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ORIGINAL ARTICLE

"Neighborhood fear of crime and disadvantaged areas: a comparative longitudinal study"

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Abstract

The current study explores how neighborhood fear of crime ("worry about specific crimes") changes over time in neighborhoods with different levels of disadvantage. With a comparative design, 81 and 123- neighborhoods in two cities in Sweden are followed over a six-year period. Fear of crime trajectories are assessed through growth curve modeling. We consider how differences in neighborhood processes, such as social and physical disorder, might influence fear of crime levels. The results show that fear of crime increased over time in both cities and the increase was related to higher levels of physical disorder in several areas. Furthermore, the change differed depending on the neighborhood type – in highly disadvantaged neighborhoods, the fear was stable at a high level. In contrast, the largest increases in fear could be seen in the areas with the lowest disadvantage in both cities. Theoretical and practical implications are discussed.

Keywords Fear of crime · Disadvantaged neighborhoods · Local disorder · Longitudinal · Multilevel modeling · Comparative

Introduction

Fear of crime is a major concern for individuals and has negative consequences for neighborhoods, such as lowering social bonds, residential ties, and social cohesion in the neighborhood (Markowitz et al. 2001; Riger et al. 1981). Furthermore, there is a well-established link between neighborhood characteristics and fear of crime, where disadvantaged neighborhoods have higher levels of fear of crime (Swedish National Council for Crime Prevention 2009; Ivert et al. 2016; Kuen et al. 2022). What remains understudied is whether and how neighborhood fear of crime develops over time in areas with different levels of disadvantage and if this pattern is similar across cities. The purpose of this study is to expand the current knowledge

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on growth trajectories of neighborhood fear of crime while also assessing how time-varying neighborhood processes are associated with this change.

Neighborhood characteristics and processes

One powerful explanation linking neighborhood characteristics and fear of crime stems from Shaw and McKay's social disorganization theory (Shaw and McKay 1942). The theory posits that certain characteristics of a neighborhood, such as a high poverty rate, physical decay, population turnover, and ethnic diversity, can be linked to higher crime rates and has, in recent years, been extended to account for higher levels of fear of crime (Brunton-Smith and Sturgis 2011; Ivert et al. 2016; Swatt et al. 2013; Wyant 2008). Concerning fear of crime, these neighborhood characteristics are often attributed to the concepts of incivilities and collective efficacy. According to the incivilities' thesis, visual signs of disorder in the neighborhood make people fearful, lowering social control in the neighborhood. This situation, in turn, results in a negative spiral where more disorder occurs, and subsequently, crime levels increase. Several studies have investigated the incivilities thesis and found evidence for a strong relationship between local disorder and fear of crime (Brunton-Smith 2011; Brunton-Smith and Sturgis 2011; Hardyns et al. 2018). Local disorder is often measured as a combination of physical and social disorder, such as run-down buildings or youth gangs loitering. However, recent findings suggest that one should differentiate between the two dimensions since they can impact fear of crime levels differently (Kuen et al. 2022). Since social and physical disorder are two dimensions under an umbrella term, it is worthwhile to analyze them separately to disentangle processes that can affect fear of crime.

Collective efficacy, which also builds on social disorganization, states that some neighborhoods have higher levels of local disorder because there is a lack of social cohesion and less informal social control in those areas, such as a willingness to intervene for the good of the community (Sampson et al. 1997). Several studies suggest that the relationship between local disorder and fear of crime is moderated by collective efficacy (see, e.g., Abdullah et al. 2015; Hinkle 2013). Using the British Crime Survey, Markowitz found evidence suggesting a reciprocal loop where lower levels of social cohesion led to increases in crime and fear of crime which then, in turn, affected levels of social cohesion (Markowitz et al. 2001). Additionally, Steenbeek and Hipp (2011) found that levels of local disorder affected levels of social control, which is a part of collective efficacy, which in turn affected disorder levels, thus, including a measure of collective efficacy when assessing changes in local disorder and fear of crime could be beneficial. While the research on neighborhood disadvantage and fear of crime are quite consistent, Breetzke and Pearson (2015) found that individuals who live in more affluent areas had higher levels of fear of crime than poorer neighborhoods. These findings have been linked to the "paradox of fear", where individuals *perceive* a high risk of victimization when in fact there is a lower *actual* risk of victimization, and has been found to exist on both an individual and a neighborhood level (Breetzke and Pearson 2015). Overall,

research indicates the importance of considering neighborhood structural and social characteristics when studying neighborhood development.

Fear of crime

The concept of fear of crime and how to measure it has been a topic for debate for decades (Hale 1996; Farrall et al., 1997) and in the current study we turn our focus on the affective component of fear of crime. This is defined as worry about specific crimes assumed to be influenced by neighborhood processes such as worry about robbery, being assaulted in the neighborhood and burglary in the home.

A limited number of studies have addressed changes in fear of crime over time, resulting in mixed evidence. Some US studies indicate that fear of crime decreased during the '90 s and '00 s, assumed to be a result of factors such as changes in policing, neighborhood processes, and decreased crime rates (e.g. Skogan 2011) and in Northern Europe in the last 20 years (Smeets and Foekens 2017). More recent research in a European context by Glas (2021) found that neighborhood safety, measured on an individual level, declined in the early 2000s then stabilized in the later years until 2017. Furthermore, in a Swedish context, the annual Swedish Crime Survey states that fear of crime levels has fluctuated over the last 15 years (Swedish National Council for Crime Prevention 2022). However, the Swedish Crime Survey is limited because it only addresses trends in descriptive statistics. Regarding trends on an individual and neighborhood level, fear of crime has been found to change in individuals over time (Ditton et al. 2005) and between neighborhoods (Ivert et al. 2016). Ivert et al. (2016) found that while fear of crime levels remained high in neighborhoods with high initial values of fear of crime, the levels increased more in segregated areas compared to less segregated areas. The study was conducted in Malmö, Sweden, the same as one of the cities observed in the current study and concluded that the gap between neighborhood levels of fear of crime increased during 1998–2012. However, the study was limited to a two timepoint design. It did not consider the possibility of different factors at play in different neighborhood types that can influence fear of crime levels, making it difficult to make assumptions about when and why a change occurs (Grimm and Ram 2012).

Current study context

The current study aims to compare changes over time in neighborhood-level fear of crime ("worry about specific crimes") in two of the largest cities in Sweden; Malmö and Stockholm. The cities have much in common, and both have a high degree of urbanization, with fairly high levels of criminal activity (Swedish National Council for Crime Prevention 2022) and residential segregation (Delegationen mot segregation 2021). While several studies have assessed fear of crime in different types of neighborhoods, as reported earlier, there is a lack of research assessing fear of crime between cities. One exception is a cross-sectional study by Valente et al. (2022) that looked at individuals and found similarities in fear of crime levels regarding neighborhood processes in four Italian cities. The strongest consistency in influencing

high levels of fear of crime was found in neighborhood levels of disorder and community disaffection, more so than previous victimization at an individual level. It should be noted that the current study is not strictly a cross-city comparative study, given that the methodology was not identical between the two cities. Instead, it can be argued that this study compares theoretical concepts that have been measured similarly and should therefore give stronger evidence on general and potentially contextual factors with fear of crime rather than looking at the two cities in separate studies. We intend to expand the current knowledge by looking at the neighborhood level of fear of crime over a six-year period in two Swedish cities. By using neighborhoods as our unit of analysis, we utilize a growth curve perspective to assess change in fear of crime (at the neighborhood level) by investigating if and why this change occurs. We create trajectories for each city and their neighborhood types about fear of crime while assessing how time-varying neighborhood processes such as social- and physical disorder and collective efficacy are related to this change. Our aim is stated in the following research questions:

- *How does neighborhood fear of crime change over time?*
- *How do neighborhood processes affect the change?*
- *To what extent is neighborhood change in fear of crime similar across cities?*
- *To what extent are the patterns similar across neighborhoods with varying levels of disadvantage?*

Method

Data and sample

The current study is a comparative and longitudinal study with a repeated cross-sectional survey design using neighborhoods as units of analysis. Survey data were collected at the individual level and aggregated at the neighborhood level. Two data sources were used in this study collected independently: Malmö Community Survey (CS) and the Stockholm Crime Survey (CS). Both surveys assessed crime-related aspects such as perceived unsafety, previous victimization, and experience of witnessing crime and disorder.[1] Malmö CS was conducted in 2012, 2015, and 2018 and included a representative sample of people aged 18–85 registered in Malmö. At the time of writing, the Stockholm CS has been conducted in 2008, 2011, 2014, 2017, and 2020 and included a representative sample of the residents 16 years and older registered in Stockholm. For comparative purposes, only the years 2011, 2014, and 2017 were used in this analysis. An attrition analysis revealed that men, young people, foreign born, and people with lower education were slightly underrepresented in the surveys compared to the city population. This pattern was true for Malmö and Stockholm and is consistent with previous crime survey research (Swedish National Council for Crime Prevention 2022).

[1] For full information on the questionnaire items, please see appendix.

Table 1 Sample information

	Year	Average geographical size of neighborhood	Average sample size per neighborhood	Total number of individual responses /total number of participants	Response frequency (%)	Number of neighborhoods included in analyses (total number of neighborhoods represented in the survey)
Malmö	2012	1,21 km^2 (2700 inhabitants/1200 households)	40–160	4195/7930	52	81 (104)
	2015	–	40–160	3105/7930	39	81 (104)
	2018	–	40–160	3846/9713	39	81 (105)
Stockholm	2011	1,25 km^2 (7300 inhabitants/3300 households)	250	18,409/32 000	59	123 (129)
	2014	–	250	16,435/32,382	53	123 (129)
	2017	–	250	20,781/40,000	55	123 (131)

Neighborhoods with less than 20 respondents were excluded from further analysis (Raudenbush and Sampson 1999). The final sample consisted of 81 neighborhoods from Malmö (average individual responses per neighborhood: 37) and 123 neighborhoods from Stockholm (average individual responses per neighborhood: 136). The neighborhoods were administrative units divided by the cities. For more information about the sample, see Table 1.

Measures

Outcome variable

"Worry about crimes", from now on referred to as "worry" was measured with Likert format questions such as "how much do you worry about being exposed to the following crime…?". Based on these items, a mean score was created and ranged from 0 to 3, where a high value on the index indicates high levels of worry. The worry index in the Malmö CS was constructed by combining eight items asking if participants were worried of being exposed to certain crimes in the neighborhood where they live such as burglary, damage to property, assault, threats, or arson. The worry index in Stockholm CS was constructed by combining three items deemed to assess similar types of crimes as in Malmö CS: assault, burglary, or robbery. For both indices, a minimum of 75% of the items needed to be answered for inclusion on the scale. The internal reliability analyses for Malmö revealed high internal consistency with a mean Cronbach's alpha value of 0.91 (2012: 0.92, 2015: 0.91, 2018: 0.92) and for Stockholm a mean $\alpha = 0.77$ (2011: 0.77, 2014: 0.76, 2017: 0.77).

Predictor variables

Given the repeated measures design and the longitudinal perspective, time was treated as an predictor variable on fixed occasions (Snijders and Bosker 2012). Three measurement points for Malmö included data from 2012, 2015, 2018 and in Stockholm from 2011, 2014 and 2017.

To capture physical disorder, four items were used in Malmö CS and Stockholm CS. The participants were asked if they perceived problems with littering, run-down buildings or poorly treated public places, graffiti, and/or reckless driving. The items were combined for a mean value "physical disorder index" for Malmö and Stockholm separately with a range of 0–2 (Malmö: mean $\alpha = 0.76$, 2012: 0.77, 2015: 0.75, 2018: 0.75; Stockholm: mean $\alpha = 0.61$, 2011: 0.61, 2014: 0.61, 2017: 0.62). Higher values indicate higher levels of perceived local disorder. For social disorder, 4 items were also used in both cities. The items assessed if the participants perceived problems with disruptive youth gangs, disturbing neighbors, drunk people and/or people fighting outside. A mean value for "social disorder index" with a range of 0–2 was created. A high level was equated with higher levels of social disorder (Malmö: mean $\alpha = 0.80$, 2012: 0.81, 2015: 0.80, 2018: 0.80; Stockholm: mean $\alpha = 0.73$, 2011: 0.73, 2014: 0.73, 2018; 0.72).

Regarding collective efficacy, we unfortunately only had data available for Malmö for the three timepoints. In order to measure collective efficacy, the mean index was based on the scale invented by Sampson et al. (1997) and included the two subscales of social cohesion and informal social control with a scale of 0–8, a total of 10 items, and where a high value indicated high levels of collective efficacy (mean $\alpha = 0.90$, 2012: 0.89, 2015: 0.90, 2018; 0.90).

Based on census data, a time stable neighborhood disadvantage variable was created.[2] The index consisted of a total score of concentrated disadvantage and included mean average income (reversed), proportion of low education, proportion of unemployment and proportions of foreign born. To categorize the different neighborhoods into three levels of disadvantage, one factor analysis was conducted for each city.[3] The factor scores were used to separate the different disadvantage levels: twenty five percent of the lowest factor scores where considered "neighborhood disadvantage: low" (ND low), 50% were labeled as "neighborhood disadvantage: middle" (ND middle), and the upper 25% of the factor score were considered "neighborhood disadvantage: high" (ND high). The ND high was used as a reference category in the analyses. The index had a high internal consistency (Malmö index $\alpha = 0.89$ and for Stockholm $\alpha = 0.88$).

[2] The neighborhood type was controlled for over the different waves and remained in their initial disadvantage category with just very few exceptions (which kept their initial category type).

[3] Principal component analysis extracted one factor with Eigenvalues above 1 along with an inspection of the scree plot which marked a clear 1 factor solution. In Malmö, the 1 factor solution explained 77.2% of the variance and in Stockholm 72.8%.

Analytical strategy

To establish if there is a significant change of fear of crime over time and why this change may occur, we used a 2-level growth curve modeling procedure where Malmö and Stockholm were analyzed separately. At level 1, "time," "physical disorder," "social disorder" and "collective efficacy" were treated as time variant predictor variables. At level 2, "neighborhood disadvantage" was used as a time invariant predictor variable and "worry" was used as the outcome variable.

We built the model as follows to answer the two first research questions of how fear of crime develops over time and how neighborhood processes affect growth patterns: the first step was the null model in which no predictors are included. It serves as a baseline model to examine neighborhood variation in fear of crime, without regard to time. In the second model, we entered time as fixed effect. In model 3, we added a random slope for time which means that neighborhoods were allowed to have independent growth curves over time. In the fourth model, we added the level 2 predictor of neighborhood disadvantage. In the final model (5), we added the level 1 predictors of physical and social disorder (and collective efficacy for Malmö) to account for neighborhood processes.[4]

The third research question was assessed by comparing the growth patterns between the two cities, meaning the differences in changes over time. To explore if the changes in fear of crime were similar in different types of neighborhoods, which is our fourth research question, separate models were analyzed based on neighborhood level of disadvantage (i.e., one model for high, middle and low ND) for each city, respectively.

All variables were standardized, and the predictor variables were grand mean centered prior to multilevel analysis to ease interpretation (Hox et al 2017). Given that the analysis included only neighborhoods that had data from all three timepoints, there were no missing values to take into consideration. Analyses were based on the maximum likelihood (EML) estimator and log likelihood statistics was used to compare models. The models were fitted using R and IBM SPSS version 28.

Results

Table 2 reports the mean scores for the outcome and predictor variables. As can be noted, the worry levels increased from 0.70 to 0.78 in Malmö and in Stockholm from 0.75 to 0.87 during the study period. In Table 2, we can also see that in Malmö, social disorder appears to be stable over time while physical disorder increased slightly. In Stockholm, social disorder decreased slightly over time whereas physical disorder was stable. Regarding collective efficacy, there was minor change over time (note the scale difference).

[4] The predictor variables had high levels of multicollinearity but is to be expected given the theoretical nature of the concepts and should not be an issue given acceptable values of the standard errors.

Table 2 Descriptive scores of neighborhood level of fear of crime ("worry"), local disorder and collective efficacy

	Time	Malmö*	Stockholm*
Fear of crime ('worry') (scale: 0–3)	1	0.70	0.75
	2	0.72	0,76
	3	0.78	0.87
Social disorder (scale: 0–2)	1	0.21	0.35
	2	0.22	0.31
	3	0.22	0.31
Physical disorder (scale: 0–2)	1	1.12	0.45
	2	1.15	0.45
	3	1.16	0.47
Collective efficacy (scale 0–8)	1	5.19	–
	2	5.28	–
	3	5.22	–

*Malmö wave 1 = 2012, 2 = 2015, 3 = 2018; Stockholm wave 1 = 2011, 2 = 2014, 3 = 2017

Growth curve multilevel modeling for worry

Malmö

Table 3 shows multilevel models for changes in worry in Malmö. The first empty model shows that there are significant inter-neighborhood differences in fear of crime with an intercept of 0.73 ($p < 0.001$) and the intraclass correlation was 0.74. In the second model, fixed effect of time was included, showing that worry levels are positively related to time, meaning that for each unit of time (i.e., each data collection wave) the worry increases (0.036, $p < 0.01$). In terms of model fit, the deviance score goes down: from −184.2 in Model 1 to −200.8 in Model 2, indicating support for a model extension. In the third model, the inclusion of a random slope indicates that changes in fear of crime over time differ across neighborhoods (0.002, $p < 0.001$). The deviance score goes from −200.8 to −210.5. In Model 4, neighborhood disadvantage was added as a (time invariant) categorical predictor, showing that neighborhoods with low and medium initial disadvantage (−0.370, $p < 0.001$, respectively −0.236, $p < 0.001$) have a lower level of worry compared to neighborhoods with high disadvantage. The decrease in deviance from −210.5 to 262.6 shows that the model improves. Finally, when adding the level 1 (time variant) predictor of social and physical disorder in Model 5, physical disorder is positive and significant (0.230, $p < 0.001$). This result means that a higher level of physical disorder is on average significantly associated with an increase in worry at each timepoint. No significant effect was found for social disorder. The final test of model fit between models 4 and 5 show values of -262.6 and 384.8, indicating that the full model is the most suitable in explaining changing levels of worry in Malmö. Running the same models and including collective efficacy as a level 1 (time variant) predictor in Model 5, the above associations remain (time 0.028, $p < 0.001$; physical disorder 0.168, $p < 0.001$), and collective efficacy is negatively and significantly

Table 3 Growth curve models for Malmö and changes in fear of crime ("worry"). The table includes coefficient, standard error, variance scores and model fit evaluated by deviance score and its related significance testing

Model	Malmö					
	M1	M2	M3	M4	M5:1	M5:2
Fixed part						
Predictor	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff.(s.e)
Intercept	0.733***(0.023)	0.698***(0.024)	0.698***(0.027)	0.912***(0.034)	0.785***(0.022)	0.766***(0.020)
Time		0.036***(0.008)	0.036***(0.009)	0.036***(0.009)	0.023**(0.008)	0.028***(0.008)
ND low				−0.370***(0.043)	−0.130***(0.031)	−0.095**(0.029)
ND middle				−0.236***(0.039)	−0.087***(0.025)	−0.079***(0.023)
Social disorder					0.073(0.05)	0.043(0.048)
Physical disorder					0.230***(0.046)	0.168***(0.045)
Collective efficacy						−0.159***(0.031)
Random part						
Variance level 1 (NH)	0.037	0.037	0.05	0.027	0.003	0.001
Variance level 2 (repeated measure)	0.013	0.12	0.01	0.01	0.009	0.008
Random slope—time			0.002***	0.002***	0.000	0.000
Deviance	−184.164	−200.801	−210.532	−262.570	−384.817	−408.837

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

associated with fear (−0.159, $p < 0.001$) indicating that when collective efficacy decreases worry increases.

Stockholm

Table 4 presents the results for the multilevel models in Stockholm. The null model showed a significant intercept of 0.79 ($p < 0.001$) and an intraclass correlation value of 0.49. Proceeding with the second model where time was added as a fixed effect, the level of worry increases over time (0.06, $p < 0.001$). The deviance score goes from −502.7 to −616.4. The random slope introduced in model 3 do not indicate any significant differences in changes over time between neighborhoods. When adding the neighborhood disadvantage in the fourth model, there is a difference between types of neighborhood disadvantage category and the levels of worry showing that neighborhoods with low and medium initial disadvantage (-0.169, $p < 0.001$, respectively −0.154, $p < 0.001$) have a lower level of worry compared to the neighborhoods with high disadvantage. Once again, the deviance score goes down, −618.1 to −667.6. When the predictor variables of social and physical disorder were added in the final model, social disorder was found to not be significant whereas physical disorder is (0.148, $p < 0.001$). The final model fit test indicates that a full model best explains the changes in worry in Stockholm (deviance: 667.6–732.3).

Growth curve multilevel modeling by neighborhood level of disadvantage

The next step of the analysis was to investigate changes in fear of crime over time by neighborhood levels of disadvantage. After fitting the null model, time was added as a fixed effect (Model 2) and the third model added local disorder (and collective efficacy for Malmö). Tables 5 and 6 present the results from the third and final model for each category in Malmö and Stockholm, respectively.[5] The findings for Malmö indicate that in ND high areas worry appear to be rather stable over time with no major change over time. Proceeding with ND middle, we found that physical disorder is positive and significant (0.324, $p < 0.001$), indicating that in ND middle areas, physical disorder is related to worry levels. Finally, in ND low areas, we found a positive and significant association in terms of worry levels over time (0.037, $p = 0.002$). Just like the for ND middle areas, physical but not social disorder is significant and positive (0.231, $p = 0.021$). When adding collective efficacy to the model, it renders similar results overall as mentioned above, with the addition of ND middle and ND high areas see an increase in worry when collective efficacy goes down (middle: −0.171, $p < 0.001$; high: −0.256, $p < 0.01$).

For *Stockholm*, depicted in Table 6, the final model shows that all ND areas increase in worry levels over time (ND high: 0.028, $p < 0.01$. ND middle: 0.061,

[5] Only the final model is depicted to ease with interpretation but results from the previous models are available upon request. The model fit improved for each model expansion where the deviance score was lowest for the final model.

Table 4 Growth curve models for Stockholm and changes in fear of crime ("worry"). The table includes coefficient, standard error, variance scores and model fit evaluated by deviance score and its related significance testing

Model	Stockholm				
	M1	M2	M3	M4	M5
Fixed part					
Predictor	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Intercept	0.794***(0.010)	0.735***(0.011)	0.735***(0.011)	0.856***(0.017)	0.810***(0.016)
Time		0.059***(0.005)	0.05***(0.005)	0.059***(0.005)	0.057***(0.005)
ND low				−0.169***(0.024)	−0.092***(0.023)
ND Middle				−0.154***(0.020)	−0.095***(0.019)
Social disorder					0.036(0.033)
Physical disorder					0.148***(0.037)
Random part					
Variance level 1 (NH)	0.009	0.010	0.010	0.004	0.003
Variance level 2 (repeated measure)	0.009	0.006	0.005	0.005	0.005
Random slope- time			0.000	0.001	0.001
Deviance	−502.7	−616.4	−618.1	−667.6	−732.3

***$p<0.001$, **$p<0.01$, *$p<0.05$

$p<0.001$, ND low: 0.08, $p<0.001$). Also, in ND high areas, social disorder is significant and positive (0.223, $p<0.01$) meaning that social disorder is associated with worry over the different timepoints. Regarding ND middle areas, the pattern is similar to Malmö where physical disorder increases so does worry levels (0.145, $p<0.01$). For ND low areas, neither social nor physical disorder is significant.

For illustrative purposes, Fig. 1 for Malmö and Fig. 2 for Stockholm show that even if fear of crime decreases in ND high neighborhoods at timepoint 2, the overall fear of crime levels increase in both cities from timepoint 1 to timepoint 3. The graphs also show that differences in worry levels between neighborhood types were more pronounced in Malmö than in Stockholm with ND low and ND middle areas being almost similar in Stockholm. However, the graphs also suggest that the difference in worry levels between the neighborhood types is decreasing over time in both cities, with the gap in worry levels between the least and most disadvantaged areas being the narrowest during the last timepoint. Furthermore, the graphs indicate that the largest increase in fear of crime have occurred in the least disadvantaged areas in both Malmö and Stockholm.

Table 5 Coefficients for the final growth curve model of disadvantaged areas in Malmö

ND	Malmö		
	ND Low (m3)	ND Middle (m3)	ND High (m3)
Fixed part			
Predictor	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Intercept	0.635 (0.035)***	0.705 (0.016)***	*0.808 (0.034)***
Time	0.037** (0.012)	0.014 (0.011)	0.019 (0.018)
Social disorder	0.047 (0.129)	−0.024 (0.081)	0.123 (0.085)
Physical disorder	0.231 (0.100) *	0.324 (0.071)***	0.143 (0.084)
Random part			
Variance level 1	0.005	0.002	0.005
Variance level 2	0.005	0.010	0.012
Malmö with collective efficacy			
Fixed part			
Intercept	0.624*** (0.035)	0.694***(0.015)	0.760***(0.034)
Time	0.047*** (0.013)	0.017(0.011)	0.018(0.011)
Social disorder	−0.007 (0.131)	−0.132 (0.080)	0.106(0.079)
Physical disorder	0.180 (0.103)	0.298*** (0.066)	0.058 (0.084)
Collective efficacy	−0.098 (0.06)	−0.171 (0.043)***	−0.256 (0.081)**
Random part			
Variance level 1	0.005	0.001	0.003
Variance level 2	0.005	0.009	0.012

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Table 6 Coefficients for the final growth curve model of disadvantaged areas in Stockholm

	Stockholm		
ND	ND low (m3)	ND middle (m3)	ND high (m3)
Fixed part			
Predictor	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
Intercept	0.684 (0.021)***	0.712 (0.012)***	0.763 (0.023)***
Time	0.080 (0.011)***	0.061 (0.007)***	0.028 (0.010)**
Social disorder	0.046 (0.057)	−0.033 (0.052)	0.223 (0.069)**
Physical disorder	0.009 (0.081)	0.145 (0.055)**	0.112 (0.070)
Random part			
Variance level 1	0.003	0.005	0.005
Variance level 2	0.005	0.004	0.005

***$p < 0.001$ **$p < 0.01$ *$p < 0.05$

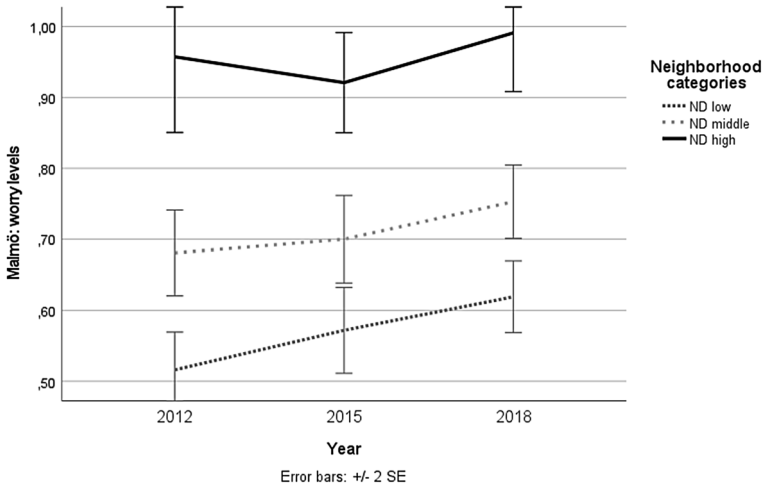

Fig. 1 Fear of crime levels ("worry") in Malmö over time divided by the three neighborhood categories

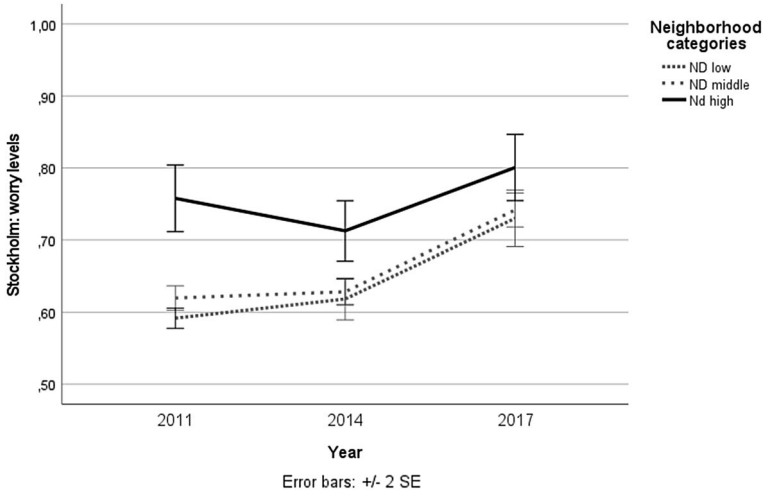

Fig. 2 Fear of crime levels ("worry") in Stockholm over time divided by the three neighborhood categories

Discussion

The understanding of how changes in neighborhood fear of crime over time is related to neighborhood processes across cities and neighborhoods is limited; hence, we examined this and found some consistencies. First and foremost, results showed that in both cities, neighborhoods with high disadvantage had the highest level of worry followed by middle and low disadvantaged areas. This is consistent with previous

research, showing higher levels of fear of crime in more disadvantaged areas (Ivert et al 2016). From a theoretical perspective, this is reasonable since neighborhoods have varying levels of crime, incivilities and collective efficacy (Brunton-Smith and Sturgis 2011; Markowitz et al 2001). These results are noteworthy however since it points to a general aspect in relation to fear of crime: neighborhoods in both Malmö and Stockholm that share similar characteristics in terms of education, income, unemployment levels and percentage of foreign-born population also have similar levels of worry in relation to other neighborhoods in their city. There was a difference in levels of fear of crime between the neighborhood types in the two cities; however, the change between neighborhood types was similar for both cities: for instance, in Malmö, the change in fear of crime is mainly driven by neighborhoods with low disadvantage becoming more worried. Whereas in Stockholm, the worry levels go up in all types of areas but even more so in the neighborhoods with low disadvantage. This points to a general aspect of fear of crime that was present in both Malmö and Stockholm, namely that the increase in worry levels was higher in the areas with low levels of neighborhood disadvantage. This brings us to another important finding in this study, namely that the gap in fear of crime between different neighborhood types is decreasing. Worry levels increased over the studied period in both cities; however, it becomes apparent that depending on the level of neighborhood disadvantage, there are different fear of crime trajectories. In comparison to previous findings by Ivert et al (2016) for Malmö and the period between 1998 and 2012, the authors found that the distance between neighborhoods was increasing. One reason for this contrasting result could be because we also took local disorder into account in our model, or it could be related to a general increase in fear of crime during the last decade (Swedish National Council for Crime Prevention 2022). Our results showed that the changes in fear of crime in some neighborhoods was found to be related to (physical) disorder, which is in line with some previous research (Brunton-Smith 2011). However, this causality link has been questioned (O'Brien et al 2019) where one argument is that the correlation between fear of crime and disorder influence each other, and a sensitivity of "seeing disorder" in the neighborhood in turn increases fear (Jackson et al 2010). Our findings also showed that physical rather than social disorder is more important in relation to fear of crime, however, not in all areas. This contrasts with findings by Ward et al (2017) who found that it is not possible to distinguish between social and physical disorder on a neighborhood level, whereas our results show that there is a point in studying the two subconstructs of local disorder separately on a neighborhood level.

In the present study, there is some heterogeneity in results between Malmö and Stockholm. In Malmö, there was no substantial change in fear of crime over time, while in Stockholm all neighborhood types had a negative development. Furthermore, social disorder was significantly related to fear of crime in highly disadvantaged areas in Stockholm, but no such effect was found in Malmö. This could either be due to some unknown contextual difference between the cities or due to differences in methodology used. Further research is needed to investigate this difference. In Malmö, we had the possibility to also add collective efficacy to the model and it was found to be significant in the overall model and neighborhoods with middle and high disadvantage. When collective efficacy was lower, fear of crime increased,

which is in line with previous research suggesting collective efficacy as a mediator in neighborhoods with high local disorder and high levels of fear of crime (see e.g. Abdullah et al 2015; Hinkle 2013).

Despite the contributions of this study, it is not without limitations. First, there is a risk of ecological fallacy when aggregating individual data to identify relationships among variables when there are in fact none or a risk of omitting variables of importance (Robinson 2009). However, research where individual data are aggregated to a higher level is common in social sciences research (Snijders and Bosker 2012) and has been done previously in the field of neighborhood research (Robinson et al 2003; Markowitz et al 2001). Another methodological consideration regards the data sources and the difference in number of participants and the total number of neighborhoods between Malmö and Stockholm. However, a comparative design sets the focus on comparing the theoretical phenomenon studied (Ragin and Rubinson 2007) and that data have been collected through similar research designs rather than strictly identical methodologies where we assessed "fear of crime" obtained from two community surveys. Lastly, the variables "worry," "social" and "physical disorder" were not measured identically in both cities in terms of items and response alternatives. This result may lower the validity and reliability of the measures; however, we matched the items that measured the most similar crime types and that are relevant in regard to crime relating to neighborhood processes. Both surveys utilized Likert-scales, so a standardization procedure rendered comparability. Due to space limitations, we only include the affective component of fear of crime in this article, and we did however repeat the analyses for Malmö and Stockholm using the cognitive component of fear of crime, namely experiencing unsafety when walking alone at night in one's neighborhood. The results revealed the same patterns as for the affective component of fear of crime.

Future research should explore other potential factors that could be responsible for the change in fear of crime in the areas with low disadvantage. Findings from the present study show that worry increased in neighborhoods with the lowest disadvantage in Stockholm and was not found to be related to local disorder, and only physical disorder in Malmö. It might be related to high levels of media coverage regarding crime and how media refers to criminality and could impact fear of crime levels (Heber 2011; Näsi et al 2021) and inflate the "fear of crime paradox." Another aspect to consider for future research is to look at changes in crime levels, since we only assessed changes in non-crime factors such as local disorder and collective efficacy, affect fear of crime.

Considering the effect fear of crime has on individuals, communities, and societies, it is imperative to continue to clarify the mechanisms related to fear of crime. This study has added some important findings: neighborhood fear of crime increased during the studied period; however, the change was different depending on which structural characteristics the neighborhood has, and physical disorder was one factor involved in impacting fear of crime at each timepoint, although not consistently. The results were remarkably similar in both cities, making the conclusions stronger. In terms of policy implications, the findings suggest that different types of neighborhood disadvantage might need different types of interventions: residents in highly disadvantaged neighborhoods continue to be fearful and residents in neighborhoods with the lowest disadvantage are increasing most in fear of crime.

Appendix

	Malmö		Stockholm	
	Items	Response alternatives	Items	Response alternatives
Worry	'Are you worried about' 'Having your home broken into' 'Having your basement/attic storage or garage broken into?' 'That your car would be vandalized or stolen when parked in your neighborhood' 'That your moped and/or motorcycle would be vandalized or stolen when parked in your neighborhood' 'That your bicycle would be vandalized or stolen when parked in your neighborhood' 'Being attacked or assaulted in your neighborhood' Being threatened or harassed in your neighborhood' 'That someone would set fire on something that they were not supposed to set fire on close to your house?'	0:'no, never' 1:'yes, but occasionally' 2: 'yes, quite often' 3: 'yes, very often'	'Are you worried of being exposed to the following crimes in the neighborhood where you live?' 'Assault or violence outside the home' 'Burglary in your residence' 'Robbery'	0:'not worried' 1:'not very often' 2: 'rather often' 3: 'very often'
Physical disorder	'Would you say that in your neighborhood there is a problem with…' 'Litter in streets and public places' 'Vandalism (for example, graffiti, damaged telephone boxes, broken windows, smashed streetlights, vandalized cars or bicycles)' 'Run-down buildings and poorly maintained open spaces (for example, abandoned cars, burnt out buildings or cars, wastelands)' 'People driving dangerously (for example, speeding or driving on pavements or walkways)'	0:'No, no problem at all (doesn't exist or is uncommon)' 1:'Yes, somewhat of a problem (it is quite common)' 2:- 'Yes, a big problem (it is very common)'	'Do you perceive any problems regarding the following phenomena in your neighborhood?' 'Graffiti' 'Littering' 'Arson, such as burning trash cans' 'Buildings occupied by drug addicts'	0:'no' 1:'yes, to a small extent' 2: 'yes, to a large extent' 3: 'yes, but not a problem' (recoded to 0)
Social disorder	'Would you say that in your neighborhood there is a problem with…' 'Young people who cause problems and/or disturb the public order' 'People who cause problems for or disturb their neighbors (for example, neighbors who are noisy or aggressive)' 'People who are drunk and misbehave in public places' 'People who quarrel or fight in public places'	0:'No, no problem at all (doesn't exist or is uncommon)' 1:'Yes, somewhat of a problem (it is quite common)' 2:- 'Yes, a big problem (it is very common)'	'Do you perceive any problems regarding the following phenomena in your neighborhood?' 'Young people who disturb' 'Disturbing neighbors' 'Drunk people who disturb' 'People fighting outside'	0:'no' 1:'yes, to a small extent' 2: 'yes, to a large extent' 3: 'yes, but not a problem' (recoded to 0)

	Malmö		Stockholm	
	Items	Response alternatives	Items	Response alternatives
Collective efficacy – social cohesion	'For each statement about your neighborhood, please state whether you strongly agree, agree, disagree, or strongly disagree' 'People in this neighborhood generally get along with each other' 'People around here are willing to help their neighbors' 'People in this neighborhood can be trusted' 'This is a close-knit neighborhood' 'People in this neighborhood share the same values'	0: 'Strongly disagree' 1: 'Disagree' 2: 'Neither agree or disagree' 3: 'Agree' 4: 'Strongly agree'		
Collective efficacy – informal social control	'For each statement about your neighborhood, please state whether you strongly agree, agree, disagree, or strongly disagree' 'If a group of neighborhood children were skipping school and hanging out on a street corner, how likely is it that your neighbors would do something about it? 'If some children were spray-painting on a local building, how likely is it that your neighbors would do something about it?' 'If a child was showing disrespect to an adult, how likely is it that people in your neighborhood would do something about it?' 'If there was a fight in front of your house and someone was being beaten or threatened, how likely is it that your neighbors would do something about it?' 'If someone was trying to break into a car in front of your house, how likely is it that people in your neighborhood would do something about it?'	0: 'Strongly disagree' 1: 'Disagree' 2: 'Neither agree or disagree' 3: 'Agree' 4: 'Strongly agree'		

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Declarations

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