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ORIGINAL ARTICLE

Impact of self-reported bank fraud on self-rated health, comorbidity and pain

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Abstract

Objectives As reported in other high-income countries, around the 2008 Great Recession the Spanish banking sector engaged abusive practices that satisfy the definition of fraud. Our objective is to examine the association between self-reported bank fraud and physical health, using a gender perspective.

Methods With data from the 2017 Madrid Health Survey, we examined the association between the economic impact of fraud and poor self-rated health (SRH), comorbidity and pain ($N = 4425$). Interactions of time since fraud and sex with economic impact were tested by Poisson regression models with robust variance.

Results In total, 11% of adults in Madrid reported bank fraud since 2006. Among men, those who experienced frauds with severe economic impact were more likely to report adverse health than those who did not experience fraud (PR comorbidity: 1.46; PR pain conditions: 2.17). Among men time elapsed since fraud strengthened the association between severe economic impact and poor SRH ($p = 0.022$; $p = 0.006$, respectively). Among women, associations did not reach statistical significance.

Conclusions Bank frauds are an emerging phenomenon which is likely to damage public health. Stricter regulation to protect people from fraudulent bank practices is needed.

Keywords Financial fraud · Self-rated health · Stressful live events · Spain

Introduction

In the past 15 years, in different countries, including Spain, the banking sector engaged in abusive practices, related to credit and savings financial products (Zunzunegui 2014, 2018; Conac 2018). We refer to these abusive practices as bank fraud, defined as "action that is contrary to truth and integrity, that harms those who it is committed against" (http://dle.rae.es/?id=IQS313i). These frauds have been sentenced as offenses in national and European courts (Zunzunegui 2014). The European Court of Justice issued several rulings declaring that Spanish legislation did not comply with European directives on consumer rights (Online Resource, Supplementary Table 1). In 2019, the Parliamentary Research Commission on the Financial Crisis in Spain concluded that the Central Bank of Spain did not adequately supervise financial activity during the

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economic crisis, and asked for reform. The main types of frauds consisted in selling products that were not adequate for small savers, under a lack of information about the characteristics of the products and the exact nature of their financial risks (Boletín Oficial de las Cortes Generales 2019). Official figures show that more than three million people in Spain purchased fraudulent products between 1998 and 2012 (Online Resource, Supplementary Table 2). Bank fraud rapidly expanded during the 2008 economic crisis and became one of the main and most harmful causes of widespread financial shocks among the population.

There is scientific evidence on the health impact of wealth losses. In particular, wealth shocks, bankruptcy and over-indebtedness are associated with higher general mortality rates (Brzoska and Razum 2008; Pool et al. 2018), higher rates of suicide (Richardson et al. 2013; Wang et al. 2015) and poorer physical and mental health (Richardson et al. 2013; Turunen and Hiilamo 2014; Białowolski et al. 2019; Sarriá et al. 2019). Fraud impacts not only on wealth but also on psychosocial stress since it often entails abuse of relations of trust (Freshman 2012) between bank employees and their clients, taking advantage of information and power asymmetry (Missé 2016).

Little information is available on the specific impact of bank fraud on health. Two previous studies (Ganzini et al. 1990; Zunzunegui et al. 2017) showed that prevalence of poor self-rated and mental health was greater among those exposed to bank fraud than in the general population. Cross-sectional design, opportunistic samples and limited sample sizes, and comparison of people exposed to bank fraud with the general population make findings of these studies preliminary, but they highlight the potentially strong impact of bank fraud on health (Bilal and Kaufman 2017).

This study is based on the hypothesis that bank fraud is a risk factor for physical health. The study objective is to examine the association between being affected by bank fraud and poor physical health, using a gender perspective. The study aims at answering three research questions. First, does the magnitude of the bank fraud matter? Second, does the impact of the bank fraud on health vary by gender? Third, how does the time elapsed since bank fraud affect health and does this effect vary by gender?

Methods

Source of data

The 2017 Municipal Health Survey was carried out in 2017 among residents of Madrid aged 15 and over. Questions on bank fraud were asked to a subsample of 4425 people. The information was collected through computer-assisted telephone interviews. Half of those surveyed were interviewed using a landline telephone number, and half via mobile phone. A randomized stratified sampling method was used. The stratification criteria were first the district and then sex and age group. An error of less than 1.5% was guaranteed in the event of relative frequency ($p = q = 0.5$). Source of data has been previously described in depth (Sarriá et al. 2019). The Ethics Committee of the Institute of Health Carlos III approved this project (reference number CEI PI 51_2017_v2).

Outcomes

The outcomes analyzed were self-rated health, comorbidity and pain. The validity of these self-reported indicators is supported by significant literature (Ferraro and Su 2000; Zellweger et al. 2014; Maixner et al. 2016; Baćak and Ólafsdóttir 2017).

- Self-rated health (SRH) in the past 12 months, assessed in five categories and dichotomized for analysis in good (very good, good) and poor (fair, poor, very poor).
- Comorbidity, defined as the presence of two or more diagnosed chronic diseases. The survey question was: "Has a doctor ever told you that you have any of the following conditions: high blood pressure; cardiovascular conditions, arthrosis (excluding arthritis), allergies, asthma, respiratory diseases, diabetes, infectious diseases, cancer, cerebrovascular accidents, cirrhosis, autoimmune diseases of the skin, other autoimmune diseases, gastrointestinal conditions, sleep apnea, neurological diseases, osteoporosis, musculoskeletal diseases, metabolic diseases or vision problems?"
- Pain conditions other than joint pain: Presence of at least one of the following conditions diagnosed by a doctor: chronic back pain, frequent migraine or headache and fibromyalgia. Low back and cervical pain and migraines are frequent questions to examine pain conditions unrelated to joints (Maixner et al. 2016). We added fibromyalgia because of its relatively high frequency in the survey population and reports on associations between this painful condition and psychosocial stress (Varinen et al. 2017).

Exposure variables

Questions used to assess bank fraud were developed and validated in a pilot study by Zunzunegui and colleagues (Zunzunegui et al. 2017). The current study was built on those questions. Participants were asked whether "*in recent years, and specifically since the year 2006, do you believe you have suffered bank fraud?*". Those who responded affirmatively were asked which type of product they had

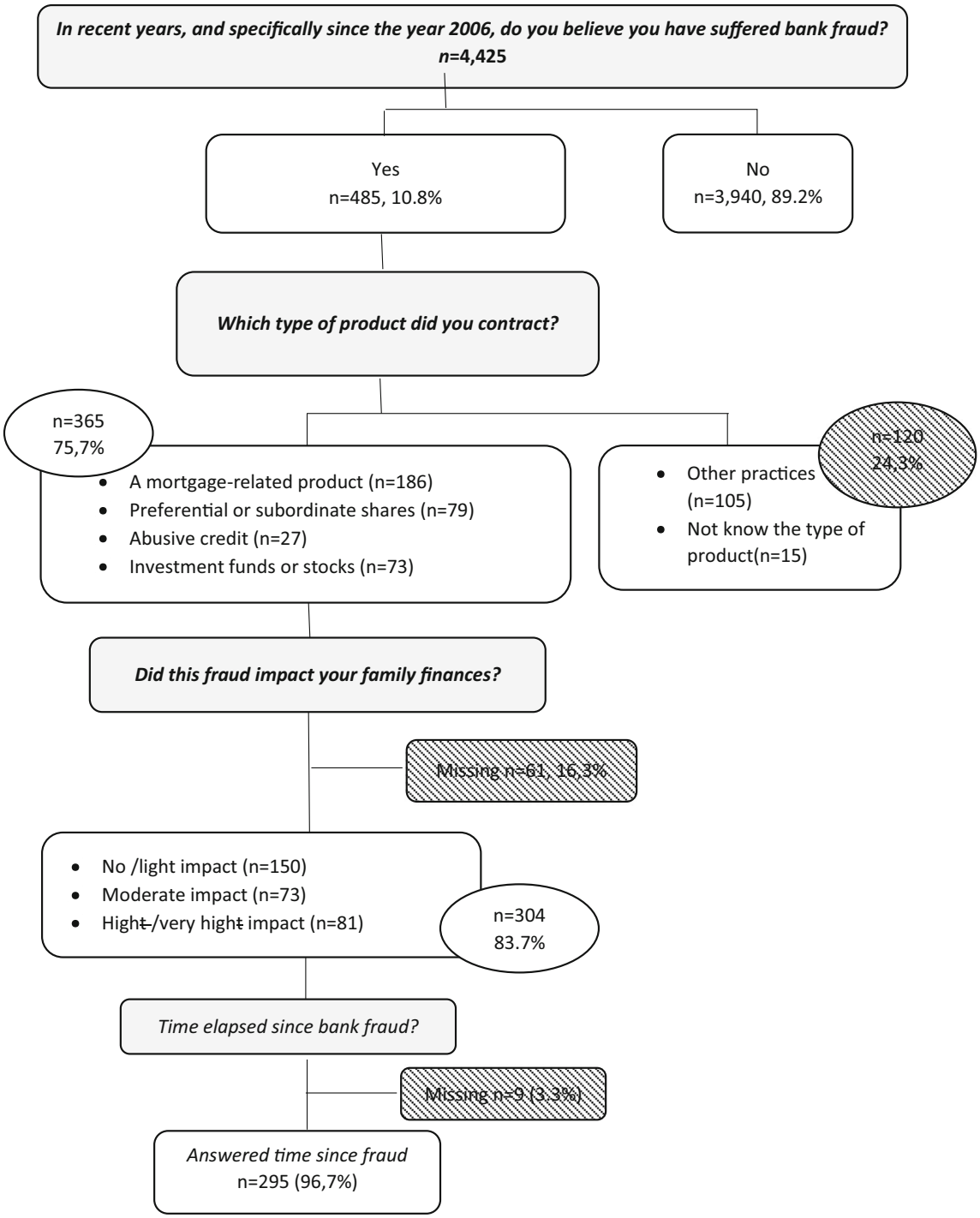

Fig. 1 Sample definition. Madrid Health Survey, Spain 2017

contracted (Fig. 1). The response categories included all the financial products declared by court sentences as fraudulent. This variable was recoded into six categories: a mortgage-related product; abusive credit; investment funds or stocks; preferential or subordinate shares; other practices; do not know the type of product. Those who responded affirmatively to any of the products listed, except "other types of fraud" or "do not know the type of product" were then asked, "*Did this fraud impact your family finances?"* Possible responses were: no impact, light, moderate, high, very high. The economic impact of fraud was recoded into three categories: fraud with no/light impact; moderate impact; and severe (high or very high) impact. Those who had not experienced any fraud

(category "no fraud") were used as the reference category in the analysis.

The time elapsed since bank fraud (or "time since fraud") was calculated as the difference in months between the date of the interview and the date obtained in the question *"At what time (month/year) did you become aware that you had experienced bank fraud?"*. Time of exposure was only collected among those reporting a type of fraud listed in the questionnaire, excluding those who chose the category "other."

Confounding variables

Given the scarce literature on the impact of bank fraud on health, the main determinants of health were considered as confounding variables. Specifically, we included age, sex (man, woman), place of birth (Spain, other country) and social class of the main family breadwinner. Social class was grouped into: high (directors, managers and university professionals); middle (intermediate occupations and self-employed) and low (manual) (Domingo-Salvany et al. 2013).

Statistical analysis

First, we compared the distribution of the economic impact of bank fraud across categories of age, sex, social class and place of birth (Chi-square test). In the subsample reporting a bank fraud listed in the questionnaire, we examined time elapsed since fraud across potential confounders (ANOVA).

Second, we estimated the prevalence of poor SRH, comorbidity and pain by type of fraud. Third, we estimated the prevalence of poor SRH, comorbidity and pain by economic impact of fraud (test for linear trends) and compared time since fraud among those with good and poor health (ANOVA).

Prevalence ratios (PR) of poor health were estimated using Poisson regression with robust variance, which is considered the method of choice in epidemiology (Barros and Hirakata 2003), adjusted for potential confounders. To examine whether the effect of bank fraud on health differed between men and women, we explored the interactions of sex and economic impact of fraud on SRH, comorbidity and pain. Lastly, we tested whether the associations between time since fraud and health outcomes were modified by the economic impact of fraud. Given the significant interactions, which differed by sex, sex-specific results are shown.

All the analyses were carried out using weighted coefficients with the program Stata 15.0. All the frequencies showed in the text are unweighted; percentages are weighted.

Results

The prevalence of bank fraud was 10.8% (IC 95%: 9.9–11.7%), which means 306,517 people (IC 95%: 280,690–332,343) were affected. Out of the 485 subjects who reported a type of fraud listed in the questionnaire, around 38.2% ($n = 186$) contracted a mortgage-related product, 16.9% ($n = 79$) preferential or subordinate shares, 5.5% ($n = 27$) abusive credit, 15.2% ($n = 73$) investment funds or stocks and 24.3% ($n = 120$) answered other practices or did not know the type of product (Fig. 1).

Of those surveyed ($n = 4425$), 89.2% ($n = 3940$) reported no fraud, 3.5% ($n = 150$) experienced fraud with no impact or light economic impact, 1.7% ($n = 73$) reported moderate impact, 2.0% ($n = 81$) experienced a severe impact, and 4.6% ($n = 181$) were missing values (Fig. 1). The prevalence of fraud was greater in those aged 29 and over (8.2% *vs.* 1.9%); among the middle social class (7.5% high social class, 9.1% middle, 5.6% lower); and among those born in Spain (7.4% in Spanish *vs.* 5.9% in foreigners).

In the subsample with information on time since fraud, average duration increased significantly with age ($p = 0.004$), and for foreigners (60.7 months *vs.* 49.7 months), although the latter was not statistically significant ($p = 0.074$) (Table 1).

Table 2 describes the prevalence of poor SRH, comorbidity and pain, by the economic impact of fraud and the unadjusted and adjusted prevalence ratios of poor SRH, comorbidity and pain, by the economic impact of fraud, stratified by sex.

People who have suffered from fraud with a moderate or severe economic impact, report poor health more frequently than those with no fraud or fraud with no/light economic impact for all three outcomes. Specifically, among those who had suffered a severe bank fraud, 39.5% reported poor SRH, 36.3% reported comorbidity and 44.8% reported chronic pain compared to 28.2%, 27.6% and 30.4% of those with no fraud, respectively.

The association of comorbidity and pain with the economic impact of fraud differed for men and women with significant p value interaction ($p = 0.027$ and $p = 0.048$, respectively).

Little difference is observed between the unadjusted and adjusted prevalence ratios point estimates. The probability of reporting poor SRH is 41% greater among those who have suffered severe bank frauds than in people who did not experience fraud. Specifically, using as the reference category those not exposed to fraud, the exposure to fraud with a severe economic impact significantly increased the probability of comorbidity (PR: 1.46) and pain (PR: 2.17) in men, though not in women.

Table 1 Distribution/means of sample characteristics by economic impact and duration of fraud. Madrid Health Survey, Spain 2017

Characteristics	*N*	Economic impact of bank fraud				*p* value[a]	Duration of bank fraud (*N* = 295)		*p* value[b]
		No fraud *n* = 3940	No impact/light *n* = 150	Moderate *n* = 73	Severe *n* = 81		*N*	Mean (SD)	
Age groups						< 0.001			0.104
18–29	746	98.1	1.0	0.6	0.3		14	46.7 (38.2)	
30–44	1135	91.4	4.1	2.1	2.5		98	53.0 (39.1)	
45–64	1355	91.5	4.0	2.1	2.4		110	62.2 (38.9)	
65+	1016	92.5	3.9	1.4	2.2		71	64.7 (36.5)	
Age, mean (SD)	3477	48.7 (17.4)	52.3 (14.4)	50.9 (14.5)	52.4 (15.2)	0.013	–	–	0.004
Gender						0.278			0.783
Male	1974	92.0	3.8	1.9	2.3		152	58.4 (37.7)	
Female	2278	93.6	3.1	1.5	1.8		141	59.6 (39.6)	
Social class						0.001			0.245
High	1628	92.5	4.4	1.2	1.9		119	57.6 (38.0)	
Middle	962	90.9	4.4	2.5	2.1		83	54.8 (37.1)	
Low	1580	94.4	1.9	1.7	2.0		86	64.4 (40.3)	
Place of birth						0.018			0.074
Spain	3477	92.6	3.7	1.9	1.8		247	60.7 (38.5)	
Other country	775	94.1	2.5	0.6	2.7		46	49.7 (37.7)	

SD standard deviation

[a]Chi-square test for categorical variables and ANOVA for continuous variables

[b]ANOVA with categorical variables and linear regression with continuous variables

Time since fraud increased with the severity of the economic impact of fraud [mean (standard deviation, SD) no/light impact 49.4 months (35.1), moderate 66.6 (39.8), severe 68.8 (39.5), ($p < 0.001$)]. Time since fraud was greater among people with poor SRH [mean (SD): 67.8 (37.8) *vs.* 55.0 (38.3) months, ($p = 0.012$)]; with comorbidity [mean (SD): 58.1 (37.6) vs. 59.4 (39.0) months]; and with pain [mean (SD): 62.8 (38.9) *vs.* 56.9 (38.3) months].

Figure 2 shows the prevalence of poor SRH, comorbidity and pain by time since fraud and by economic impact of fraud among men (Fig. 2a–c) and among women (Fig. 2d–f). Robust Poisson regression model is included as Online Resource, Supplementary Table 3.

Among men, interactions between duration and impact of fraud on poor SRH and comorbidity were statistically significant ($p = 0.022$ and $p = 0.006$, respectively). These interactions were not significant in women ($p = 0.479$, $p = 0.777$ respectively).

For men who suffered fraud with severe economic impact, we observed that the prevalence of poor SRH ($p = 0.009$) (Fig. 2a) and of comorbidity ($p = 0.030$) (Fig. 2b) increased with time since fraud.

For men exposed to fraud with moderate, or light/no impact, the economic impact of fraud on SRH, comorbidity and pain was not significant and did not depend on time since fraud (Fig. 2c).

Among women, none of the multiplicative interactions of time since exposure and the economic impact of fraud reached statistical significance ($p = 0.479$; $p = 0.777$; $p = 0.182$, for SRH, comorbidity and pain, respectively) (Fig. 2d–f).

Discussion

Main results

One in ten people in the city of Madrid reported a bank fraud in 2006–2017, with mortgage fraud being the most frequently reported. As for our research questions, first, when we examined both genders together, people who experienced bank fraud with a severe economic impact showed worse health in all health outcomes: poor SRH, comorbidity and pain. Second, regarding the role of gender, these associations were significative for men but did not reach statistical significance in women. Third, the time elapsed since awareness of fraud was associated with increasingly poor SRH and comorbidity among those men reporting severe economic impact. The same association pattern was evident in women (results not shown), but it did not reach significance.

Table 2 Prevalence and prevalence rates of poor self-rated health, two or more chronic conditions and pain conditions by the economic impact of the fraud. Madrid Health Survey, Spain 2017

Outcomes variables	Prev (%)	Unadjusted prevalence rates (CI 95%)			p^b	Adjusted prevalence rates[a] (CI 95%)				p
		Both genders	Males	Females		Both genders	Males	p	Females	
Poor self-rated health										
Economic impact					0.589			0.273		0.363
No fraud	28.2	1	1	1		1	1		1	
Light	25.9	0.92 (0.69–1.23)	1.10 (0.70–1.71)	0.83 (0.57–1.21)		0.99 (0.74–1.32)	1.11 (0.70–1.75)		0.91 (0.62–1.32)	
Moderate	33.1	1.17 (0.83–1.67)	1.42 (0.86–2.33)	1.05 (0.64–1.72)		1.19 (0.83–1.71)	1.19 (0.70–2.02)		1.19 (0.72–1.94)	
Severe	39.5	1.40 (1.05–1.87)	1.60 (1.02–2.52)	1.31 (0.90–1.90)		1.41 (1.06–1.86)	1.48 (0.98–2.25)		1.35 (0.93–1.96)	
At least 2 chronic conditions										
Economic impact					0.027			0.014		0.342
No fraud	27.6	1	1	1		1	1		1	
Light	31.3	1.13 (0.88–1.46)	1.69 (1.21–2.35)	0.79 (0.53–1.18)		1.08 (0.83–1.39)	1.54 (1.11–2.15)		0.75 (0.51–1.10)	
Moderate	26.7	0.97 (0.64–1.45)	0.99 (0.53–1.85)	1.00 (0.60–1.69)		0.95 (0.64–1.42)	0.82 (0.43–1.57)		1.13 (0.71–1.80)	
Severe	36.3	1.32 (0.96–1.80)	1.64 (1.03–2.59)	1.15 (0.75–1.75)		1.31 (1.00–1.71)	1.46 (1.01–2.12)		1.19 (0.81–1.75)	
At least one condition associated with pain										
Economic impact					0.048			< 0.001		0.614
No fraud	30.4	1	1	1		1	1		1	
Light	29	0.95 (0.73–1.24)	1.07 (0.67–1.70)	0.95 (0.70–1.29)		0.98 (0.75–1.28)	1.06 (0.66–1.68)		0.94 (0.68–1.29)	
Moderate	39.1	1.29 (0.95–1.75)	1.58 (0.95–2.62)	1.22 (0.84–1.77)		1.34 (0.99–1.81)	1.46 (0.87–2.46)		1.26 (0.88–1.81)	
Severe	44.8	1.48 (1.14–1.91)	2.31 (1.59–3.34)	1.12 (0.77–1.62)		1.47 (1.12–1.94)	2.17 (1.55–3.04)		1.06 (0.71–1.57)	

CI 95%, confidence interval at 95%

[a]Adjusted by gender, age, social class and immigration

[b]p value of gender and economic impact interaction

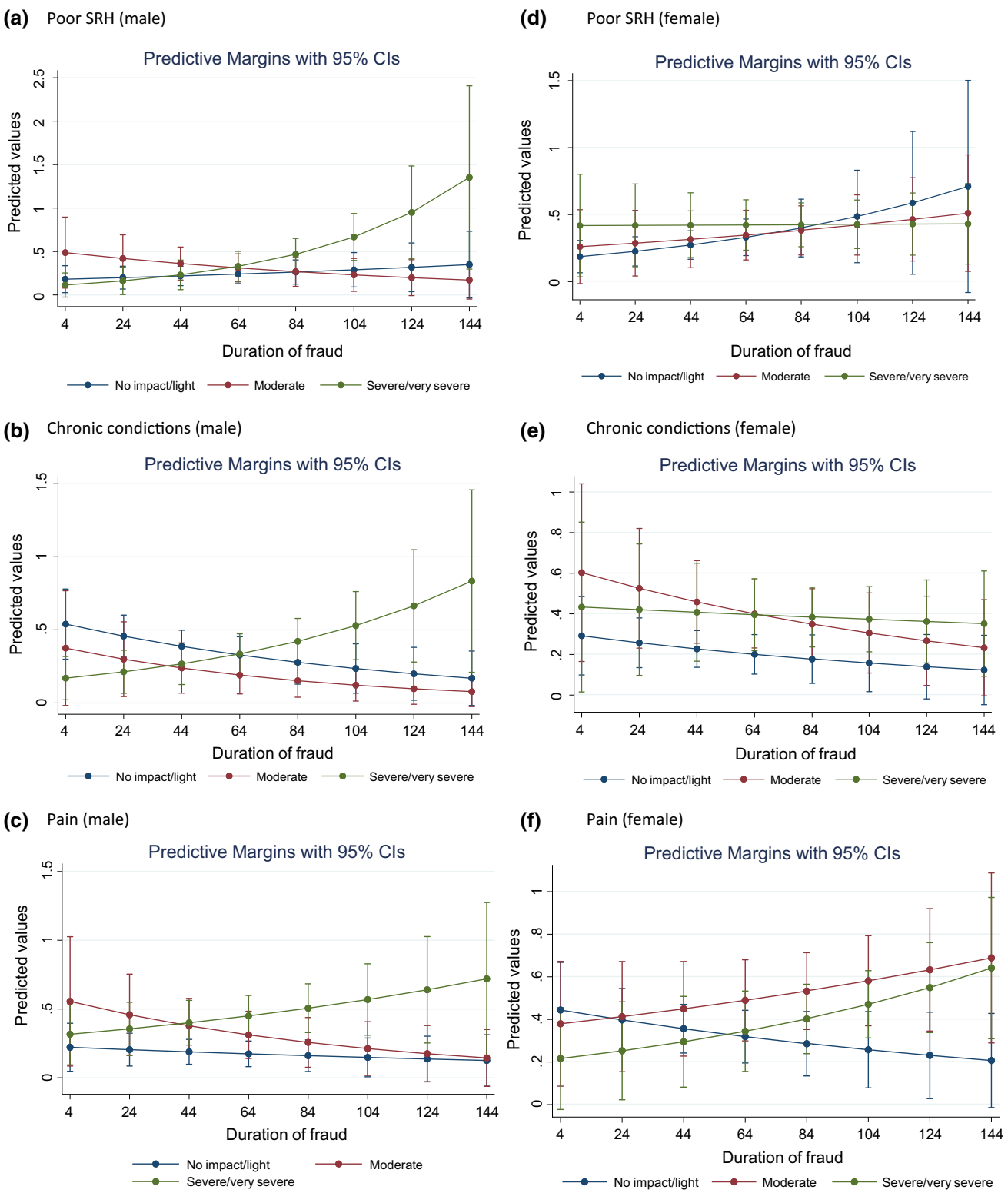

Fig. 2 Prevalence of poor self-rated health (SRH), comorbidity and pain, by the number of months of exposure to fraud and by the impact of fraud on family finances in men and women. Madrid Health Survey, Spain 2017

Explanation of results

Official estimates of the number of people affected by bank fraud in Spain place the figure at more than three million people so far out of an Spanish population of 46 million. This is compatible with our estimate of 10.8% prevalence of bank fraud in Madrid. The socioeconomic profile of people affected by bank fraud corresponds to those who have financial capacity to invest or contract home loans, individuals from the middle social class, of Spanish origin, and over age of 30.

There is little published research on the effects of bank fraud on physical health. However, there is an emerging literature on the physical health effects of similar life events which involve both severe wealth losses and high financial stress, such as wealth shocks, over-indebtedness and bankruptcy. Over-indebtedness has been associated with poor SRH (Sweet et al. 2013; Białowolski et al. 2019), with greater incidence of chronic disease (Blomgren et al. 2016), hypertension (Sweet et al. 2013), back pain (Ochsmann et al. 2009) and obesity (Münster et al. 2009). Financial bankruptcy has been associated with a decrease in good SRH (Addo 2017), a greater risk of melanoma (Havlik et al. 1992) and myocardial infarction (Savu et al. 2016).

Wealth shocks also induce increasing feelings of helplessness and worry (Turunen and Hiilamo 2014) or loss of sense of control (Mejía et al. 2016) as well as mental health problems such as anxiety, depression and trauma, which often result in somatic symptoms such as pain (Tylee and Gandhi 2005; Freshman 2012; Cohen et al. 2019). High levels of financial and psychosocial stress can lead to changes in physiological biomarkers of inflammation and cardiovascular and endocrine problems (Boen and Yang 2016).

Bank fraud is itself an stressful life event that can lead to further psychosocial stress (Cohen et al. 2019), as well as generating feelings of betrayal and high institutional distrust (Freshman 2012). The wealth shock involved in many cases of bank fraud can lead those affected to move to more disadvantaged neighborhoods, to be unable to pay their utility bills or to have poor nutrition, in addition to having lesser access to credit. A small but highly vulnerable segment of those affected by fraud suffered home foreclosure, a practice that has a severe impact on health (Vásquez-Vera et al. 2016).

Among men with severe economic impact, time since fraud increased the probability of poor health. The health effect of bank fraud among those whose family finances had been severely compromised is cumulative, and health worsened with time. This suggests a structural impact, which is likely to diminish material resources and initiate a downward spiral of poverty, housing and food problems, further over-indebtedness and growing financial strain which leads to physical health deteriorating with time (Kahn and Pearlin 2006; Marmot 2017). Future research is needed to explore the degree to which governmental support, economic compensation by banks and timing of response in the wake of disaster affect resilience or exacerbate the traumatic response, promoting chronicity of symptoms (Freshman 2012).

To our knowledge, this is the first study that analyzes gender differences in the impact of bank fraud on physical health. Our results agree with studies carried out by Mackenbach et al. (2008), where inequalities in socioeconomic status assessed by education or occupation are observed and show a steeper physical health gradient for men compared to women (Mackenbach et al. 2008). There are only two studies on wealth shocks and over-indebtedness that stratify by gender, and both find that women's physical health is more affected by financial shocks than men's (Kondo et al. 2008; Blomgren et al. 2016). This is consistent with the fact that women's health is more affected by economic insecurity than men's health (Otaki et al. 2018). In the same line, two studies (Bolívar Muñoz et al. 2016; Vásquez-Vera et al. 2016) find greater effects of evictions and the threat of eviction on poor SRH among women as compared to men. We cannot discard that women's physical health is as negatively affected by severe bank fraud as is men's, as a lack of significance could be due to lack of statistical power, given that the prevalence ratios in women are greater but do not reach statistical significance.

The primary limitation of the study is its cross-sectional nature, given that the health indicators collected at the time of the interview could reflect a state of health that is prior to the experience of fraud. Second, the self-reported assessment of bank fraud could be perceived as problematic, as low financial literacy may prompt miss-assessment. However, all throughout the analysis, we have only used the information on those specific types of frauds which have been *sentenced as offenses or scams* by courts in Spain, according to the European Consumers Directives and the sentences of the European Union Court of Justice. In 2017, at the time of the Madrid Health Survey, these financial frauds had been increasingly recognized by sentences in trials all over Spain and extensively covered by the mass media at least since 2011; the Central Bank of Spain and the Spanish *Consejo General del Poder Judicial* (maximum institution of judiciary power) have published statistics on these frauds. Our questions to assess financial frauds hence referred to well-known and widespread frauds, and in 2017, people affected by frauds disposed of enough information to make sure that they have been victims of scams. Our estimate of the extent of bank fraud

in Madrid is consistent with the official statistics on the number of people affected. We give evidence of a statistical association, a dose–response trend, and this association is apparent in three health indicators and in men and women, even if it reaches significance only in men. We have chosen occupation instead of education as an indicator of socioeconomic position because in Spain education is strongly related to age. A final limitation of our analysis is that the size of our sample does not allow for an analysis by subgroups, which would permit an examination of the impact of the types of fraud—credit or savings—and additional hypotheses related to the processes of claims and compensation.

Despite its limitations, this study provides sound scientific knowledge about a widespread social phenomenon in times of economic crisis, bank fraud and its effects on health. It was carried out using a representative sample of the population of the city of Madrid, and it uses a battery of questions about bank fraud whose validity is supported by a preliminary study (Zunzunegui et al. 2017). Thus, this work suggests that severe bank fraud negatively affects the health of the population. This effect increases according to the duration of exposure to fraud and seems to be stronger in men. Stricter regulation to protect people from fraudulent bank practices is needed, given their impact on public health.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The Ethics Committee of the Institute of Health Carlos III approved this secondary data analysis project (Reference Number CEI PI 51_2017_v2) dated September 4, 2017.

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