

## Article

# Fear of crime and its relationship to self-reported health and stress among men

Gloria Macassa,<sup>1,2</sup> Rocio Winersjö,<sup>3</sup> Katarina Wijk,<sup>4</sup> Cormac McGrath,<sup>5</sup> Nader Ahmadi,<sup>6</sup> Joaquim Soares<sup>7</sup>

<sup>1</sup>Department of Occupational and Public Health Sciences, University of Gävle, Sweden;

<sup>2</sup>Epidemiology Unit-ISPUP, University of Porto, Portugal; <sup>3</sup>Swedish Board of Health and Social Welfare, Sweden; <sup>4</sup>Department of Research, Gävleborg Region, Sweden; <sup>5</sup>LIME, Karolinska Institute, Sweden; <sup>6</sup>Department of Social Work and Psychology, University of Gävle, Sweden;

<sup>7</sup>Department of Public Health, Mid-Sweden University, Sweden

## Significance for public health

Fear of crime is a growing public health concern. However the majority of available studies have addressed the impact of fear of crime on health outcomes among women. This study investigated the impact of fear of crime on self-reported health and stress among men living in Gävleborg County, Sweden. Results indicated that fear of crime was associated with poor self-reported health and stress. This suggests that there is a need to further understand how fear of crime impact men's physical and psychological health as well as their quality of life across different contexts.

## Abstract

**Background:** Fear of crime is a growing social and public health problem globally, including in developed countries such as Sweden. This study investigated the impact of fear of crime on self-reported health and stress among men living in Gävleborg County.

**Design and Methods:** The study used data collected from 2993 men through a cross sectional survey in the 2014 Health in Equal Terms survey. Descriptive and logistic regression analyses were carried out to study the relationship between fear of crime and self-reported health and stress.

**Results:** There was a statistically significant association between fear of crime and self-reported poor health and stress among men residing in Gävleborg County. In the bivariate analysis, men who reported fear of crime had odds of 1.98 (CI 1.47-2.66) and 2.23 (CI 1.45-3.41) respectively. Adjusting for demographic, social and economic variables in the multivariate analysis only reduced the odds ratio for self-reported poor health to 1.52 (CI 1.05-2.21) but not for self-reported stress with odds of 2.22 (1.27-3.86).

**Conclusions:** Fear of crime among men was statistically significantly associated with self-reported poor health and stress in Gävleborg County. However, the statistically significant relationship remained even after accounting for demographic, social and economic factors, which warrants further research to better understand the role played by other variables.

## Introduction

Fear of crime is a growing social and public health problem globally, including in developed countries such as Sweden.<sup>1-3</sup>

Among known predictors, gender has been found to be the strongest predictor of fear of crime. Studies of gender differences in fear of crime have systematically reported high levels of fear of crime among women, even though women are less victimized than men.<sup>4</sup> This is known as the *fear victimization paradox* and various explanations have been put forward to explain it. For instance, evolutionary explanations suggest that feelings of fear are functional in the sense that they signal a dangerous situation.<sup>5</sup> It presupposes that if someone perceives a situation as dangerous, it will result in an increased alertness and sensitivity towards situational cues to estimate the degree and kind of danger, which prepares the organism for behaviours like fight and flight, and allows the organism to avoid similar situations in the future.<sup>6</sup> On the other hand, non-evolutionary explanations point to the fact that women have more fear of crime because they are physically weaker than men and thus unable to defend themselves against male perpetrators.<sup>7</sup> However, a study by Killias *et al.*<sup>8</sup> found that vulnerability did not mediate the effect of gender on fear of crime. Others, such as Warr<sup>9</sup> and Sutton *et al.*,<sup>10</sup> propose the shadow hypothesis, which suggests that women's fear of crime is greatly related to an overarching fear of sexual assault, escalating women's fear of all types of crime. According to Sutton and Farrell,<sup>10</sup> it is possible that masculinity (in terms of men not feeling *safe* to admit that they feel unsafe, even if they do fear crime, because they worry that they will be likened to a woman rather than being considered a valued man and masculine) creates a social desirability bias in men's reporting of crime and when bias was accounted for in their study, men experienced greater fear of crime than women.<sup>10</sup> In addition, the Derksen study<sup>11</sup> observed that when men left university they went from being less afraid of crime than women to being more afraid of crime. Furthermore, the study revealed that despite increased fear, men in the community maintained the *façade* of being fearless.<sup>11</sup> More recently, modern theories have emerged to help explain gender differences in fear of crime.<sup>12,13</sup> According to Rader *et al.*,<sup>13</sup> the study of fear of crime and threat of victimization should accommodate emotional, cognitive and behavioural responses. He and colleagues argued that most of the inconsistencies in the findings of studies on fear of crime result from an oversimplification of the conceptualization of fear of crime measurement. Threat of victimization includes three indicators – cognitive (perceived risk), emotional (fear of crime) and behavioural (precautionary behaviours) – that seem to be important for the measurement of fear of crime.<sup>13</sup> Results from studies using the threat of victimization measurement have shown that the cognitive and behavioural components work together to provide a more comprehensive picture of fear of crime.<sup>13,14</sup>

Fear of crime has been found to impact health outcomes (physical and mental)<sup>15-17</sup> and various studies have indicated a relationship between fear of crime and self-reported poor health.<sup>16,17</sup> Some have argued that fear of crime might be an outcome caused by poor health, rather than poor health being caused by fear of crime. Regarding people with poor health, it is argued that they are more likely to be targeted by criminals (they perceive themselves as easy victims) and are less likely to defend themselves due to physical limitation.<sup>1</sup> Furthermore, it has been suggested that analyses of fear of crime have to an extent ignored the contribution of health status to being vulnerable to fear of crime and some studies have found that fear of crime is higher among persons with disabilities or physical limitations.<sup>18</sup> Using data from the New Zealand general social and New Zealand police surveys, Pearson *et al.*,<sup>17</sup> found that fear of crime, rather than the recorded crime rates, was associated with poor physical and mental health outcomes.

In Sweden, fear of crime has attracted increasing attention in the daily press,<sup>19</sup> and according to Heber, the daily press reporting of rising crime in Sweden, mainly in the suburbs of cities, has produced fear among women and children.<sup>19</sup> However, a more recent study using data from the Swedish Crime Survey 2006-2014 reported decreasing levels of fear of crime nationwide, but highlighted that differences between neighbourhoods were increasing.<sup>3</sup> Nevertheless, few studies have assessed the relationship between fear of crime and health among men only and none to our knowledge in the East Central Sweden region.<sup>20</sup> Therefore, this study scrutinized the impact of fear of crime on health outcomes among men living in Gävleborg County. The following research questions were asked: i) *Is fear of crime among men associated with self-reported poor health and stress in Gävleborg County?* ii) *What factors were related to fear of crime and self-reported poor health and stress among men?*

## Design and Methods

### Setting

Located in East Central Sweden, Gävleborg County had approximately 281,815 inhabitants in 2015, distributed across 18,198 square kilometres. Extensive industry and services are situated along the coast, particularly around Gävle, the county's capital.<sup>20</sup>

### Data and procedures

The study used data obtained from the 2014 Health on Equal Terms (HET) survey of the County of Gävleborg in South East Sweden. The survey represented a regional sample of the annual National Public Health Survey Agency in collaboration with all regions and county councils and Statistics Sweden.<sup>21</sup>

The health in equal terms survey used a two-step probabilistic sampling procedure of all residents aged 16-84 years old in the county. In the first stage the total sample survey consisted of 222,199 participants and the second and final sample of 12,550. Of these, only 6,377 returned the questionnaire for a response rate of 50.8%.<sup>22</sup> This study only used men's data (N=2993) after excluding the 4364 female respondents. The questionnaire of the 2014 Gävleborg HET survey comprised 85 questions covering different topics including health, well-being, consumption of drugs and medicines, health behaviours and social relationships. More detailed information regarding the background and description of the questions in the Swedish Health in Equal Terms Survey can be found elsewhere.<sup>22</sup> In addition, socio-demographic data, such as

income and education, were linked from the total population registers of Statistics Sweden to the survey through the unique Swedish Personal Identity Number. The educational date was taken from the education register, while data related to income, economic support and pensions were retrieved from the income and taxation register.<sup>23</sup>

## Variables

### Outcome variables

There were two outcomes in this study: self-reported health and self-reported stress.

In the HET survey,<sup>21</sup> self-reported health was assessed with the question *How do you rate your general health?* with the options *very good, good, fair, poor* and *very poor*. For this study, the answers were dichotomized. Respondents who answered *very good* or *good* were regarded as having good health and those who

**Table 1. Characteristics of the sample included in the study, Gävleborg County Health in Equal Terms Survey 2014.**

Variable	Number	%
Fear of Crime		
No	2732	91.3
Yes	198	6.6
Self-reported health		
Good	2009	67.1
Bad	921	30.8
Self-reported stress		
No	2761	92.2
Yes	223	7.5
Age group		
18-29	259	8.7
30-44	410	13.7
45-64	1114	37.2
65-84	1210	40.4
Educational level		
Primary and similar	1718	57.4
Secondary and similar	741	24.8
University and similar	499	16.7
Occupation		
Manual worker	1274	42.6
Lower and middle non-manual	701	23.4
Higher non manual	260	8.7
Income		
Low	520	17.4
Medium	1395	46.6
High	1069	35.7
Marital Status		
Married	1502	50.2
Unmarried	1063	35.5
Divorced	349	11.7
Widowed	77	2.6
Violence (physical and threats of violence) in the past twelve months		
No	2821	94.3
Yes	93	3.1
Difficulty to make ends meet in the last 12 months		
No	2693	90
Yes, one time	121	4.1
Yes, several times	154	5.1

Missing values for total sample by fear of crime (N=63, 2.1%), self-reported health (N=63, 2.1%), self-reported stress (N=9, 0.3%), education (N=35, 1.2%), occupation (N=750, 25.3%), income (N=9, 0.3%), marital status (N=2, 0.1%), financial strain (N=79, 2.6%).

answered *fair*, *bad* or *very bad* were regarded as having poor health. Furthermore in HET survey <sup>21</sup>self-reported stress was assessed with the question *Do you feel stressed at the moment?*; *Stressed* was defined as a state where one felt tense, restless, nervous, worried or distracted. The options were *not at all*, *to some extent*, *pretty much*, and *very much*. In the analysis, the variable was dichotomized as *yes* (options *pretty much* and *very much*) and *no* (option *not at all*).

### Independent variables

The main independent variable in this study was fear of crime. In the survey, the following question was asked: *Do you ever refrain from going out alone for fear of being attacked, robbed or otherwise molested?* Answer options were *no*, *yes*, *sometimes* and *yes, often*. For the purposes of this study, the variable fear of crime was dichotomized as *yes* (yes, sometimes and yes, often) and *no*.

Other independent variables (co-variables) were sex, age group, marital status, education, obesity, any type of violence (experience of physical violence and threat of violence), income and financial strain.

*Sex:* male, female.

*Age group:* 18-29, 30-44, 45-64 and 65-84.

*Marital status* was categorized as married, unmarried, divorced and widowed.

*Education* was assessed through SCB's educational register from 2012. The classification is made according to the person's highest level of education in line with Swedish educational nomenclature (SUN) 2000. For this study, three levels of education were created: primary school or similar, secondary school/similar and university/similar.

*Income* data were collected from taxation registers and income registers<sup>23</sup> as total individual income, and three groups were created: (a) low income (SEK 0-132741 per year), (b) medium income (SEK 132742–267424 per year), and (c) high income (SEK 267425 or more per year).

*Occupation* was measured as manual worker, lower and middle non-manual and higher non-manual.

*Any type of violence:* In the HET survey,<sup>21</sup> respondents were asked if they had experienced physical violence or the threat of violence in the past twelve months. In this study the two types of violence were merged into one variable (any type of violence) that was dichotomized as *yes* and *no*.

*Financial strain:* In the survey the following question was asked: *Have you had difficulty in managing your current expenses for food, rent, bills, etc. in the past 12 months?* The following answer options were available: *no*, *yes*, *once*, and *yes, several times*. In the analysis the variable was dichotomized as *yes* (yes, once and yes several times) and *no* (no).

### Statistical analyses

The analyses comprised descriptive statistics and logistic regressions. Descriptive statistics consisted of the frequencies of variables included in the sample. Furthermore, logistic regression analyses were carried out in two steps. First, a bivariate logistic regression was carried out to assess the relationships between the outcome variables self-reported health and self-reported stress with the main independent variable fear of crime (see Model I). After, multivariate logistic regression analyses were performed for self-reported health and self-reported stress and fear of crime with adjustment of other variables (age, marital status, education, occupation, income, any type of violence and financial strain) (Model II). In the regression analysis, the models were tested for goodness of fit using the Hosmer-Lemeshow logistic regression test. Results of the regression analyses are presented as odds ratios (OR), with

95% confidence intervals (CIs). All analyses were performed using SPSS software, version 22.<sup>24</sup>

### Ethical approval

The use of the 2014 Gävleborg County Health on Equal Terms survey in the present study was reviewed and approved by the Regional Ethical Review Board in Uppsala (approval no. 2015/497). In addition, the study was performed in compliance with the Helsinki Declaration. Verbal informed consent was obtained from all participants before SCB carried out the data collection.

## Results

### Descriptive

In the study sample, fear of crime was reported by 6.6% of respondents (N=198) and 30.8% (N=921) and 7.5% (N=223) reported poor health and stress respectively.

**Table 2. Odds ratio (OR) with 95% confidence interval (CI) of the relationship between fear of crime and self-reported health among men, Gävleborg County, Health in Equal Terms Survey 2014.**

Variable	Model 1 OR with 95% CI	Model 2 OR with 95% CI
Fear of Crime		
No	1	1
Yes	1.98 (1.47-2.66)	1.52 (1.05-2.21)*
Age group		
18-29		1
30-44		1.84 (1.01-3.34)*
45-64		3.05 (1.73-5.37)*
65-84		4.64 (2.61-8.24)*
Educational		
Primary and similar		1.13 (0.80-1.59)
Secondary and similar		1.20 (0.84-1.70)
University and similar		1
Occupation		
Manual worker		1.62 (1.06-2.47)*
Lower and middle non-manual		1.44 (0.97-2.14)
Higher non manual		1
Income		
Low		2.33 (1.61 -3.37)*
Medium		1.89 (1.48-2.41)*
High		1
Marital Status		
Married		1
Unmarried		1.01 (0.79-1.32)
Divorced		1.24 (0.91-1.69)
Widowed		1.08 (0.58-1.99)
Violence (physical and threats of violence) in the past twelve months		
No		1
Yes		1.91 (1.05-3.48)*
Difficulty to make ends meet in the last twelve months		
No		1
Yes, one time		1.15 (0.68-1.93)
Yes, several times		2.92 (1.85-4.60)*

\* P<0.001

In the sample, 57.4% of the respondents had primary education or similar, 42.6% were manual workers and 46.6% had a medium income. Some 50.2% of respondents were married and 35.5% were single; 3.1% reported exposure to any type of violence (from physical to threats of violence) and 5.1% had experienced financial strain in the past twelve months. The sample distribution is presented in Table 1.

## Regressions

### Relationship between fear of crime and self-reported health

The results of the bivariate regression analysis showed a statistically significant relationship between fear of crime and self-reported poor health. Respondents who reported fear of crime had odds of poor health of 1.98 (CI 1.47-2.66) (Table 2, Model 1). Adjusting for other co-variables (age, marital status, education, occupation, income, any type of violence and financial strain) did not eliminate the statistical significance but the odds reduced to 1.52 (CI 1.05-2.21) (Table 2, Model 2). In Model 2, respondents in the age group 65-84 years had increased odds of 4.64 (CI 2.61-8.24) as compared to respondents in the age group 18-29 years. In addition, compared to higher non-manual workers, respondents who were manual workers had odds of poor health of 1.62 (CI 1.06-2.47) (Table 2, Model 2).

Regarding income, respondents with low and middle incomes had an odds ratio of poor self-reported health of 2.33 (CI 1.61-3.37) and 1.89 (CI 1.46-2.41) as compared to their high-income counterparts. Furthermore, respondents who reported exposure to violence (physical violence and threats of violence) and having experienced financial strain several times in the past twelve months were at increased risk of poor health with odds ratio of 1.91 (CI 1.05-3.48) and 3.92 (CI 1.85-4.60) respectively (Table 1, Model 2).

### Relationship between fear of crime and self-reported stress

Results of the bivariate analysis showed a statistically significant relationship between fear of crime and self-reported stress. Respondents with fear of crime had an odds ratio of 2.23 (CI 1.45-3.40) (Table 3, Model 1). Adjusting for other variables did not reduce the odds ratio and the relationship continued to be statistically significant (Table 3, Model 2). In the same model, being a manual worker was associated with increased odds of self-reported stress with an odds ratio of 2.79 (CI 1.25-6.25). Furthermore, respondents who had experienced financial strain once or several times in the last twelve months had high odds of self-reported stress, with odds ratios of 3.40 (CI 1.86-6.22) and 5.07 (CI 3.00-8.56) respectively (Table 3, Model 2).

## Discussion

The results revealed a statistically significant association between fear of crime and self-reported poor health and stress among men residing in Gävleborg County. The statistically significant association after adjusting for demographic and socioeconomic covariates was, however, slightly reduced for self-reported poor health. Other studies carried out elsewhere have presented similar results.<sup>15,17,24,25</sup> For instance, the study by Pearson et al. found a significant association between fear of crime and physical and psychological wellbeing at the individual level in New Zealand.<sup>17</sup> On the other hand, Crossman and Rader observed no statistically significant effect on self-reported health for men regarding fear of walking in their neighbourhood.<sup>26</sup> Most of the

available studies addressing fear of crime and health outcomes among men and women have indicated an overwhelming disadvantage for women, with high levels of fear of crime and poor health. As stated above, results of this study showed that men reported fear of crime which in turn was associated with self-reported health and stress. It is argued that feelings of masculinity might explain why men report less fear of crime than women. For instance in a study of gendered norms associated with fear of crime, Sutton *et al.*,<sup>10</sup> asked men to portray themselves in the best possible way; in these *socially desirable* responses, men reported *less* fear than men asked to respond honestly. Sutton and colleagues argued that their experimental results were consistent with theories of masculinity that emphasize the importance of emotional invulnerability and self-sufficiency. In contrast, women asked to make *socially desirable* responses tended to report *more* fear than those asked to respond honestly, indicating how fear of crime curtailed women's freedoms. Sutton and colleagues argued further that fear of crime could, by itself, be a prescribed norm in its own right, causing women (and men) to feel that their expressed fear is a yardstick by which they might be judged.<sup>10</sup> In addition, Day *et al.*,<sup>27</sup> investigated feelings of fear and safety among a group of

**Table 3. Odds ratio (OR) with 95% confidence interval (CI) of the relationship between fear of crime and self-reported stress among men, Gävleborg, County Health in Equal Terms Survey 2014.**

Variable	Model 1 OR with 95% CI	Model 2 OR with 95% CI
Fear of Crime		
No	1	1
Yes	2.23 (1.45-3.40)	2.22 (1.27-3.86)*
Age group		
18-29		1
30-44		1.12 (0.56-2.27)
45-64		0.81 (0.40-1.65)
65-84		0.37 (0.17-0.81)
Education		
Primary and similar		0.56 (0.30-0.93)
Secondary and similar		0.46 (0.26-0.83)
University and similar		1
Occupation		
Manual worker		2.79 (1.25-6.25)*
Lower and middle non-manual		1.81 (0.86-3.78)
Higher non manual		1
Income		
Low		1.18 (0.66-2.10)
Medium		0.91 (0.60-1.37)
High		1
Marital Status		
Married		1
Unmarried		0.77 (0.51-1.16)
Divorced		0.76 (0.42-1.37)
Widowed		0.97 (0.22-4.20)
Violence (physical and threats of violence) in the past twelve months		
No		1
Yes		1.86 (0.88-3.94)
Financial strain (Difficulty to make ends meet in the last twelve months)		
No		1
Yes, one time		3.40 (1.86-6.22)*
Yes, several times		5.07 (3.00-8.56)*

\* P<0.001

young middle-class men at a university college in the USA and observed that public spaces or situations which challenged their gender identity generated fear among the respondents. The authors also found that spaces promoting feelings of safety added to men's fears by bolstering masculinity. Interestingly, these authors further argued that men creatively renegotiated their masculine identities to maintain safety and self-worth, as participants constructed a masculine identity that avoided confrontation and still preserved their positive self-image. Furthermore, in a study of the geography of men's fears, Brownlow<sup>28</sup> reported that compared to women's fears and perceived geographical vulnerabilities, men demonstrated a persistent and chronic wariness of their environmental context that preceded any judgment of perceived safety.

Various scholars have argued that the relationship between fear of crime and health is complex as it includes direct and indirect effects. For instance, higher levels of fear of crime might increase heart rate, leading to cardiovascular effects; higher levels of fear of crime can, however, cause physical inactivity (through avoidance of outdoor activity), which may negatively influence individual health and overall wellbeing.<sup>15,17</sup> It is argued that it is not the actual threat of being a victim that causes negative stress responses in individuals, but rather the perception of risk of being a victim of crime, which can manifest itself in physiological changes and unhealthy behaviour patterns.<sup>17</sup> Notwithstanding, Jackson and Gray<sup>29</sup> have challenged the assumption that fear of crime is only intrinsically problematic and have argued that fear of crime has both positive and negative effects, suggesting that some fear of crime can be useful as it can motivate people to take precautions against possible criminal victimization, which in turn may increase feelings of safety and security. According to Lorenc and colleagues,<sup>2</sup> it is when fear of crime has an impact on quality of life that it has negative effects.

In the multivariate analysis of the relationship between fear of crime and self-reported health, respondents in the age group 65–84 years, manual workers, those with a low income and those experiencing financial strain were at a higher risk of poor health (Table 2, Model 2). In addition, high odds of stress were found among manual workers and respondents experiencing financial strain (Table 3, Model 2). Other studies have reported that fear of crime is experienced by those with few economic resources.<sup>29</sup> Further, studies have indicated that older persons are more likely to experience fear of crime and report poor health outcomes.<sup>16,17,30</sup> Furthermore, respondents who reported being a victim of physical violence or threats of violence in the past twelve months had higher odds of self-reported poor health than those who had not experienced victimization. Other studies have reported similar results.<sup>31</sup>

In the multivariate analyses, controlling for socioeconomic and demographic variables did not eliminate the statistically significant relationship between fear of crime and self-reported poor health, or between fear of crime and self-reported stress, which could indicate that other variables (e.g. neighbourhood context) might be at play. In our study, we did not include area-level variables in the analysis as they were not available. However, other studies have found neighbourhood social fragmentation to be an important predictor in explaining area- and individual-level variations in physical and psychological wellbeing related to fear of crime.<sup>32–35</sup>

### Strengths and limitations

The study was based on a large sample of men, and used validated instruments<sup>21,23</sup> to collect an array of social, demographic and health-related states. The outcome variables self-reported health and self-reported stress, as well as the main independent variable fear of crime, are well validated within the Health and Equal Terms (HET) survey.<sup>21,23</sup> However, the study has various

caveats: it used cross-sectional data, which does not allow assessment of causal relationships and their direction. Furthermore, the study was not able to include neighbourhood- and environmental-context-based variables, which as indicated above, have been associated with fear of crime and health outcomes.<sup>32,34,35</sup> In addition, the study had a response rate of 50.8%, which can be considered low, and interestingly in the past years response rates of population-based surveys have decreased in the country as a whole.<sup>34</sup> However, the response rate is unlikely to have influenced the observed results due to non-response bias.<sup>22</sup> The SCB uses population weights to calculate prevalence at the population level and also adjusts sample sizes in the different strata.<sup>22,36–38</sup> Finally, our study used a dichotomous single-item question for the measurement of fear of crime. Although the majority of available studies still use this type of measure of fear of crime (which reflects general fear of crime), in recent years there has been an argument that it would be better to use questions addressing specific crime or a composite measure of threat of victimization in order to increase the validity and reliability of respondents answers.<sup>13,39</sup>

For instance Rader and colleagues,<sup>13</sup> suggest a composite measure of threat of victimization that includes three components; cognitive (perceived risk), emotional (fear of crime) and behavioural (precautionary behaviours) which they consider to be important in the measurement of fear of crime.<sup>13</sup>

### Conclusions

This study found a statistically significant association between fear of crime and self-reported poor health and stress among men residing in Gävleborg County. However, the statistically significant relationship remained even after accounting for demographic, social and economic factors, which warrants further research to better understand the role played by other variables.

Correspondence: Gloria Macassa, Department of Occupational and Public Health Sciences, University of Gävle, Kungsbäcksvägen 47, Building 51; SE-80176 Gävle, Sweden.

Tel.: +46.026.648228.

E-mail: gloria.macassa@hig.se

Key words: Fear of crime, men, self-reported health and stress, Gävleborg County.

Contributions: the authors contributed equally.

Conflict of interest: the authors declare no potential conflict of interest.

Funding: This study was funded by the University of Gävle through research grants allocated to the Faculty of Health and Occupational Studies Grant 2016.

Received for publication: 23 May 2017.

Accepted for publication: 24 October 2017.

©Copyright G. Macassa et al., 2017

Licensee PAGEPress, Italy

Journal of Public Health Research 2017;6:1010

doi:10.4081/jphr.2017.1010

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

### References

1. Jackson J, Stafford M. Public health and fear of crime: a prospective cohort study. *Br J Criminol* 2009;49:832–47.
2. Lorenc T, Clayton S, Neary D, et al. Crime, fear of crime, envi-

- ronment, and mental health and wellbeing: mapping review of theories and causal pathways. *Health Place* 2012;18:757-65.
3. Ivert AK, Levander MT, Mellgren C. Den öjamlika otr-ygheten: stabilitet och förändring i bostadsområden över tid (Fear of crime and inequality-stability and change in residential neighbourhoods over time. *Socialvetenskaplig Tidskrift* 2015;3-4.
  4. Fetchenbauer D, Buunk BP. How to explain gender differences of crime: towards an evolutionary approach. *Sexual Evol Gender* 2005;7:95-113
  5. Buss D. *Evolutionary psychology: The new science of the mind*. Boston: Allyn and Bacon; 1999.
  6. Konner M. *The tangled wing: biological constraints on the human spirit*. New York: Holt Rinehart and Winston; 1982.
  7. Hale C. Fear of crime: A review of the literature. *Int Rev Victimol* 1996;4:74-150.
  8. Killias M, Clerci C. Different measures of vulnerability in their relation to different dimensions of fear of crime. *Br J Criminol* 2000;40:437-50.
  9. Warr M. Fear of rape among urban women. *Soc Problems* 1985;32:238-50.
  10. Sutton RB, Farrall S. Gender, socially desirable responding and the fear of crime. *Br J Criminol* 2005;45:212-24.
  11. Derksen SW. Gender, social desirability and fear of crime: are women really more afraid?. Winnipeg: University of Manitoba, Department of Psychology 2012; pp 1-220.
  12. May D, Rader NE, Goodrum S. A gendered assessment of the threat of victimization: Examining gender differences in fear of crime, perceived risk, avoidance and defensive behaviours. *Crim Justice Rev* 2009;1-24.
  13. Rader NE, David CM, Goodrum S. Empirical assessment of the threat of victimization: considering fear of crime, perceived risk, avoidance, and defensive behaviors. *Socio Spectrum* 2007;27:475-505.
  14. Gray E, Jackson J, Farrall S. Feelings and functions in the fear of crime: applying a new approach to victimisation insecurity. *Br J Criminol* 2011;51:75-94.
  15. Stafford M, Chandola T, Marmot M. Association between fear of crime and mental health and physical functioning. *Am J Public Health* 2007;97:2076-81.
  16. Olofsson N, Lindkvist K, Danielsson L. Fear of crime and psychological and physical abuse associated with health in a Swedish population aged 65-84 years. *Public Health* 2012;126:358-64.
  17. Pearson AL, Breetzke GD. The association between the fear of crime, and mental and physical wellbeing in New Zealand. *Soc Indicators* 2014;119:281-94.
  18. Stiles BL, Halin S, Kaplan HB. Fear of crime among individuals with physical limitations. *Crim Justice Rev* 2003;28:232-53.
  19. Heber A. Fear of crime in the Swedish daily press – descriptions of an increasingly unsafe society. *J Scandinav Stud Criminol Crime Prev* 2011;12:1.
  20. Population, social economy and health: Gävle: Gävleborg Region 2016; pp.1-65.
  21. Boström G, Nyqvist K. Objective and background of the questions in the national public health survey. Stockholm: Statens folkhälsoinstitut; 2010. Available from: <https://snd.gu.se/catalogue/file/1876>
  22. Statistics Sweden. Technical report-A description of procedures and methods in the Health in Equal Terms Survey in Gävleborg 2014. (Teknisk Rapport-En beskrivning av genomförande och metoder "Hälsa på lika villkor" Gävleborg 2014). Stockholm: Statistiska Centralbyrån 2014; pp1-96 (in Swedish).
  23. Swedish National Data Service. National public health survey, Health on equal terms. 2014; Available from: <https://snd.gu.se/en/catalogue/study/ext0118>
  24. IBM SPSS Statistics for Windows 22.0. Chicago: IBM Corp 2011
  25. Beaulieu M, Leclerc N, Dube M. Fear of crime among the elderly. *J Gerontol Soc Work* 2004;40:121-38.
  26. Nasar JL, Jones KM. Landscape of fear and stress. *Environ Behav* 1997;29:281-323.
  27. Crosman JS, Rader NE. Fear of crime and personal vulnerability: examining self-reported health. *Social Spectrum* 2011;31:141-62.
  28. Day K, Stump C, Carreon D. Confrontation and loss of control: Masculinity and men's fear in public space. *Environ Psychol* 2003;23:311-22.
  29. Brownlow A. A geography of men's fear. *Geoforum* 2005;36:581-92.
  30. Jackson J, Gray E. Functional fear and public insecurities about crime. *Br J Criminol* 2010;50:1-22.
  31. Wilkinson RG, Pickett KE. Income inequality and population health: A review and explanation of the evidence. *Soc Sci Med* 2006;62:1768-84.
  32. Mathis A, Rooks R, Kruger D. Neighbourhood environment and self-rated health among urban older adults. *Gerontol Geriatr Med* 2015.doi:10.1177.
  33. Fletcher J. The effects of intimate partner violence on health in young adulthood in the United States. *Soc Sci Med* 2010;70:130-5.
  34. Ivory V, Collings SC, Blakely T, Dew K. When does neighbourhood matter? Multilevel relationships between neighbourhood social fragmentation and mental health. *Soc Sci Med* 2011;72:1993-2002.
  35. Stjärne MK, Leon AP, Halqvist J. Contextual effects of social fragmentation on the risk of myocardial infarction. Results from the Stockholm heart epidemiology program (SHEEP). *Int J Epidemiol* 2004;33:732-41.
  36. Boström G. What non-response means to the result in public health surveys? [In Swedish]. Stockholm 2014
  37. Lundström S, Särndal C. Calibration as a standard method for treatment of nonresponse. *J Official Stat* 1999;15:305-28.
  38. Särndal C, Lundström S. *Estimation in surveys with nonresponse*. Chichester: John Wiley & Sons; 2005.
  39. Lim H, Chun Y. The limitations and advancement in measuring fear of crime. *J Publ Administr Gov* 2015;5:140-8.