain variables. These results seem to illustrate an interaction between stress related to low SES, and the experience of pain via emotional distress [25], where symptoms of depression might act as mediators on the SES–pain relationship.

Table 3
Multiple linear regression analyses of the association between socio-economic variables and symptoms of depression at BL and pain variables at FU among women with pain at FU (adjusted for age, BMI, chronic diseases and pain variables at BL) ($N = 1324$).

Variables	Pain intensity			Pain frequency			Number of pain locations			Pain related disability		
	β	SE	p-Value	β	SE	p-Value	β	SE	p-Value	β	SE	p-Value
Baseline pain												
Intensity	0.36	0.02	.000									
Frequency				0.45	.03	.000						
Number of pain locations							0.55	0.03	.000			
Pain related disability										0.58	0.03	.000
Marital status												
Married/cohabitant	0.04	0.14	.17	0.04	0.09	.15	−0.01	0.14	.81	0.01	0.17	.62
Single/divorced/widow												
Education												
Low	0.12	0.14	.000	0.07	0.08	.01	0.07	0.13	.008	0.10	0.17	.000
High/intermediate												
Occupation												
Blue-collar worker	0.01	0.16	.86	0.04	0.10	.24	0.04	0.16	.11	0.01	0.20	.65
White-collar worker												
Financial support												
Working/studying	−0.04	0.20	.32	0.05	0.12	.14	−0.05	0.20	.09	−0.01	0.25	.66
Sick-leave/early retirement/ Unemployed												
Job Strain	0.05	0.24	.16	−0.01	0.15	.86	−0.01	0.24	.86	0.03	0.30	.22
Social support at work	0.05	0.14	.16	−0.04	0.08	.18	−0.02	0.14	.38	−0.04	0.17	.16
Working hours	0.02	0.01	.65	−.03	.00	.36	−0.08	0.01	.006	−0.08	0.01	.01
Financial worry	0.01	0.16	.87	0.01	0.09	.85	0.04	0.15	.22	0.04	0.19	.14
Problems with daily expenses	0.05	0.19	.15	0.00	0.11	.98	0.05	0.18	.08	0.02	0.23	.46
Symptoms of depression	0.08	0.03	.02	0.03	0.02	.93	0.11	0.03	.000	0.07	0.03	.008
Total R^2	(18.3)			(25.3)			(42.1)			(49.1)		

4.1. Baseline pain as a predictor

The fact that BL pain was the single strongest predictor of all pain related outcomes shows that many pain conditions are recurrent and/or long-term in character. Recurrent or chronic pain might result in increased pain sensitivity due to the plasticity of the sensory neural system [26,27]. Sustained pain from BL to FU might indicate a chronic condition with changes also among psychosocial mechanisms. From a learning perspective, repeated experiences of pain offer opportunities of adaptation were certain behavior patterns might reinforce and maintain the painful condition. The role of pain behaviors in the development of chronic pain were introduced by Fordyce [28] as overt behavior-strategies aiming to reduce pain or to reach appetitive consequences such as social reinforcement or with the aim of escaping from aversive duties. More recently, such behaviors have also been described in terms of emotional and cognitive acts (e.g. negative appraisals, pain-related fear) [29]. These behaviors serve the laws of operant conditioning and are described as powerful maintaining components in the development of pain.

4.2. Socioeconomic status predicting pain

In the present study, SES was measured through three different, but potentially overlapping concepts; educational level, occupational status and subjective financial strain/problems with daily expenses. Educational level is commonly established prior to illness of most chronic conditions and is in contrast to occupational and financial status not reversible, or affected by the health status. Therefore educational level has been judged as a relevant measure of SES when relating such concepts to health [30], and has previously been associated with pain in general population samples [31]. In the present study, educational level at BL was not associated with the presence of overall pain at FU, but was identified as a central predictor to all pain related outcomes among women with pain at FU. The role of educational level in the present study seems to be more accurately understood as a risk factor for the characteristics of pain, but not for pain per se. This closely follows the systematic review of the relationship between educational status and back-pain conducted by Dionne et al. [30], demonstrating stronger evidence for an effect of education on the duration and negative consequences of pain than on the incidence of pain. Since many health-related events are linked to educational level, low SES seems to increase the susceptibility to illness or impair the adaptation to health related conditions. This is in line with findings relating SES to coping strategies which are known to influence the outcome of an episode of pain [32]. Individuals with lower educational level tend to use less effective coping strategies for their pain [33]. In a study of patients seeking care at a pain clinic, Roth and Geisser [34] found that negative cognitions related to pain (e.g. Catastrophizing) mediated the relationship between education and pain-related disability. Catastrophizing is one of the key components in the fear avoidance model illustrating the maintenance of pain due to cognitive, emotional and behavior factors [29], and has repeatedly been associated with worse clinical outcomes in pain populations [35,36]. The link between educational level and pain has often been discussed in terms of physically demanding jobs and poor psychosocial working conditions. In the present study educational level was associated with pain outcomes while occupational status was unrelated to these variables among women with pain. This has been demonstrated previously, indicating that educational level has a strong effect on pain outcomes, which should not be understood as related to occupational class and/or working conditions [30,37]. Finally, low SES has been associated with increased levels of stress hormones and allostatic load [38–40]. Lower educational level might be associated with increased frequency and vulnerability to stressful events and thereby allostatic load accelerating pain maintenance processes [41,42].

Working hours were negatively related to number of pain locations and pain-related disability among women with pain at FU. It is tempting to view these results as working hours at BL being related to a general functional status at BL, carried over to FU and thereby functioning as a buffer for disabling pain. To work full time at BL might indicate that pain was not widespread and the presence of a relatively good functional status. To be 'in work' has previously been described as promoting health and well-being in general and

functional status among individuals with pain [43,44]. However, in the current study, to have a job or studying was un-related to the presence of pain and pain-related outcomes over time. This suggests that working hours as an independent factor is associated with pain localizations and pain-related disability. Further studies are needed to investigate the role of working hours in relation to pain over time.

Financial strain at BL (worry and problems with daily expenses) was associated with FU pain. Financial worry was a measure of how troubled the woman was concerning her financial situation, and therefore included a subjective affective measure related to the financial situation. This was different from problems with daily expenses which was a simple 'no'/'yes' item. Economic hardships have previously been associated with pain as a mediator in terms of increased worries and daily stressor s affecting pain intensity, frequency, and complexity resulting in increased vulnerability towards pain [1,45]. Contrary to such findings, financial strain and problems with daily expenses were not associated with pain outcomes among women with pain in the present study. Financial variables might reflect the individual's abilities to handle pain in terms of material resources and insurance benefits. Income level might also be related to motivation of returning to work depending on the health care insurance system in a society. A strained financial situation at BL might constitute an increased vulnerability to chronic pain by creating a heighten general level of stress and sub-sequently causing the individual to fail in adopting functional strategies for handling her pain in terms of balancing activity and rest.

To be a blue-collar worker at BL was associated with pain at FU, but was not related to a worse clinical outcome among women with pain. Occupational status has been associated with pain previously and could be explained via specific work-characteristics related to lower status jobs such as higher physical demands [46]. To suffer from pain in a physically demanding work place might restrict the individual's capacity to adapt work-load and work-pace to her physical health and she might therefore suffer a greater risk of 'overdoing' in an initial phase of her pain condition. Thus, to work in a blue-collar position with physical demands tearing on the individual might be both an initial cause and a perpetuating factor for the development of pain. Lower occupational status has also been associated with worse psychosocial work environments which are known risk factors for pain [47], but neither job strain nor social support at work were related to pain at FU in the present study. Therefore the results presented here highlight the role of physical characteristics of lower occupational status jobs as described above.

4.3. Symptoms of depression mediating the relationship pain–SES

Symptoms of depression were related to both SES and pain in the univariate analyses, and were independently associated both with overall pain at FU and with all pain variables (except pain frequency) among women with pain at FU. Additionally, when depressive symptoms were introduced in the regression models there were clear decreases in the coefficients for SES variables for all outcomes except pain-related disability. This might infer a mediating role of depressive symptoms on the relationship between SES factors and pain. Depression is the most commonly psychological factor associated with pain, related to a host of negative pain outcomes [18,19]. Depressive symptoms, as a possible mediator of the SES–pain relationship, could be explained by several processes. Most importantly, the depressive state is characterized by avoidance and passive problem solving (e.g. rumination). As such, depression may act as a bearer of dysfunctional coping strategies thereby increasing the risk for long-term pain by adopting behavior patterns characterized by avoidance and repetitative negative thinking about pain. Symptoms of depression may be central in the early stages of pain where activity and adaptation is of great importance for the course of future pain development. Secondly, as a concept of negative cognitions and emotions, depression lowers the individual's intrapersonal resources to handle external stressors related to ordinary life (e.g. financial strain), by limiting effective problem solving. Depressive symptoms might also negatively affect interpersonal resources in terms of social withdrawal and isolation and thereby diminishing social support [5], known as an important buffer for pain. Additionally, since educational level was the main SES factor predicting pain outcomes, depressive symptoms and educational level might interact on certain areas with shared processes related to pain. Higher educated individuals might possess more efficient capabilities to navigate through the health care system and interact with health care personnel [42]. Since depression is characterized by behavioral inhibition, social isolation and reduced cognitive abilities, there are possible overlapping difficulties, serving as perpetuating factors for each other.

4.4. Limitations

Firstly, our measures of SES could be criticized in several aspects. We did not include an objective measure of financial situation. Instead we used subjective perceptions of financial strain. To include a measure of income is common, but for the study of women not the first choice since women who do not work outside the home will have a personal income which does not represent the SES of the household. Secondly, income could be a rather unstable SES indicator since employment status and income situations may change rapidly. Educational level was not measured by years of education which has been recommended in the literature [48], but simply by forming two categories with high and low educational level respectively. Educational level could have been more precisely measured in order to demonstrate more specific effects of that variable on pain. In general, we followed the recommendations in the literature to include several SES measures and also to combine objective and subjective measures [5]. Secondly, the sample was recruited in Stockholm, and may not be representative of women in the rest of the country. Therefore, the generalisability of the study findings might be restricted. This is of specific interest when examining socio-economic factors, since the area of residence characterized by socio-economic level might have influence on both the subjective and objective health of an individual [15,49]. The associations between SES and health have been related to adverse life events, restricted access to health-care and environments associated with increased amount of stressors. The current study sample was followed for 12 months which might be regarded a short time interval when studying the influence of socio-economic factors on pain development. There are studies where longer time perspectives have been used, e.g. [50]. However, the influence of SES on pain seem to be more related to adult social status and relatively present interactions between the two concepts such as adult mental health, than to childhood social class [25]. Despite this, a longer time interval, or repeated measures would have been even more illustrative to describe the associations between SES and pain.

4.5. Conclusions and implications

Even considering the aforementioned limitations, the current study demonstrated different associations between financial strain and occupational status and the presence of pain over time among women in general. A clear link emerged between one of the most commonly used measures of SES, educational level, and several pain outcomes. The current study also presented results that may indicate a mediating role of depressive symptoms on the relationship between SES and pain among women in general and among

women reporting pain. Thus, this study does not only add to the growing body of evidence for the link between poor socio-economic status and pain among women [31,51], but also makes an important contribution by associating educational level to several pain outcomes over time among women afflicted with pain.

The underlying components for this association, whether poor problem solving or dysfunctional coping strategies, have to be clearly outlined in order to address suitable interventions in preventive work and in treatment. In a clinical setting, knowledge of the added effect of depressive symptoms and low educational level in pain development is of great importance when communicating with patients. In both medical and psychological treatments, the effect of the intervention relies heavily on the quality of the communication with the patient and the caregivers capacity to adapt to the patients cognitive and emotional level.

Conflict of interest

Neither author has any economic or other conflicts of interest concerning this article.

References

[1] Jablonska B, Soares JJF, Sundin Ö. Pain among women: associations with socioeconomic and work conditions. Eur J Pain 2006;10:435–47.
[2] Gallo LC, Bogart LM, Vranceanu A, Matthews KA. Socioeconomic status, resources, psychological experiences, and emotional responses: a test of the reserve capacity model. J Pers Soc Psychol 2005;88:386–99.
[3] Marmot MG. The status syndrome: how social standing affects our health and longevity. New York: Henry Holt; 2004.
[4] Mead H, Witkowski K, Gault B, Hartmann H. The influence of income, education, and work status on women's well being. Womens Health Issues 2001;11:160–72.
[5] Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? Psychol Bull 2003;129:10–51.
[6] Gee GC, Payne-Sturges DC. Environmental health disparities: a framework integrating psychosocial and environmental concepts. Environ Health Perspect 2004;112:1645–53.
[7] Barbeau EM, Krieger N, Soobader M. Working class matters: socioeconomic disadvantage, race/ethnicity, gender, and smoking in NHIS 2000. Am J Public Health 2004;94:269–78.
[8] Townsend MS, Peerson J, Love B, Achterberg C, Murphy S. Food insecurity is positively related to overweight in women. J Nutr 2001;131:1738–45.
[9] Hemström Ö. Alcohol-related deaths contribute to socioeconomic differentials in mortality in Sweden. Eur J Public Health 2003;12:254–62.
[10] Almeida DM, Neupert SD, Banks SR, Serido J. Do daily stress processes account for socioeconomic health disparities? J Gerontol B 2005;60B(Special Issues II):34–9.
[11] Hatch SL, Dohrenwend BP. Distribution of traumatic and other stressful life events by race/ethnicity, gender, SES and age: a review. Am J Community Psychol 2007;40:313–32.
[12] Callahan LF. Social epidemiology and rheumatic disease. Curr Opin Rheumatol 2003;15:110–5.
[13] Gran JT. The epidemiology of chronic generalized musculoskeletal pain. Best Pract Res Clin Rheumatol 2003;17:547–61.
[14] Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M, Simmons A, Williams G. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. Ann Rheum Dis 1998;57:649–55.
[15] Brekke M, Hjortdahl P, Kvien TK. Severity of musculoskeletal pain: relations to socioeconomic inequality. Soc Sci Med 2002;54:221–8.
[16] Berglund A, Bodin L, Jensen I, Wiklund A, Alfredsson L. The influence of prognostic factors on neck pain intensity, disability, anxiety and depression over a 2-year period in subjects with acute whiplash injury. Pain 2006;125:244–56.
[17] Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Wiliams B, Riley JL. Sex, gender, and pain: a review of recent clinical and experimental findings. J Pain 2009;10:447–85.
[18] Bair MJ, Robinson RL, Katon W, Kroenke K. Depression and pain comorbidity: a literature review. Arch Intern Med 2003;163:2433–45.
[19] Linton SJ, Bergbom S. Understanding the link between depression and pain. Scand J Pain 2011;2:47–54.
[20] Thomtén J, Soares JJF, Sundin Ö. The influence of psychosocial factors on quality of life among women with pain: a prospective study in Sweden. Qual Life Res 2011;20:1215–25.
[21] Arnér S. Clinical pain analysis-somatic aspects. Klinik och Terapi 1984;(Suppl 1):9–12.
[22] Carlsson AM. Assessment of chronic pain II: problems in the selection of relevant questionnaire items for classifications of pain and evaluation and prediction of therapeutic effects. Pain 1984;19:173–84.
[23] Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. J Occup Health Psychol 1998;3:322–55.
[24] Goldberg DP. The user's guide to the General Health Questionnaire. London: NFER Publishing Company; 1991.
[25] Macfarlane GJ, Norrie G, Atherton K, Power C, Jones GT. The influence of socioeconomic status on the reporting of regional and widespread musculoskeletal pain: results from the 1958 British Birth Cohort Study. Ann Rheum Dis 2009;68:1591–5.
[26] Latremoliere A, Woolf CJ. Central sensitization: a generator of pain hypersensitivity by central neural plasticity. J Pain 2009;10:895–926.
[27] Apkarian VA, Hashmi JA, Baliki MN. Pain and the brain: specificity and plasticity of the brain in clinical chronic pain. Pain 2011;152:S49–64.
[28] Fordyce WE. Behavioral methods for chronic pain and illness. St Louis: Mosby Fordyce; 1976.
[29] Vlaeyen JWS, Linton SJ. Pain-related fear and its consequences in chronic musculoskeletal pain. In: Linton SJ, editor. New avenues for the prevention of chronic musculoskeletal pain and disability. Amsterdam: Elsevier Science; 2002. p. 81–103.
[30] Dionne CE, Von Korff M, Koepsell TD, Deyo RA, Barlow WE, Checkoway H. Formal education and back pain: a review. J Epidemiol Community Health 2001;55:455–68.
[31] Eriksen J, Jensen MK, Sjøgren P, Ekholm O, Rasmussen NK. Epidemiology of chronic non-malignant pain in Denmark. Pain 2003;106:221–8.
[32] Christensen U, Schmidt L, Hougaard CØ, Kriegbaum M, Holstein BE. Socioeconomic position and variations in coping strategies in musculoskeletal pain: a cross-sectional study of 1,287 40- and 50-year old men and women. J Rehabil Med 2006;38:316–21.
[33] Cano A, Mayo A, Ventimiglia M. Coping, pain severity, interference, and disability: the potential mediating and moderating roles of race and education. J Pain 2006;7:459–68.
[34] Roth RS, Geisser ME. Educational achievement and chronic pain disability: mediating role of pain-related cognitions. Clin J Pain 2002;18:286–96.
[35] Crombez G, Vlaeyen JWS, Heuts PH, Lysens R. Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. Pain 1999;80:329–39.
[36] Fritz J, George S. Identifying psychosocial variables in patients with acute work-related low back pain: the importance of fear-avoidance beliefs. Phys Ther 2002;82:973–83.
[37] Hagen KB, Tambs K, Bjerkedal T. What mediates the inverse association between education and occupational disability from back pain? A prospective cohort study from the Nord-Trøndelag health study in Norway. Soc Sci Med 2006;63:1267–75.
[38] Kubzansky LD, Kawachi I, Sparrow D. Socioeconomic status, hostility, and risk factor clustering in the normative aging study: any help from the concept of allostatic load? Ann Behav Med 1999;21:330–8.
[39] Cohen S, Doyle WJ, Baum A. Socioeconomic status is associated with stress hormones. Psychosom Med 2006;68:4141–220.
[40] McEwen BS. Allostasis and allostatic load: implications for neuropsychopharmacology. Neuropsychopharmacology 1999;22:108–24.
[41] Goertzel BN, Pennachin C, de Souza Coelho L, Maloney EM, Jones JF, Gurbaxani B. Allostatic load is associated with symptoms in chronic fatigue syndrome patients. Pharmacogenomics 2006;7:485–94.
[42] Shavers VL. Measurement of socioeconomic status in health disparities research. J Natl Med Assoc 2007;99:1013–23.
[43] Moffett KJA, Underwood MR, Gardiner ED. Socioeconomic status predicts functional disability in patients participating in a back pain trial. Disabil Rehabil 2009;31:783–90.
[44] Wadell G, Burton AK. Is work good for your health and well being? London: The Stationary Office; 2006.
[45] Rios R, Zautra AJ. Socioeconomic disparities in pain: the role of economic hardship and daily financial worry. Health Psychol 2011;30:58–66.
[46] Frank JW, Kerr MS, Brooker A, DeMaio SE, Maetzel A, Shannon HS, Sullivan TJ, Norman RW, Wells RP. Disability resulting from occupational low back pain. Part 1: what do we know about primary prevention? A review of the scientific evidence on prevention before disability begins. Spine 1996;21:2908–17.
[47] Hoogendoorn WE, van Poppel MNM, Bongers PM, Koes BW, Bouter LM. Systematic review of psychosocial factors at work and in the personal situation as risk factors for back pain. Spine 2000;25:2114–5.
[48] Poleshuck EL, Green CR. Socioeconomic disadvantage and pain. Pain 2008;163:235–8.
[49] Brekke M, Hjortdahl P, Thelle DS, Kvien TK. Disease activity and severity in patients with rheumatoid arthritis: relations to socioeconomic inequality. Soc Sci Med 1999;48:1743–50.
[50] Hestbaek L, Korsholm L, Leboeuf-Yde C, Ohm Kyvik K. Does socioeconomic status in adolescence predict low back pain in adulthood? A repeated cross-sectional study of 4,771 Danish adolescents. Eur Spine J 2008;17:1727–34.
[51] Verhaak PFM, Kerssens JJ, Dekker J, Sorbi MJ, Bensing JM. Prevalence of chronic benign pain disorder among adults: a review of the literature. Pain 1998;77:231–9.