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Research Article

Do tenants suffer from status syndrome? Homeownership, norms, and suicide in Belgium

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Do tenants suffer from status syndrome? Homeownership, norms, and suicide in Belgium

Joan Damiens¹

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Abstract

BACKGROUND

Death by suicide is particularly high for the middle-aged and for single and/or childless individuals. At the same time, the risk of suicide is higher for tenants than for homeowners. The literature linking housing tenure and suicide according to age, gender, and family configuration is scarce.

OBJECTIVE

This study examines the varying association between housing tenure and suicide risk according to sex, age (for adults), and household composition.

METHODS

We used data from Belgium's National Register linked to 2001 census data and death certificates. We conducted multinomial logit regression to estimate the mortality relative risk ratios by suicide and by other causes in the population aged 25 to 69 years in 2002, separately by sex.

RESULTS

We find that homeownership was negatively associated with suicide risk for both men and women, before and after controlling for age, housing quality, and demographic and socioeconomic characteristics. Interacting age and housing tenure, we find that renting is associated with a higher risk of suicide among adults in their 40s and 50s, but not among younger and older adults. Among marital and parental statuses, married men and single women with no children at home present a higher risk of suicide in mid-life when renting, compared to owning.

CONCLUSIONS

Homeownership is associated with a lower suicide risk for middle-aged populations, more specifically for married men, unpartnered women, and individuals living without children.

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CONTRIBUTION

Our research provides a better understanding of the role of gender and family norms in the association between housing tenure and suicide mortality.

1. Introduction

In recent decades, suicide has been one of the leading causes of death among the young and middle-aged European population. In 2003, suicide was the leading cause of death for the EU-25 population 20 to 44 years old (Niederlaender 2006). More recently, in 2017, it was the second-leading cause of death for 15-to-49 year olds in Western Europe (IHME 2017). Among older working-age groups (50–64 years), suicide was the seventh-leading cause of death (IHME 2017). Within Europe, in 2015 Belgium had the fifth highest suicide rate³, i.e., about 17 suicides per 100,000 inhabitants (EU-28 average: 11).

Studies have identified higher mortality rates in general – and higher suicide rates in particular – among the more deprived populations (Jalles and Andresen 2015; López-Contreras et al. 2019; Lorant et al. 2005; Silva, Loureiro, and Cardoso 2016; Stack 1982, 2000), in terms of income (Machado, Rasella, and Dos Santos 2015), and among the precariously employed and the unemployed (Mäki and Martikainen 2012; Milner, McClure, and De Leo 2012; Min et al. 2015). Among the socioeconomic determinants of suicide risk, housing conditions and tenure are poorly studied due to a lack of good-quality data, with existing studies often reducing housing tenure to its economic dimension (e.g., Lorant et al. 2005). On the one hand, homeowners can be considered a selected population, as homeownership requires material resources and access to information – for instance, about credit programmes and available real estate (Haurin, Herbert, and Rosenthal 2007). On the other hand, previous research has demonstrated that homeownership is specifically associated with better physical and mental health (Herbert and Belsky 2008; Hiscock et al. 2001; Ineichen 2003; Macintyre et al. 2003) and lower risk of suicide for both sexes (DeBastiani, Norris, and Kerr 2019; Lorant et al. 2005). Homeownership is viewed as an important milestone in terms of residential experience and is normative for periods of life when financial stability is expected to be achieved (Hiscock et al. 2001); i.e., when one is getting older, is married, or is a parent. Not achieving this social norm by a given age could be interpreted as a failure and may increase the risk of poor mental health (Cleary 2012), to a different extent for men and women. Suicide and homeownership are strongly associated with socioeconomic background (educational attainment, occupation, income), but they are also subject to

³ After Lithuania, Latvia, Slovenia, and Hungary.

social norms related to gender, age, life events, and living arrangements (Ellaway, Macdonald, and Kearns 2016; Lorant et al. 2005).

To our knowledge, no previous studies investigate the role of gender and social norms in the relation between housing tenure and suicide. Our objective is to evaluate whether the relation between homeownership and suicide differs according to age, life stage, and living arrangement, considering the social norm of homeownership in the life course for each gender. We aim to provide a more nuanced view of the link between homeownership and suicide, without claiming a causal relation.

2. Literature review

2.1 Social norms, social exclusion, and risks of suicide

Suicide is a complex cause of death, at the crossroads between personal and social factors. Durkheim (1951 [1897]) highlighted two strong social determinants of suicide. First are the normative social expectations that define the community's impact on an individual's life and well-being. In changing societies these normative references and markers may be absent, which can lead to so-called anomic suicides (Durkheim 1951; Graeff and Mehlkop 2007). On the one hand, norms that are too rigid can act as a burden on those that do not conform to them, which may lead to struggles with self-perception and integration and provoke suicidal behaviours (Cleary 2012; Durkheim 1951). Despite growing individualism, social norms and expectations remain a major factor in people's mental and social well-being.

On the other hand, integration within the community and social support are positive factors in dealing with stressors. Good interpersonal relations help people confront their problems and develop successful coping mechanisms while reducing the risk of isolation, addiction, and risky behaviours. Social support decreases the risk of depression and suicidal behaviours (De Silva et al. 2005; Heikkinen, Aro, and Lönnqvist 1993; Joiner 2005; Silva, Loureiro, and Cardoso 2016; Stanley, Stanley, and Hensher 2012). Extending Durkheim's argument, one recent theory, formulated by Joiner (2005), focuses on the importance of interpersonal relations: suicidal thoughts and behaviours are fed by the sense of being a burden on others or of not belonging to a community.

2.2 Social determinants of suicide

Recent studies affirm and extend Durkheim's theorisation of the socioeconomic and demographic inequalities at play in suicide. Social status (Marmot 2004) provides an

important framework for understanding the link between social norms, well-being, and potential suicide. It stresses that social inequalities in mental health and mortality go beyond the rich/poor dichotomy and depend on one's position compared to one's peers. In their decisions, individuals are influenced by others' life courses and by social expectations of when life events should happen and in what order (Liefbroer and Billari 2010). These expectations are asserted in two ways: through internalized condemnation (manifesting as feelings of shame or guilt) of some behaviours or decisions, or their absence, at certain ages (Heckhausen 2006; Horne 2003), and through social rejection (expressed through conflict or gossip) of events happening outside a normative age span (Liefbroer and Billari 2010). Insecurity about one's social integration and interpersonal relations is detrimental to a person's mental health, feeding the risk of depressive states and life-threatening behaviours (Heikkinen, Aro, and Lönnqvist 1993; Milner, McClure, and De Leo 2012). Moreover, socially disadvantaged individuals tend to face more uncertainty and have lower self-esteem and a negative social image. They may cumulate stress factors, creating obstacles to their relations with others (O'Connor and Nock 2014; Stansfeld, Head, and Marmot 1997). Men, who are traditionally expected to ensure their household's material security (Payne, Swami, and Stanistreet 2008), and women to a lesser extent, are at a significantly higher risk of suicide when they are unemployed (Artazcoz et al. 2004) or have lower education, and this is partly mediated by working conditions (Blakely, Collings, and Atkinson 2003) and employment status (Milner et al. 2013; Min et al. 2015).

The impact of social norms is heavier in contexts where transgressing norms is less common. For example, an analysis of 38 countries shows that being divorced is more detrimental to well-being in countries where divorce is rare (Kalmijn 2010). Another study on 24 European countries shows that childlessness is associated with poorer psychological well-being in countries where family norms are more rigid (Huijts, Kraaykamp, and Subramanian 2013). Liefbroer and Dourleijn (2006) also demonstrate that the risk of divorce for individuals who cohabited before marriage is always higher than the risk of divorce for people who married without any period of cohabitation, but this relation is particularly strong and visible when cohabitation is rare – cohabitants show an unusual tendency to avoid marital commitment and might have less trust in their relationship – or very common – people who marry directly are a very selected population who might be very compatible or personally disposed to avoid union dissolution (Liefbroer and Dourleijn 2006). When it comes to housing tenure, we can expect that not achieving this milestone will have more detrimental effects on mental health in countries such as Belgium, where transition to homeownership is normative, than in countries where being a tenant is more common. In Belgium, where homeownership is achieved by the majority of the population, tenants might be a selected population with a

particularly low socioeconomic position or a less stable family life than the rest of the population.

Mental health outcomes are not only related to social norms but also to individual demographic characteristics. Being a woman is associated with more frequent suicidal thoughts and attempts, while being a man is linked with a higher risk of suicide (Bossuyt and Van Casteren 2007; Blair-West et al. 1999; Payne, Swami, and Stanistreet 2008; Van der Heyden et al. 2009). Women's better handling and expression of their feelings, in contrast to the pressure on men to hide their inner struggles, can explain this paradox (Dykstra and Keizer 2009; Payne, Swami, and Stanistreet 2008). Instead of seeking help or expressing their depressive states, men are likelier to turn to substance abuse or violence as coping mechanisms; hence their higher risk of not surviving suicide attempts (Cleary 2012; Payne, Swami, and Stanistreet 2008).

For both genders, suicide risk increases with age and tends to peak in middle age (Stack 1982, 2000), as this phase of life includes many personal and professional challenges but also disruption, frustration, and disappointment (Graham 2015; Milner, McClure, and De Leo 2012), such as marital separation or job loss. For older adults, well-being might depend more on health status and the presence of chronic pain (Conejero et al. 2016; Conejero et al. 2018). Being involved in an active social life or in a family life and living with a partner or with children (Conejero et al. 2016; Conejero et al. 2018; Hooghe and Vanhoutte 2011) are associated with better physical and mental health (Williams 1997; Borges et al. 2010), but differently for both genders. However, family norms for men and women play a major role in societal expectations. For women, being childless during the reproductive years is associated with poorer well-being (Graham 2015) and higher suicide risk (Stack 1982, 2000), while the trend is reversed for never-married women aged 65 and over (Graham 2015; Hank and Wagner 2013). For men, marital status counts more than parenthood in terms of life satisfaction (Dykstra and Keizer 2009) and their suicide rate (Bruce and Kim 1992).

2.3 The social norm of homeownership

Homeownership is a social norm – that is, an accepted way of living and a behaviour that people believe others expect of them (Ajzen and Fishbein 2005; Liefbroer and Billari 2010). At a certain age, access to property is expected according to the social ideal and represents the possibility of engaging in long-term material projects such as buying and maintaining a dwelling through a mortgage. Not attaining this status can be perceived as a failure, a deviation from the norm (Bugeja-Bloch 2013; Hiscock et al. 2001). Being a renter as a 20-year-old single and childless young worker or student may be socially accepted, whereas being a tenant as a 50-year-old partner and parent may not comply

with the norm and may suggest material instability. In a context where around 70% of Europeans (OECD 2015, 2017) own their dwelling, being a tenant can be the consequence of deprivation and can feed social stigma about vulnerable groups such as single mothers or the lower-educated (Bugeja-Bloch 2013). Homeownership enhances one's status in society, bringing about a sense of achievement and more confidence in the future. As a consequence, homeowners may adopt a healthier lifestyle, leading to longer life and better physical and mental health (Ignatieff 1996; Marmot 2004).

2.4 Housing tenure: A determinant of well-being and suicide risk

Homeownership is positively associated with the well-being of the individual (Herbert and Belsky 2008), except for those in low-income households who sacrifice their comfort and their ability to pay their bills by becoming owners (Mulder and Lauster 2010). Homeownership is often related to a better situation than rented housing (Ineichen 2003; Herbert and Belsky 2008) in terms of geographical location, environment, and housing quality (Macintyre et al. 2003). In addition, tenants are less likely than homeowners to carry out renovations at their own expense as their dwelling may only be temporary (Herbert and Belsky 2008). The symbolic meaning of housing has an effect on health: home is considered a place of safety, belonging, and control, set against the uncertainties of the outside world (Shaw 2004). Hiscock et al. (2001) apply the concept of ontological security to refer to well-being associated with homeownership. The majority of the 43 homeowners and tenants they interview report homeownership as a social achievement and an investment in their future well-being and that of their offspring. Homeowners report more self-esteem and confidence in the future, and a better appreciation of life in general (Hiscock et al. 2001). These advantages are apparent for all household members of an owner-occupied accommodation, from children to older adults (Galster et al. 2007). For some younger or middle-aged adults the experience of living in an owner-occupied home can mean living in or returning to the parental home, or living at a partner's place. In these situations they can benefit from a better living environment, but they can also suffer from a low level or loss of economic independence, and hence poorer mental health outcomes (Copp et al. 2017).

According to the literature, it is difficult to discern whether the beneficial effect of homeownership on mental health stems from a selection effect, a causal effect, or a combination of both (Macintyre et al. 1998; Hiscock et al. 2001). People who can afford to buy and keep their own dwelling may be predisposed toward better mental health and better access to medical and mental health resources, social support, and material options for overcoming life issues and depressive states (Ellaway, Macdonald, and Kearns 2016; Holupka and Newman 2012; Slominski et al. 2011; Smith et al. 2003). The therapeutic

effect or causal effect of housing tenure is harder to apprehend. Being an owner does not always render immediate advantages in terms of health or having the resources to counter suicidal thoughts or behaviours, and it entails the pressure of taking on a long-term financial obligation (Macintyre et al. 1998; Smith et al. 2003). However, it does provide better housing quality and higher social standing (Herbert and Belsky 2008; Hiscock et al. 2001).

In empirical studies, homeownership is associated with a lower risk of suicide. Studies in the United States (DeBastiani, Norris, and Kerr 2019) and in Europe (Lorant et al. 2005) describe housing tenure as a major determinant of suicide risk, among other socioeconomic factors such as education and occupational category. In Norway, Finland, Denmark, Belgium, and England/Wales, higher risks of suicide are found for tenants compared to owners, especially in Norway and Denmark for men and in most of these countries for women, whatever their educational level (Lorant et al. 2005). However, little is known about how social norms related to homeownership can affect the relationship between housing tenure and suicide, and how this relationship varies according to age and household composition for men and women.

2.5 Belgian context

2.5.1 Suicide

Between the early 1990s and the beginning of the 21st century, death by suicide did not noticeably increase in Belgium, and the distribution of means of self-injury did not change significantly (Bossuyt and Van Casteren 2007). Men are at a higher risk of suicide, and usually employ more violent means. Likewise, lower educational attainment is associated with a higher risk of suicide for men, and being a homeowner is protective against suicide for both genders (Lorant et al. 2005). Belgium's suicide rate for working-age adults is high, a pattern that does not apply to Belgium's neighbouring countries – Germany, the Netherlands, France, and Luxembourg (IHME 2017). A possible explanation is Belgium's ground-breaking 2002 law reform, which provides legal pathways for both euthanasia and assisted suicide – considered by the 10th revision of the International Classification of Diseases (ICD) as non-administration of surgical and medical care (Y66) and suicide (X60–X84 respectively). However, international comparison (especially with the Netherlands, which implemented the same law) does not confirm this hypothesis (Rurup et al. 2012). Belgium's high rate of suicide could also result from cultural factors, as shown in a study of self-harming teenagers in Belgium and the Netherlands. Belgian teenagers report more traumatic events and less coping mechanisms when facing mental health issues than their Dutch counterparts (Portzky, De

Wilde, and Van Heeringen 2008). Similarly, Belgian adults living in Flanders show less intention of seeking help when encountering suicidal thoughts and behaviours than their Dutch counterparts (Reynders et al. 2015).

2.5.2 Housing tenure

In the following we draw on recent work by Schnor and Mikolai (2020), who provide a detailed description of Belgium's housing market. Homeownership, or living in owner-occupied accommodation, is normative in Belgium (Fikse and Aalbers 2020), as shown by its high prevalence of homeownership (69% in 2001) compared to other European countries, and its housing structure marked by short supply of affordable rental housing (OECD 2015, 2017). The social housing sector accounts for only about 6% of the country's housing stock, which is insufficient to provide for all those whose low income qualifies them for social housing, forcing some of them to rent in the private market (Andrews, Sánchez, and Johansson 2011). In Belgium housing prices have increased in recent decades, outpacing the rest of Europe (OECD 2017). Belgium's tax system is more advantageous for homeowners than tenants, and the banking system does not facilitate access to ownership for low-earning households as loans remain hard for them to get (Lahaye et al. 2013). A much higher proportion of tenants (34%) than owners (2.4%) spend 40% or more of their income on housing. The financial means of tenants have weakened over time, which makes renting financially difficult and undesirable as a tenure status (Halleux and Strée 2012; Hiscock et al. 2001; OECD 2015: 85; Schnor and Mikolai 2020). Belgium's 2001 census data shows that single women and single mothers are at risk, with very little access to homeownership and good-quality housing (Vanneste et al. 2007).

In Belgium, for the period 2011–2015, the life expectancy of homeowners has been estimated as on average 5.6 years longer for males and 3.6 longer for females compared to their tenant counterparts (Eggerickx et al. 2018; Van Aerden et al. 2019). Being a tenant in the Belgian context, where homeownership is particularly common, is tantamount to going against the tide. Transgression of this norm can therefore be detrimental to people's self-esteem, social integration, and well-being (Huijts, Kraaykamp, and Subramanian 2013; Kalmijn 2010; Liefbroer and Billari 2010).

2.6 Research hypotheses

The literature shows that homeownership has a positive effect on well-being and mental health (Galster et al. 2007; Herbert and Belsky 2008). Therefore, our first hypothesis is

that homeownership is negatively related to suicide risk, independently of demographic, socioeconomic, and health-related characteristics, including educational level, occupational category, and subjective health (**H1**).

Homeownership is seen as a major achievement in terms of residential experience and is normative, especially for those who are expected to have achieved financial stability; i.e., those who are getting older or who have children or a resident partner. Not complying with this social norm by a given age and in terms of family status may be interpreted as a failure and may increase the risk of poor mental health, social stigmatization, depression, and suicide. Our second hypothesis is that the negative relation between homeownership and suicide strengthens for middle-aged adults (mid-30s to late 50s); that is, in their working and childrearing years when the social norm of homeownership weighs particularly heavily (**H2**).

However, we do not expect the same patterns for men and women. As homeownership is very dependent on economic resources, men, the traditional breadwinners, are expected to take responsibility for the material comfort of their partner and/or children and to feel pressure to provide security for the whole household. Our third hypothesis is that middle-aged male tenants have a higher risk of suicide than owners, especially when living with a partner and with children (**H3**). Contrary to men, women are not traditionally expected to ensure the material security of the household. When women are unpartnered they must be responsible for their own housing career. Women of childrearing age who do not have children have poorer well-being on average, suggesting a link with their infringement of the traditional expectations of motherhood. Women without a partner and/or without children may benefit from homeownership because it provides a sense of belonging and trust in the future. Homeownership may also compensate for instability in other areas of their life course. Renting, on the other hand, may signal instability and a lack of social integration and investment in the future. The cumulation of renting and going against the traditional expectations of gender norms may be detrimental for middle-aged women's well-being and consequently have an impact on their risk of suicide. Our fourth hypothesis is that middle-aged and older childless and unpartnered women have a higher risk of suicide, especially if they are tenants (**H4**).

3. Data

We use data from the Demobel database provided by Statistics Belgium for the CAUSINEQ project (Statbel 2019). The data combines socioeconomic information from Belgium's 2001 census (Enquête Socio-économique Générale), demographic information from Belgium's National Register for 2001–2003, and information about date and cause of death from Belgium's death certificates for 2002–2003. Belgium's 2001

census is the country's most recent population census that does not rely on registers. It contains very detailed information about living conditions that is not available in more recent data, including self-reported health level, and offers socioeconomic and housing-related information. The census, conducted in October 2001, was organized as a population-wide survey and achieved a coverage of 93% of people domiciled in Belgium. The census consisted of one questionnaire per individual in addition to one questionnaire per household about housing. Information about homeownership does not indicate which household member actually owns the home, so we cannot differentiate between the actual homeowner and those living in an owner-occupied dwelling without owning it (e.g., younger adults living at their parents'). For more simplicity, we will refer to homeownership as living in a place owned by at least one member of the household.

Analytical sample. As our data on homeownership comes from the 2001 census, we restricted our observation period to suicides committed in 2002. As a robustness check, models considering suicides in 2002 and 2003 were conducted and are presented in the methodological appendix (Appendix, Figure A-M1). We concentrate on the adult population aged 25–69 in 2001; i.e., individuals born between 1932 and 1981. We excluded suicides among the young and the old due to the specificity of their motives and orientation towards specific factors. Unlike older people, working-age adults are less exposed to extreme isolation due to their work activities, are more frequently exposed to friends and family relationships, and have greater mobility. Similarly, health problems are less prevalent and less of a source of mobility deprivation. It makes little sense to consider the housing tenure of young people under the age of 25 as they usually live with their parents. Our analytical sample includes $N = 3,000,870$ men (17,405 deaths, including 1,098 suicides in 2002) and $N = 2,996,314$ women (9,333 deaths, including 441 suicides).

Variables. In the housing questionnaire the reference household member was asked to indicate whether the household owned the dwelling or rented it from the private or the public sector. As the social housing market is marginal in Belgium (Andrews, Sánchez, and Johansson 2011), only two categories were kept: owner and tenant. This answer is attributed to all members of the household, without knowing which member is the legitimate owner. The questionnaire also gathered information about housing quality, such as the presence of at least one bathroom within the dwelling, the presence of central heating, and the density of occupancy, i.e., the number of inhabitants per room. These variables will be considered as covariates, as housing tenure is associated with better housing quality (Macintyre et al. 2003) and poor housing conditions are related to depression and anxiety (Singh et al. 2019).

The dependent variable, death by suicide, is defined in the 10th revision of the International Classification of Diseases as codes X60 to X84.

The study includes a series of covariates. Household composition is a strong determinant of homeownership (Mulder and Lauster 2010) and suicide risk (Conejero et al. 2016; Hooghe and Vanhoutte 2011). Living arrangements were reconstructed based on information on the relationship of each household member to the reference member and on the civil status of all household members available in the National Register. Here the parental relationship is defined by the presence of children (biological, adoptive, or step) in the household and not by the fact of being a biological parent. Finally, where there is an unrelated individual in the household we assume an unmarried partnership, a broad way of defining a coresident couple that can also include flat-sharing and thus overestimate the phenomenon. The nationality of the person (Belgian, other European, non-European) implies different general health status (migrants show a better health status, for selection reasons: Deboosere and Gadeyne 2005), cultural factors (e.g., religiosity can lead to rejecting suicide: Wu et al. 2015), and problems of socioeconomic integration that impact individuals' risk of suicide (Bauwelinck et al. 2017) and access to homeownership (Davidov and Weick 2011). The region of residence (Flanders, Wallonia/Brussels) is a factor to consider in the relationship, as regions conduct different policies in terms of housing and mental healthcare. The area of residence (urban, suburban, rural) influences access to homeownership, as being a tenant is much more common in cities than in the countryside (Xhignesse et al. 2014), and suicide risk (Hooghe and Vanhoutte 2011). Educational attainment (primary, low secondary, high secondary, higher education) and occupational status also condition access to homeownership (Rameli, Salleh, and Ismail 2016) and suicide risk (Conejero et al. 2016). For this last variable we distinguish between the unemployed, the inactive population, permanent work contracts, temporary contracts, and the self-employed. The literature shows that professional contracts have a particularly significant impact on attitudes and well-being (De Cuyper et al. 2010). In Belgium, job insecurity and fairness are a factor in the active population's well-being and health and in attitudes towards the labour market and organisations (Bernhard-Oettel et al. 2011; De Witte et al. 2012). The 2001 census also yields information about the individual's subjective health status based on a 5-point scale (very good, good, intermediate, bad, very bad).

4. Methods

We first use multinomial logistic regressions to estimate the likelihood of dying by suicide in 2002. Our dependent variable distinguishes between suicide (1), death from another cause (2), and survival (0). We build up our model stepwise. Model 1 estimates the relation between housing tenure and suicide, controlling for age. In a second series of models we check whether our results are robust when we include information on housing

quality (measured by the presence of a bathroom, the presence of central heating, and density of occupancy), demographic characteristics (nationality, region and area of residence, household configuration), educational level, and occupational status (see Table 1). As subjective health is highly related to suicide rates (see Appendix, Table A-2), we only present models controlling for this covariate in the Appendix (Table A-4). Models presented in this section include age as a linear specification with a quadratic term. More flexible models, based on 5-year age groups, are presented in the methodological appendix (Appendix A-M2).

To test our second hypothesis on the relation between the age-dependent social norm of homeownership and the risk of suicide in Belgium we estimate interaction effects between age and housing tenure. In these models we use multinomial logistic regressions, distinguishing suicide (1) and deaths from other causes (2) from survival (0). Results for death from other causes are displayed in the Appendix (Figure A-6). Finally, we estimate a threefold interaction between age, housing tenure, and living arrangements to address the question of whether specific household configurations increase individual vulnerability. To do so, we calculate the predicted probabilities of suicide for homeowners and tenants according to their age and for different household configurations.

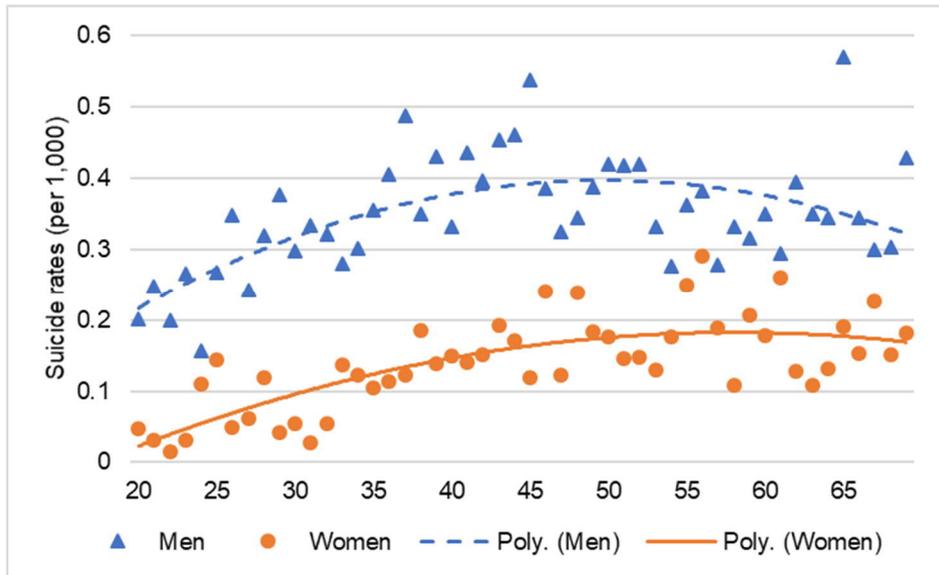
As we use population data, and thus a large dataset, we do not provide *p*-values but only confidence intervals, which are more appropriate to interpret the effect strengths of the relations (Du Prel et al. 2009).

5. Results

5.1 Suicide and age

Figure 1 shows age-specific suicide rates for men and women. These rates do not follow a clear linear pattern: they rise in young adulthood, from approximately 20 to 35 years old, peak in the 40s and the 50s for men and women, and subsequently decrease. In our model, next to a linear term we add a quadratic term to approximate these curvilinear trends. This method is equivalent to a log-quadratic function, proposed by Horiuchi (2003) to assess the acceleration of human mortality among the middle-aged adult population.

Figure 1: Suicide rates (per 1,000) per age, male and female population aged 20–69, 2002



Source: Census of Belgium 2001 and National Register data, death registers; authors' calculations

5.2 Homeownership, age, and household composition

In 2001, for all adult ages, the majority of women and men residing in Belgium were homeowners (see Appendix, Figure A-1). The proportion of young owners in their early 20s is very high, reflecting the fact that many young adults live in their parents' home. Between the ages of 20 and 29 young people start to become independent; hence homeownership drops. At age 26 the proportion of owners is at its lowest (50%) and then increases rapidly, probably due to Belgian housing policies that provide incentives to acquire property (Lahaye et al. 2013). From age 40 the proportion of owners reaches 70% and remains high thereafter. Men and women show similar patterns.

The proportion of homeowners is substantially lower among singles and cohabiting couples than among married couples (Table A-1, Appendix). Regarding residence with children, 78.1% of men and 73.7% of women living with their children are owners. The proportion of homeowners is lower among people living without children (57.7% for men and 62.6% for women).

5.3 Main effects

Regression model results are presented as coefficients in Table 1 for men and women, including the main variables of interest: housing tenure, age, and household type. The results show that renting is related to higher suicide risk among men and women, and this finding is robust to all controls (cf. Model 1 and Model 2). This is not specific to suicide mortality, as mortality risks from other causes are also higher for tenants than for owners. In addition, we observe that age is associated with an increased risk of suicide among men and women. The effect of household type is gendered. Men show a higher risk of suicide if they are not married (whether or not they live with a partner); the presence of children is not associated with men's suicide risk. Women's risk of suicide is lower if they are married and live with children. Women living in cohabiting relationships have a higher suicide risk, but this might be driven by a selection effect: controlling for subjective health, differences between women in marital and cohabiting unions disappear. Women living without a partner have a higher risk of suicide, especially if they live without children.

When comparing suicide with mortality from other causes, women who are single with no children or married with no children face a higher risk of suicide than married women with children, while they do not encounter higher mortality risk from other causes. The results also show that better-educated women show a higher risk of mortality from suicide than women with a low educational level. This result is in line with recent studies (Lorant et al. 2021). One explanatory hypothesis is the high prevalence of professional fatigue or burn-out among highly skilled women who combine a dense professional life with heavy responsibilities at home. However, so far empirical studies do not support this hypothesis (Györfy, Dweik, and Girasek 2016; Verdonk et al. 2010).

Table 1: Multinomial logistic regression results (Relative risk ratios and [95% CIs]) on the likelihood of suicide or death from other cause in 2002 (vs. survival), male and female population aged 25–69

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model1	Model2	Model1	Model2	Model1	Model2	Model1	Model2
Housing tenure (ref. Owner)								
Tenant	1.72 [1.51–1.97]	1.36 [1.17–1.59]	2 [1.63–2.46]	1.56 [1.23–1.97]	1.87 [1.80–1.94]	1.42 [1.37–1.48]	1.75 [1.63–2.46]	1.45 [1.37–1.52]
Unknown ^a	2.69 [2.24–3.23]	1.21 [0.80–1.82]	3.2 [2.38–4.31]	1.66 [0.88–3.13]	2.9 [2.24–3.23]	1.32 [1.20–1.46]	3.2 [2.38–4.31]	1.3 [1.13–1.49]
Age	1.07 [1.03–1.11]	1.08 [1.03–1.14]	1.16 [1.09–1.24]	1.2 [1.11–1.30]	1.11 [1.09–1.13]	1.11 [1.09–1.12]	1.16 [1.09–1.24]	1.14 [1.12–1.17]
Age ²	0.99 [0.99–1.00]							
Bathroom (ref. yes)								
No		1.01 [0.76–1.33]		1.4 [0.90–2.19]		1.17 [1.10–1.25]		1.32 [1.20–1.45]
Central heating (ref. yes)								
No		1.04 [0.89–1.20]		1.04 [0.82–1.31]		1.17 [1.12–1.21]		1.18 [1.13–1.25]
Density of occupation ^b		1 [0.99–1.00]		1 [0.99–1.00]		1 [0.99–1.00]		1 [0.99–1.00]
Household type (ref. Married w. children)								
Married w/o children		0.94 [0.76–1.16]		1.59 [1.16–2.18]		1.04 [0.99–1.09]		1.14 [1.06–1.22]
Cohabitant w. children		1.22 [0.83–1.79]		0.97 [0.44–2.14]		0.9 [0.77–1.05]		0.83 [0.65–1.06]
Cohabitant w/o children		1.27 [0.91–1.77]		1.14 [0.58–2.22]		0.93 [0.84–1.04]		1.2 [1.03–1.39]
Single		1.73 [1.36–2.21]		2.93 [1.89–4.55]		1.27 [1.17–1.36]		1.17 [1.04–1.31]
Single parent		1.44 [1.05–1.99]		1.65 [1.05–2.61]		1.14 [1.03–1.26]		1.07 [0.95–1.21]
Unknown, other ^c		1.11 [0.85–1.47]		1.34 [0.84–2.16]		1.12 [1.04–1.20]		1.27 [1.15–1.41]

Table 1: (Continued)

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model1	Model2	Model1	Model2	Model1	Model2	Model1	Model2
Civil status (ref. Single)								
Married		1.07		0.95		0.79		0.66
		[0.85–1.35]		[0.63–1.45]		[0.74–0.85]		[0.59–0.73]
Widow/er		0.411.47		1.09		1.05		0.85
		[0.96–2.24]		[0.69–1.72]		[0.97–1.15]		[0.77–0.94]
Divorced		1.23		1.23		1.02		0.85
		[0.98–1.54]		[0.86–1.77]		[0.96–1.09]		[0.77–0.93]
Unknown		1.43		1.09		0.76		0.31
		[0.59–3.46]		[0.21–5.61]		[0.56–1.02]		[0.18–0.55]
Region of residence (ref. Flanders)								
Wallonia		1.24		1.25		1.33		1.18
		[1.07–1.42]		[1.00–1.55]		[1.28–1.38]		[0.12–1.24]
Brussels		0.86		0.7		1.04		1.1
		[0.65–1.14]		[0.47–1.05]		[0.97–1.11]		[1.01–1.20]
Area of residence (ref. Urban)								
Suburban		1.06		0.75		0.91		0.9
		[0.84–1.32]		[0.52–1.08]		[0.86–0.96]		[0.83–0.97]
Rural		1.13		0.93		1.05		0.99
		[0.94–1.35]		[0.70–1.23]		[1.00–1.11]		[0.93–1.06]
Nationality (ref. Belgian)								
European		0.36		0.29		0.75		0.6
		[0.25–0.53]		[0.14–0.60]		[0.70–0.81]		[0.53–0.67]
Non-European		0.18		0.39		0.67		0.71
		[0.08–0.41]		[0.14–1.10]		[0.58–0.77]		[0.59–0.85]
Educational level (ref. Primary or less)								
Lower Secondary		0.88		1.05		0.91		0.9
		[0.72–1.07]		[0.76–1.46]		[0.87–0.95]		[0.84–0.96]
Higher secondary		0.8		1.27		0.9		0.91
		[0.65–0.99]		[0.90–1.78]		[0.86–0.95]		[0.85–0.98]
Higher, tertiary		0.6		1.46		0.75		0.73
		[0.60–0.76]		[1.01–2.09]		[0.71–0.80]		[0.67–0.80]
Unknown		0.8		0.99		1.07		1.16
		[0.62–1.03]		[0.66–1.48]		[1.02–1.12]		[1.08–1.24]

Table 1: (Continued)

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model 1	Model 2						
Occupational status (ref. Unemployed)								
Inactive		0.84		0.69		0.63		0.79
		[0.66–1.06]		[0.50–0.94]		[0.59–0.66]		[0.40–0.52]
Permanent contract		0.57		0.51		0.38		0.38
		[0.48–0.68]		[0.39–0.68]		[0.36–0.40]		[0.33–0.43]
Temporary contract		0.94		0.30		0.50		0.38
		[0.66–1.34]		[0.14–0.66]		[0.42–0.60]		[0.31–0.47]
Self-employed		0.63		0.64		0.38		0.31
		[0.49–0.82]		[0.37–1.12]		[0.35–0.41]		[0.20–0.49]
Unknown		0.59		0.71		0.41		0.49
		[0.43–0.83]		[0.43–1.17]		[0.37–0.46]		[0.41–0.58]
N	2,996,314	2,996,314	3,000,870	3,000,870	2,996,314	2,996,314	3,000,870	3,000,870

Notes: Model 1 controls for age and quadratic term of age; Model 2 controls for Model 1 + household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, density of occupancy.

^a no response or information about housing tenure; ^b measured through the number of household members per room; ^c collective households, households above 16 persons, flat-sharing.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations

Additional results present the predicted probabilities of suicide for owners and tenants, by region of residence, nationality, educational attainment, and occupation status. They are displayed in the Appendix (Figures A-2 to A-5)⁴. The results highlight

⁴ Figures A-2 to A-5 (Appendix) present the predicted probabilities of suicide of owners and tenants according to several individual characteristics (region of residence, nationality, educational level, and occupational status). First, Flemish residents show a higher risk of suicide when they rent than when they own their housing (Appendix – Figure A-2). Such a gap is not visible for Walloon and Brussels residents, especially for men. The strong promotion of homeownership in Flanders might result in a relative stigmatisation or selection of tenants (Fikse and Aalbers 2020). Second, Belgians show a visibly higher risk of suicide than European and especially than non-European foreigners (Appendix – Figure A-3). This result can be explained by the recognised better physical and mental health status of non-Belgian populations (Deboosere and Gadeyne 2005). A double selection effect is at stake. Populations moving and entering a new country might be in better shape than those who remain in their country, and health issues might lead people to return to their original living place (Deboosere and Gadeyne 2005). Among the Belgian and foreign population the risk of suicide is higher for tenants. Regarding education, there is no clear suicide mortality difference between owners and tenants among men with primary and tertiary education (Appendix – Figure A-4). On the contrary, men with lower or higher secondary education are advantaged when they are homeowners. Regarding women, only women who graduated with higher or higher secondary education show a higher risk of suicide when they are tenants. Finally, almost all occupational categories present a higher suicide mortality when they are tenants, except men and women on temporary work contracts (Appendix – Figure A-5). This can be understood as the contradiction

that the association between housing tenure and suicide is stronger in Flanders than in Wallonia/Brussels (Figure A-2) and for the Belgian population than for foreign populations (Figure A-3). Also, the association is more robust for men who graduated with at least higher secondary education, and for women who graduated with secondary education (Figure A-4). Unemployed and self-employed populations also show a stronger negative relation between homeownership and suicide risk (Figure A-5). Disparities in terms of age and household composition will be detailed in the further analyses.

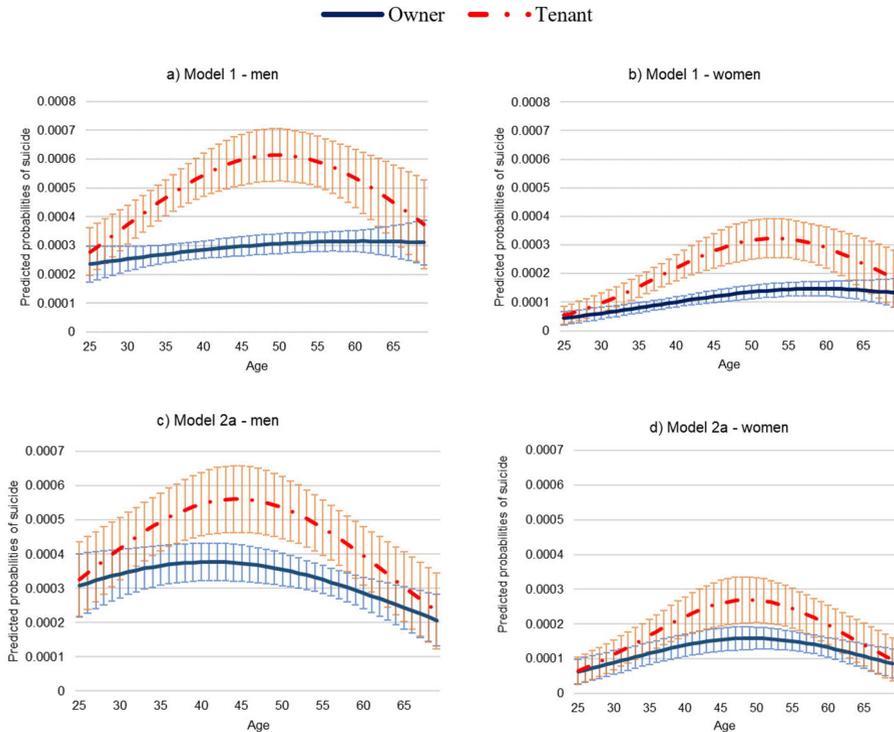
5.4 Interaction between housing tenure and age

Figure 2 illustrates the interaction effects of housing tenure and age on predicted probabilities of suicide, drawing on Model 1 (without other control variables, main effect results presented in the Appendix, Table A-4) and Model 2 (with control covariates, except subjective health, results presented in Figure 2). The predicted suicide rates are higher among tenants than among owners, with a peak among tenants in their 40s and 50s: from age 39 to 55 for men and from 45 to 55 for women. Controlling for individuals' background accounts for some, but not all, of these differences in middle age. Thus, excess suicide rates for tenants in their 40s and 50s cannot be explained by the socioeconomic and demographic variables considered here.

We note that only subjective health has a noticeable impact on confidence intervals. After adding self-reported health, tenants are not more at risk of suicide than owners, even for middle-aged adults.

between long-term homeownership costs and a short-term uncertain source of income. For instance, a study shows that temporary work contracts are associated with a delayed access to homeownership (McGrath and Keister 2008). Unemployed and inactive populations show the highest levels of suicide, especially when they are also tenants.

Figure 2: Multinomial logistic regression on the risk of suicide in 2002, predicted probabilities



Notes: Model 1a: based on Model 1, including an interaction between housing tenure and a quadratic term of age. Model 2a: based on Model 2 (controlling for housing quality, household type, nationality, region, area of residence, educational attainment, and occupational category), including an interaction between housing and a quadratic term of age. Results for other causes of death are presented in Appendix A-6. Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

5.5 Interaction between housing tenure, age, and marital status

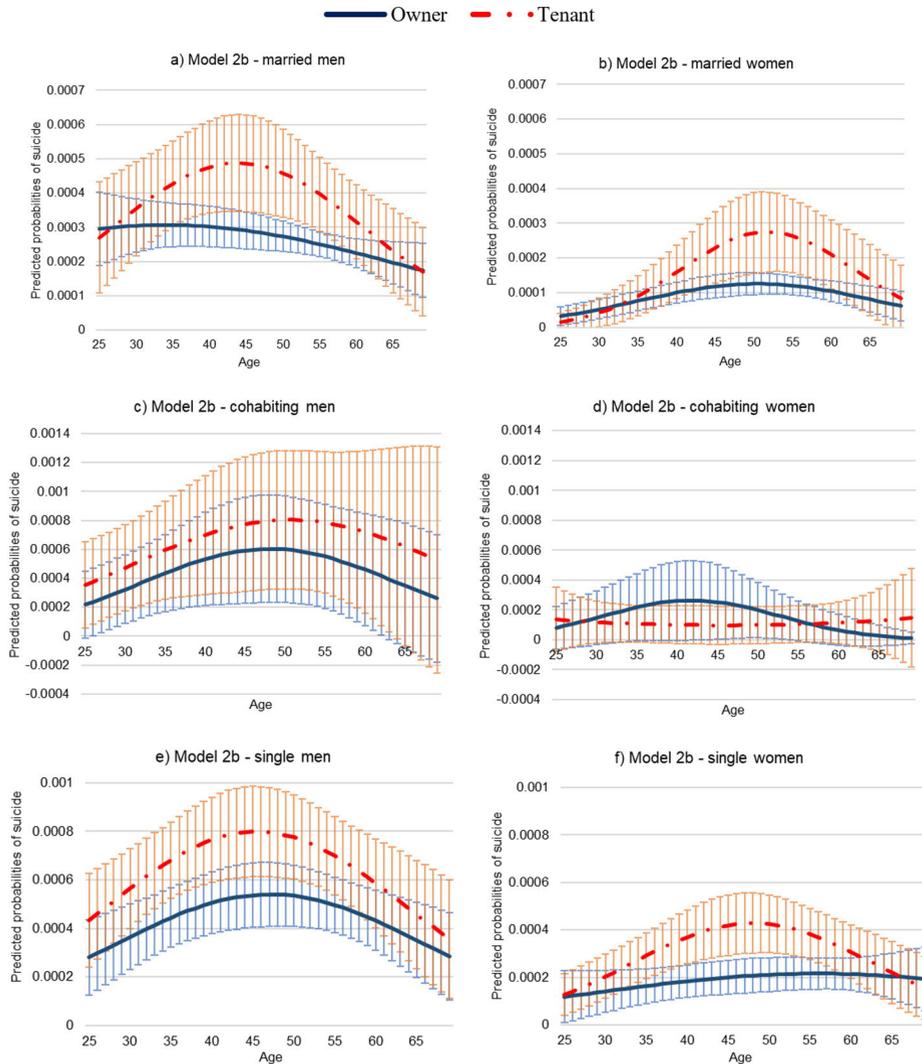
Next, we estimate a threefold interaction between housing tenure, age, and marital status. We first model this interaction based on Model 1 (without other control covariates, results presented in the Appendix, Table A-4) and then based on Model 4 (with control covariates, results presented in Figure 3 in predicted probabilities). The number of

suicides in each category is rather low (Appendix, Figure A-5), hence the large confidence intervals in our observations require careful consideration.

First, married men have a higher predicted probability of dying due to suicide between the early 30s and the mid-50s when they are renters compared to homeowners (Figure 3). Also, married women who are renting have a higher predicted probability of dying from suicide during their 50s than their home-owning counterparts.

The second noticeable result is for unpartnered women and persists after controlling for housing quality and demographic and socioeconomic characteristics (Figure 3). This result shows that being a tenant is associated with a higher rate of suicide for women from their late 30s to their early 50s; that is, in their normative childrearing years.

Figure 3: Multinomial logistic regression on the risk of suicide in 2002, predicted probabilities



Notes: Model 2b, based on Model 2 (controlling for housing quality, household type, nationality, region, area of residence, educational attainment, and occupational category), including an interaction between housing, marital status and a quadratic term of age. Results for other causes of death are presented in Appendix A-6.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

5.6 Interaction between housing tenure, age, and parenthood

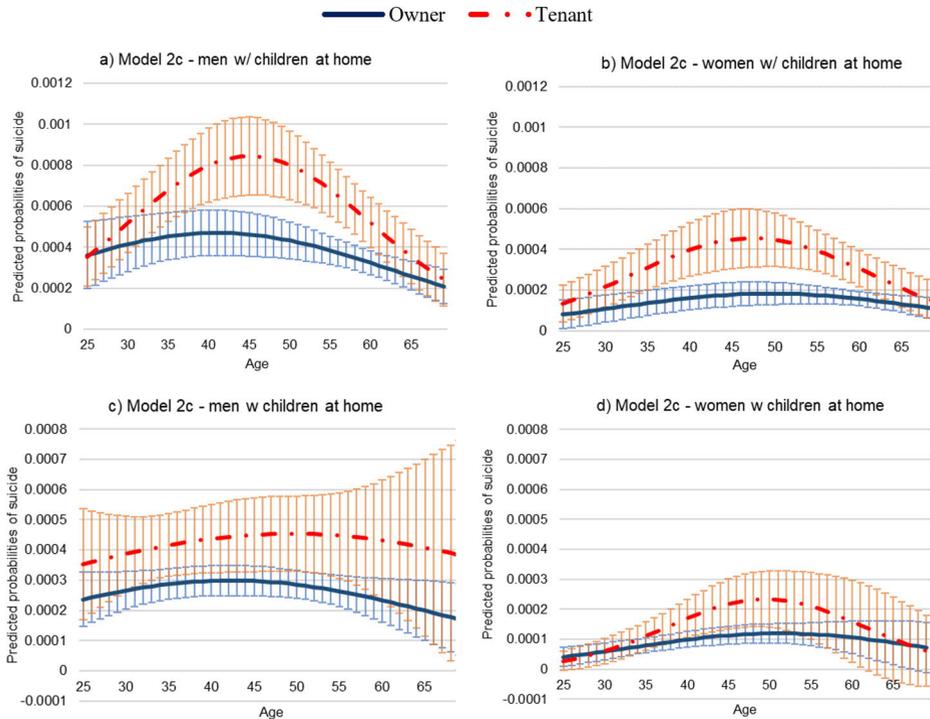
We carry out the same exercise according to parental status; i.e., whether people have children living in the same household.

Men and women not living with children show a higher risk of suicide when renting their dwelling, compared to homeowners. This is true for men from their 30s to their late 50s and for women from their mid-30s to their 60s, after controlling for housing quality, demographics, and socioeconomic variables (Figure 4).

Men living with children also show a slightly higher risk of suicide when they are tenants in their early 50s (Figure 4).

Lastly, we test whether household type – the combination of marital and parental status – reveals further insights into the relationships. The results are not displayed because this did not yield significant results, likely due to low numbers of suicides in most categories. The findings confirm that after controlling for housing-related, demographic, and socioeconomic information, only childless single women still had a higher risk of suicide when renting their accommodation. Conversely, married male tenants were not at a higher risk of suicide compared to owners, whether having children living in their home or not, once their background characteristics were accounted for.

Figure 4: Multinomial logistic regression on the risk of suicide in 2002, predicted probabilities



Notes: Model 2c, based on Model 2 (controlling for housing quality, household type, nationality, region, area of residence, educational attainment, and occupational category), including an interaction between housing and a quadratic term of age. Results for other causes of death are presented in Appendix A-6.
 Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

6. Discussion and conclusion

6.1 Main findings

This study explores, for the Belgian context, whether housing tenure and suicide risk are associated, whether this association changes across age groups and household situations, and whether it differs for men and women. The population of interest for this study is people aged 25 to 69 living in Belgium in 2002. In this study we cannot distinguish which member of the household is the legal owner of the housing. For more simplicity, we

define homeownership as the occupation of a home that is owned by one of the household members, without knowing whether the individual is actually the owner of the place.

The risk of suicide is higher for tenants than for owners, for both sexes. In this cross-sectional study we cannot conclude that housing tenure directly impacts suicide risk, but we can see that the relationship persists even after controlling for demographic characteristics, educational attainment, and occupation status. This is in accordance with our first hypothesis and with previous research on Belgium (Lorant et al. 2005) and other countries (e.g., the United States: DeBastiani, Norris, and Kerr 2019).

We find that suicide rates peak in the late 40s and early 50s for men and a bit later for women. The predicted probabilities of suicide are higher for tenants than for owners, and are highest when the social pressure to own one's own dwelling tends to be the strongest, i.e., between the late 40s and the early 60s, when one is supposed to have achieved financial and personal stability. This confirms our second hypothesis and suggests an interpretation of this result through the prism of Marmot's "status syndrome" (2004): being a renter at this age means going against a social norm, which can entail feelings of frustration or shame, compared to peers (Horne 2003; Liefbroer and Billari 2010), and points to other sources of instability in terms of employment, interpersonal relations, or geographical setting (Mulder and Lauster 2010).

The association between housing tenure and suicide according to marital configurations is not completely linked to gender norms in Western societies. On the one hand, married men have a higher risk of suicide when they are tenants, confirming the traditional expectation that men guarantee their family's material security (Dykstra and Keizer 2009; Payne, Swami, and Stanistreet 2008). However, this higher risk of suicide for tenants also applies to married women, which may indicate higher homeownership expectations for married people, independent of their gender. On the other hand, unpartnered women – especially during their childrearing years – have a higher risk of suicide when they are tenants. This does not apply to men. Unpartnered women may share a sense of uncertainty about their future if they are tenants with no housing permanence or security. When a woman is the only one responsible for her residential and material stability, being a renter increases the risk of losing her home.

Men and women with no children at home in mid-life have a higher predicted probability of suicide when they are tenants. This nuances our third hypothesis. We did not expect men's suicide risk to be strongly related to their housing tenure when they are not living with children, as we assumed that the pressure on them to provide security for the whole household would not be as heavy as when they are responsible for children. Women and men without children and without a home they own may lack a sense of achievement, belonging, and ontological security (Hiscock et al. 2001). However, our results may also mask gender-specific narratives. The data on coresidence with children does not indicate parental status. This means that persons who live without children may

be childless or their children may have left the parental home. The adult may also have gone through a separation and as a result not live with their biological children – which is more likely to happen to fathers. In some cases, this might explain the higher risk of suicide for some tenant men without children at home. Moreover, women’s well-being is highly affected by their parental status during their childrearing years (Graham 2015): the absence of children combined with the absence of homeownership could be detrimental to women’s mental health, and could be associated with their suicidal behaviour.

The loss of strong effects for nearly all interaction results after the addition of self-reported health indicates that we cannot rule out a selection effect in the relation between housing tenure, age, household composition, and suicide. However, the subjective dimension of this health indicator and its high statistical correlation with suicide risk (Appendix, Table A-2) led us to present results without controlling for this variable. Suicide in our sample occurred soon after participation in the 2001 census, which includes this subjective health measure: those who committed suicide in 2002 were likelier to report a poorer health status in 2001 compared to the general population.

6.2 Limitations

Four elements limit our interpretation and call for caution. First, the number of suicides in our observation period is low (Appendix, Table A-3), especially as we break the population down according to multiple characteristics (gender, age, and household category) and only refer to deaths in year 2002. Appendix A-M1 presents models with an additional year of observation (2003) and the results remain similar, the only exceptions being that we no longer observe the impact of housing tenure for married men, and we observe an increased suicide risk among mid-life tenants for single men. These differences possibly stem from a change of housing tenure between 2001 and 2003, as married persons and newly separated persons are likelier to change their housing tenure (Mulder and Lauster 2010). Hence our decision to remain as close as possible to the 2001 information and to only consider suicides in 2002.

Second, even though Belgian administrative data is strongly framed by laws and is high quality (Statbel 2019), the number of suicides can be underestimated, as in some cases a self-harm motivation cannot be determined and the cause of death is classified as unknown or as an accident. However, the numbers of undetermined-intent deaths are very low, and represent 2% to 3% of suicides in 2002.

Third, the use of a categorical variable for age would allow for a more flexible modelling of the phenomenon. This is presented in Appendix A-M2 and confirms most results found in Figures 2 to 4, except that the effect of housing tenure for single women

disappears. Due to the distribution of suicide rates over the life course of the population considered and the small numbers of suicides, the linear specification using a quadratic term of age was kept. Fourth, accounting for other socioeconomic characteristics such as income level and parents' socioeconomic category might also shed light on inequality of access to homeownership and parental support.

Finally, our analyses are cross-sectional. They cannot draw a conclusion about a causal direct relation between homeownership and suicide, as many factors at stake are not accounted for, such as the individual's and family's psychiatric context, or the cultural and religious background. On the one hand, housing tenure can impact mental health, but on the other hand, poor mental health can have consequences for an individual's socioeconomic situation and stability and can determine the life course and housing tenure (Macintyre et al. 1998; Hiscock et al. 2001). A predisposition to mental health issues can reduce the chance of graduating, getting and keeping a job, pursuing a long-term relationship, and achieving homeownership (Ellaway, Macdonald, and Kearns 2016; Holupka and Newman 2012; Slominski et al. 2011; Smith et al. 2003). This study cannot determine any causal relations. Our results do not exclude the possibility of a selection effect and could reflect a possible negative effect of depressive or suicidal symptoms on socioeconomic steadiness, relational stability, and personal achievement. By using a longitudinal approach, future studies could better account for this issue and better understand how the residential life course together with occupational and family trajectories affect suicide risk. In addition, because homeownership is common in Belgium, we cannot exclude the fact that the tenants represent a selected population, with particularly low socioeconomic characteristics and a higher risk of life course instability. Comparative studies including contexts where homeownership is less common (e.g., in Germany, where about 50% of the population are tenants) and even more common (e.g., in Eastern European countries such as Romania where 90% of the population are homeowners) could provide more insight on this possible selection effect.

6.3 Contribution

This study contributes to previous research by focusing on the poorly studied age- and family-status-related homeownership norm. Our research allows for a better understanding of gender-specific inequalities and determinants of suicide risk by underlining the importance of social norms and expectations. Our results call for policies for reducing self-harm to pay particular attention to the material and housing stability of those in mid-life and to acknowledge the existence of social pressure for homeownership. Such policies need to account for social norms – especially gender norms – and their potential detrimental effects on personal well-being and societal integration.

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Appendix

Table A-1: Observations and proportion of homeowners according to marital situation and parenthood in population aged 25–69

	Men		Women	
	N	% Homeowners	N	% Homeowners
Single	796,185	47.63%	857,055	49.55%
Married couple	1,930,950	80.72%	1,903,863	80.90%
Cohabiting couple	269,179	50.85%	239,952	53.73%
No child at home	1,426,306	58.93%	1,359,062	64.43%
Children at home	1,570,008	78.61%	1,641,808	74.21%
<i>Total population</i>	<i>2,996,314</i>		<i>3,000,870</i>	

Source: Census of Belgium 2001 data, DEMOBEL; authors' calculations.

Table A-2: Analysis of variance in suicide rates in 2002, according to subjective health level reported in the 2001 census

Health status in 2001	Suicide rate in 2002	ANOVA	
		F	p-value
Very good	0.0001022		
Good	0.0001765		
Intermediate	0.0003685	197.52	0.000
Bad	0.0009339		
Very bad	0.0010379		

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Table A-3: Number of suicides and total number of 25-to-69-year-old men and women according to their household composition

		Number of suicides	Number of deaths	Total
Men	Married couple	529	9,715	1,930,950
	Unmarried couple	118	1,064	269,179
	No couple	451	6,626	796,185
	Children at home	471	5,005	1,570,008
	No children at home	627	12,400	1,426,306
Women	Married couple	197	4,865	1,903,863
	Unmarried couple	30	499	239,952
	No couple	214	3,969	857,055
	Children at home	173	2,693	1,641,808
	No children at home	268	6,640	1,359,062

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Table A-4: Multinomial logistic regression results (β coefficients and [95% CIs] on the likelihood of suicide or death from other causes in 2002 (vs. survival), male and female populations aged 25–69, controlling for subjective health in model 3

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model1	Model3	Model1	Model3	Model1	Model3	Model1	Model3
Housing tenure (ref. Owner)								
Tenant	0.54 [0.41; 0.68]	0.25 [0.09; 0.40]	0.69 [0.49; 0.90]	0.29 [0.06; 0.52]	0.63 [0.59; 0.66]	0.25 [0.21; 0.29]	0.56 [0.51–0.61]	0.17 [0.12; 0.23]
Unknown ^a	0.99 [0.81; 1.17]	0.12 [-0.28; 0.52]	1.16 [0.89; 1.46]	0.4 [-0.22; 1.02]	1.07 [1.02; 1.12]	0.2 [0.11; 0.30]	1.07 [1.00–1.13]	0.14 [0.01; 0.28]
Age	0.06 [0.02; 0.10]	0.04 [-0.01; 0.09]	0.15 [0.08; 0.22]	0.13 [0.06; 0.21]	0.11 [0.09; 0.12]	0.07 [0.06; 0.09]	0.14 [0.12–0.16]	0.1 [0.07; 0.12]
Age ²	0 [0.00; 0.00]	0 [0.00; 0.00]	0 [0.00; 0.00]	0 [0.00; 0.00]	0 [0.00; 0.00]	0 [0.00; 0.00]	0 [0.00–0.00]	0 [0.00; 0.00]
Bathroom (ref. yes)								
No		-0.04 [-0.32; 0.23]	0.21 [-0.24; 0.65]		0.07 [0.00; 0.13]		0.13 [0.04; 0.22]	

Table A-4: (Continued)

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model 1	Model 3	Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
Central heating (ref. yes)								
No		0		0.01		0.12		0.09
		[-0.35; 0.14]		[-0.22; 0.24]		[0.08; 0-15]		[0.04; 0.14]
Density of occupation ^b		0		0.01		0		0
		[0.00; 0.00]		[0.00; 0.01]		[0.00; 0.00]		[0.00; 0.01]
Household type (ref. Married w. children)								
Married w/o children		-0.1		0.37		0.02		0.06
		[-0.30; 0.11]		[0.06; 0.68]		[-0.02; 0.07]		[-0.01; 0.12]
Cohabitant w. children		0.18		-0.06		-0.09		-0.15
		[-0.20; 0.56]		[-0.85; 0.73]		[-0.24; 0.06]		[-0.39; 0.08]
Cohabitant w/o children		0.28		-0.02		-0.1		0.03
		[-0.04; 0.60]		[-0.68; 0.64]		[-0.20; 0.01]		[-0.12; 0.17]
Single		0.52		0.89		0.16		-0.02
		[0.29; 0.76]		[0.46; 1.31]		[0.09; 0.24]		[-0.13; 0.09]
Single parent		0.32		0.42		0.08		-0.06
		[0.01; 0.34]		[-0.02; 0.86]		[-0.02; 0.18]		[-0.18; 0.06]
Unknown, other ^c		0.09		0.18		0.06		0.11
		[-0.17; 0.36]		[-0.29; 0.66]		[-0.01; 0.11]		[0.00; 0.21]
Civil status (ref. Single)								
Married		0.15		-0.02		-0.22		-0.38
		[-0.05; 0.23]		[-0.42; 0.38]		[-0.29; -0.15]		[-0.48; -0.28]
Widow/er		0.42		0.21		0.08		0.03
		[0.01; 0.84]		[-0.24; 0.66]		[0.00; 0.17]		[-0.13; 0.07]
Divorced		0.27		0.15		0		-0.24
		[0.06; 0.49]		[-0.20; 0.51]		[-0.06; 0.07]		[-0.34; -0.15]
Unknown		0.39		0.16		-0.19		-0.89
		[-0.48; 1.27]		[-1.46; 1.79]		[-0.48; 0.11]		[-1.42; -0.37]
Region of residence (ref. Flanders)								
Wallonia		0.09		0.01		0.04		-0.18
		[-0.05; 0.23]		[-0.20; 0.23]		[0.00; 0.08]		[-0.23; -0.13]
Brussels		-0.22		-0.5		-0.11		-0.12
		[-0.51; 0.06]		[-0.90; -0.09]		[-0.17; -0.04]		[-0.21; -0.04]

Table A-4: (Continued)

	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model1	Model3	Model1	Model3	Model1	Model3	Model1	Model3
Area of residence (ref. Urban)								
Suburban		0.04		-0.23		-0.01		-0.03
		[-0.12; 0.20]		[-0.47; 0.02]		[-0.05; 0.03]		[-0.08; 0.03]
Rural		0.2		-0.15		-0.06		-0.06
		[0.04; 0.36]		[-0.40; 0.11]		[-0.10; -0.02]		[-0.12; -0.01]
Nationality (ref. Belgian)								
European		-0.86		-1.02		-0.31		-0.53
		[-1.20; -0.52]		[-1.66; -0.39]		[-0.38; -0.24]		[-0.64; -0.42]
Non-European		-1.67		-0.88		-0.42		-0.44
		[-2.49; -0.85]		[-1.90; 0.15]		[-0.55; -0.29]		[-0.62; -0.26]
Educational level (ref. Primary or less)								
Lower Secondary		-0.04		0.21		0		0.05
		[-0.24; 0.15]		[-0.12; 0.53]		[-0.05; 0.05]		[-0.01; 0.11]
Higher secondary		-0.1		0.45		0.05		0.15
		[-0.30; 0.11]		[0.12; 0.79]		[0.00; -0.10]		[0.07; 0.22]
Higher, tertiary		-0.32		0.72		-0.04		0.08
		[-0.57; -0.08]		[0.36; 1.08]		[-0.10; 0.02]		[0.00; 0.17]
Unknown		-0.17		-0.02		0.03		0.06
		[-0.41; 0.08]		[-0.42; 0.38]		[-0.02; 0.08]		[0.00; 0.13]
Occupational status (ref. Unemployed)								
Public, permanent		-0.14		-0.03		-0.28		-0.28
		[-0.37; 0.10]		[-0.39; 0.33]		[-0.37; -0.20]		[-0.41; -0.16]
Private, permanent		-0.61		-0.5		-0.6		-0.39
		[-0.88; -0.34]		[-0.91; -0.09]		[-0.69; -0.51]		[-0.53; -0.26]
Manual, permanent		-0.2		-0.37		-0.46		-0.43
		[-0.41; 0.01]		[-0.99; 0.25]		[-0.55; -0.38]		[-0.63; -0.23]
Public, temporary		-1.48		-0.41		-0.16		-0.58
		[-2.87; -0.09]		[-1.41; 0.59]		[-0.47; 0.15]		[-1.00; -0.16]
Private, temporary		0.32		0.74		-0.43		-0.58
		[-0.35; 0.99]		[-2.14; 0.66]		[-0.83; -0.04]		[-1.08; -0.09]
Manual, temporary		0.46		-1.68		-0.17		-0.62
		[0.05; 0.87]		[-3.65; 0.29]		[-0.40; 0.05]		[-1.02; -0.23]

Table A-4: (Continued)

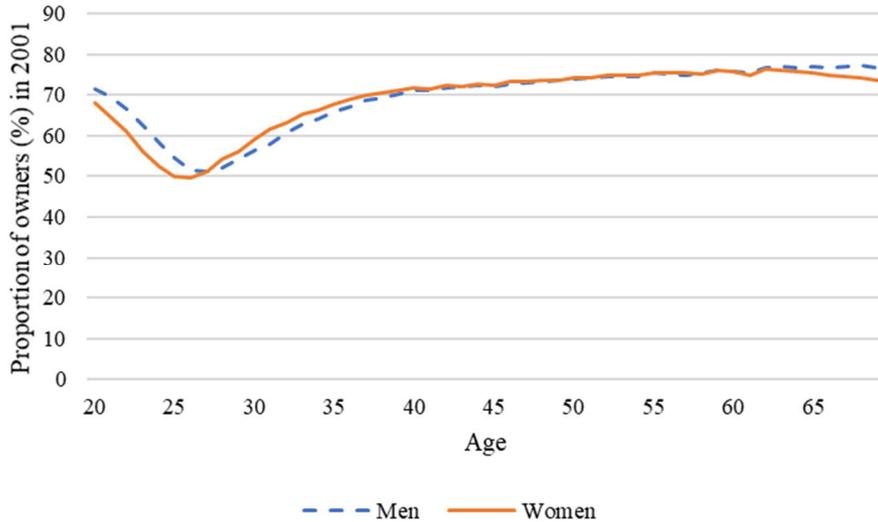
	SUICIDE				OTHER			
	Men		Women		Men		Women	
	Model1	Model3	Model1	Model3	Model1	Model3	Model1	Model3
Occupational status (ref. Unemployed)								
Self-employed		-0.14		0.11		-0.37		-0.18
		[-0.40; 0.12]		[-0.42; 0.63]		[-0.46; -0.28]		[-0.36; 0.00]
Inactive		0.26		0.02		-0.06		-0.05
		[0.00; 0.51]		[-0.33; 0.37]		[-0.11; -0.01]		[-0.11; 0.01]
Unknown		-0.26		0.09		-0.38		-0.28
		[-0.59; 0.06]		[-0.39; 0.57]		[-0.49; -0.26]		[-0.45; -0.11]
Subjective health (ref. Very good)								
Good		0.56		0.51		0.3		0.48
		[0.35; 0.77]		[0.13; 0.89]		[0.22; 0.38]		[0.36; 0.61]
Intermediate		1.14		1.45		1.1		1.54
		[0.91; 1.37]		[1.06; 1.85]		[1.02; 1.18]		[1.41; 1.66]
Bad		1.86		2.47		2.09		2.8
		[1.60; 2.13]		[2.05; 2.89]		[2.01; 2.18]		[2.67; 2.93]
Very bad		1.78		2.81		2.88		3.79
		[1.39; 2.17]		[2.28; 3.34]		[2.79; 2.97]		[3.65; 3.92]
Unknown		0.9		1.39		1.29		1.72
		[0.50; 1.31]		[0.80; 1.98]		[1.19; 1.39]		[1.57; 1.87]

Notes: Model 1 controls for age and quadratic term of age; Model 3 controls for Model 1 + household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, density of occupancy, and subjective health.

^a no response or information about housing tenure; ^b measured through the number of household members per room; ^c collective households, households above 16 persons, flat-sharing.

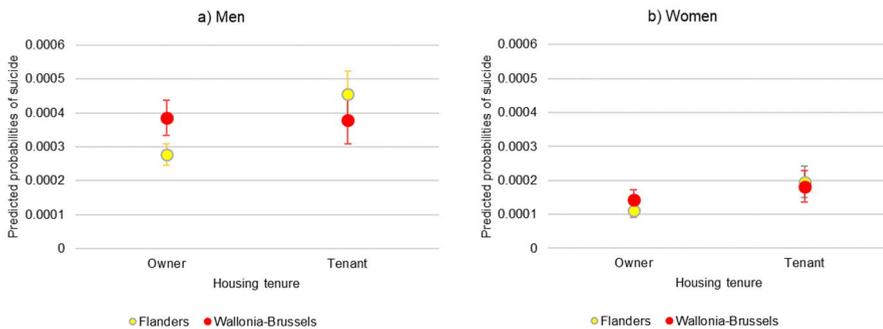
Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Figure A-1: Percentage of owners per age in Belgium, population aged 20–69, 2001



Source: Census of Belgium 2001 data; authors' calculations.

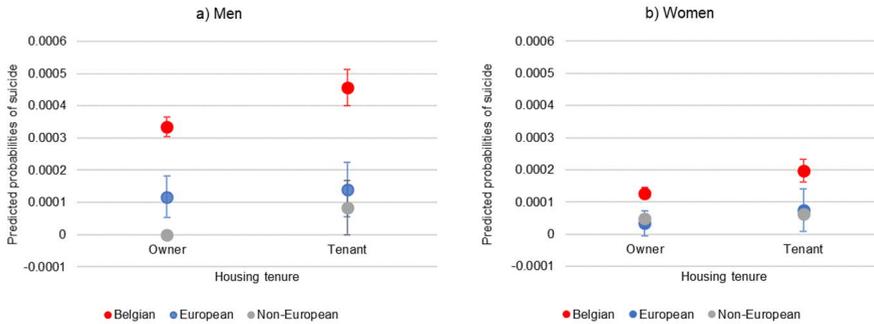
Figure A-2: Predicted probabilities of suicide for owners and tenants according to region of residence



Notes: Model based on Model 2 (controlling for housing quality, household type, nationality, area of residence, educational attainment, and occupational category), including an interaction between housing and region.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

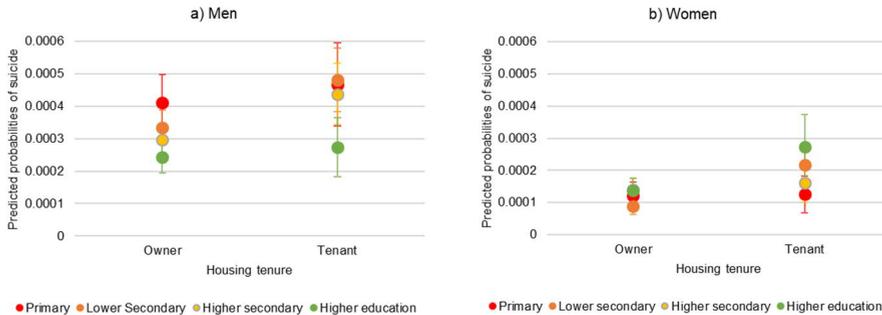
Figure A-3: Predicted probabilities of suicide in 2002 for owners and tenants according to nationality



Notes: Model based on Model 2 (controlling for housing quality, household type, region, area of residence, educational attainment, and occupational category), including an interaction between housing and nationality.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

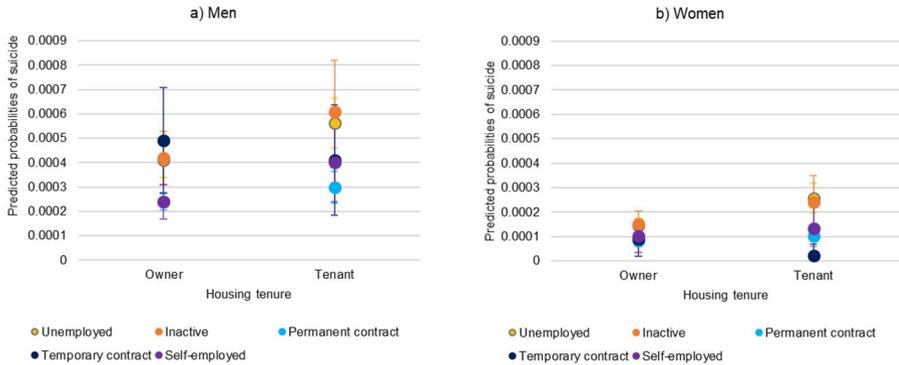
Figure A-4: Predicted probabilities of suicide in 2002 for owners and tenants according to educational level



Notes: Model based on Model 2 (controlling for housing quality, household type, nationality, region, area of residence, and occupational category), including an interaction between housing and education.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Figure A-5: Predicted probabilities of suicide in 2002 for owners and tenants according to occupational status



Notes: Model based on Model 2 (controlling for housing quality, household type, nationality, region, area of residence, and educational attainment), including an interaction between housing and occupational status.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Figures A-6 show that, except for unmarried persons, all predicted probabilities of suicide present a higher suicide mortality for tenants, compared to owners, from the 50s. This gap increases until the late 60s. This difference appears earlier, from the early 40s, for men and women without children.

Figure A-6: Multinomial logistic regression on the risk of dying from a cause other than suicide in 2002, predicted probabilities

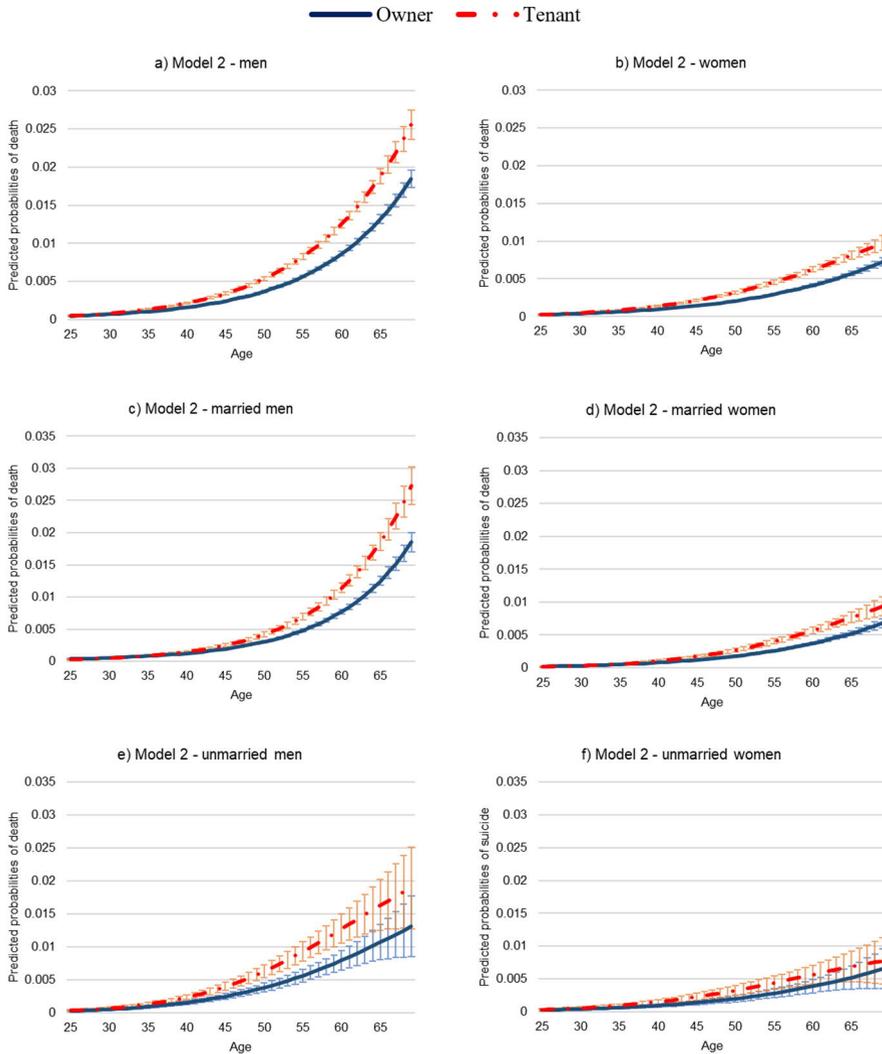
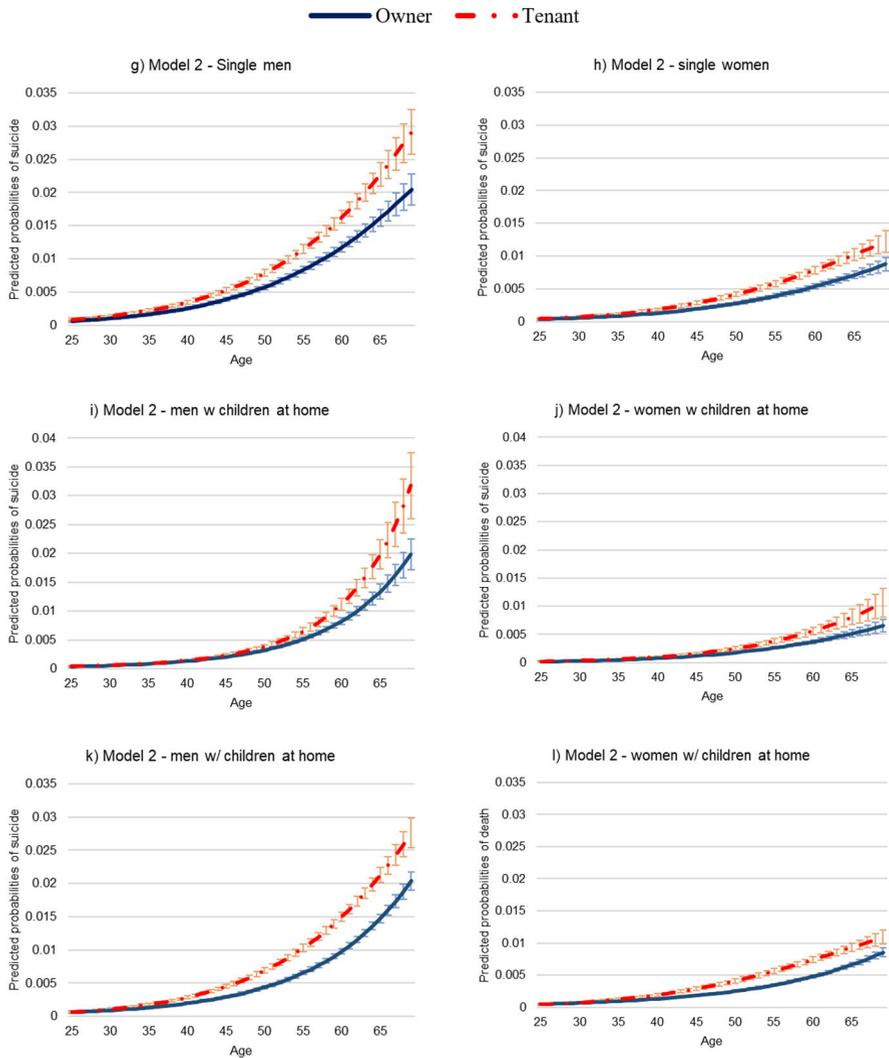


Figure A-6: (Continued)



Notes: Model based on Model 2 (controlling for housing quality, household type, nationality, area of residence, educational attainment, and occupational category), including an interaction between housing and region.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Methodological Appendix

Figure A-M1: Logistic regression on the risk of suicide in 2002 and 2003, predicted probabilities

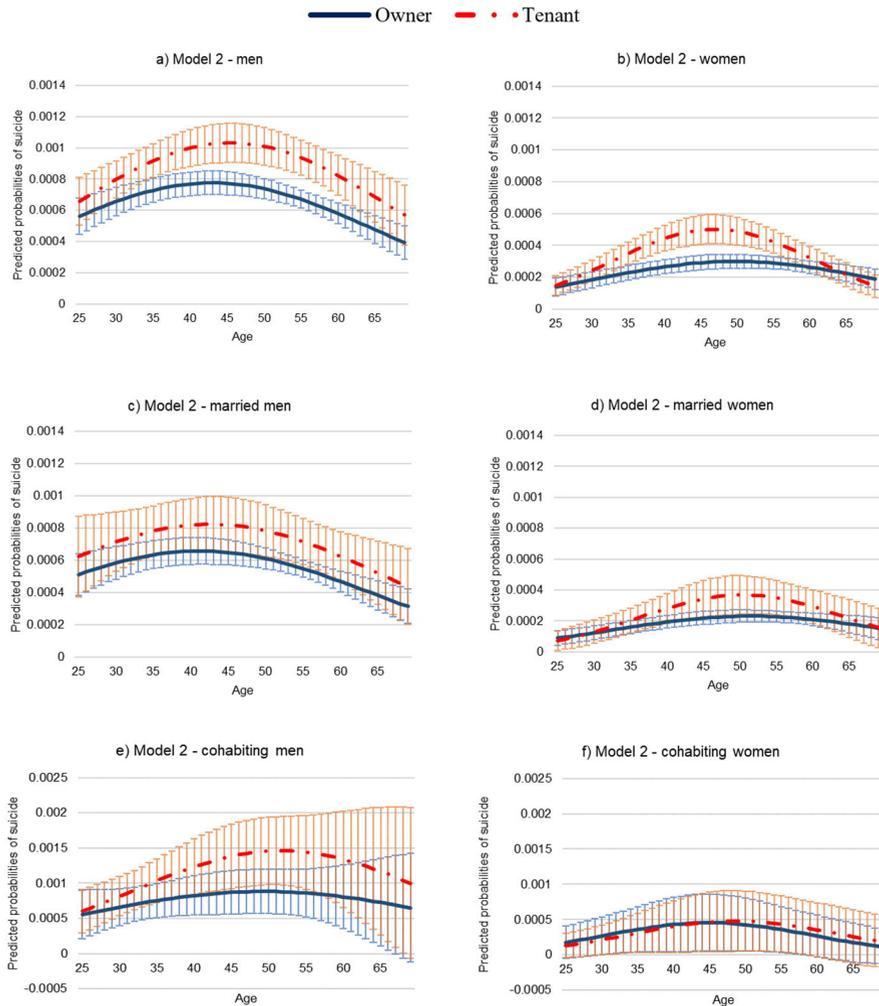
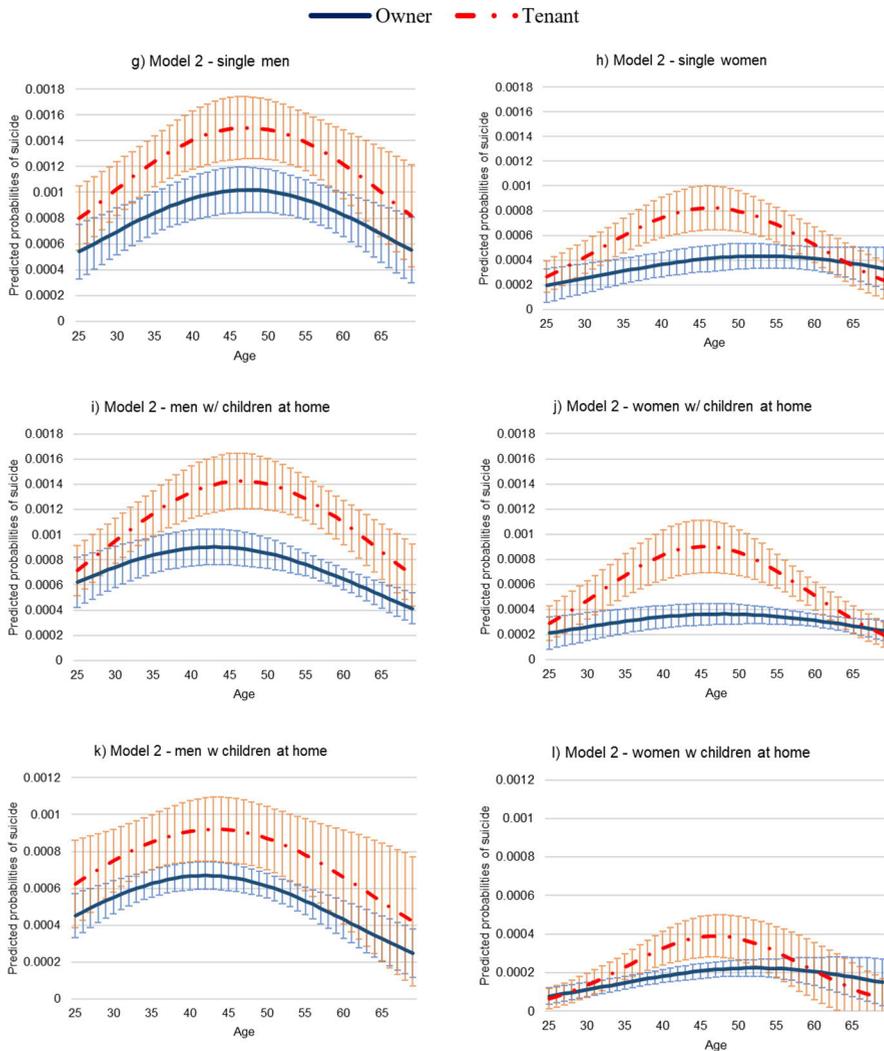


Figure A-M1: (Continued)



Note: Model 2 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, and density of occupancy. Models 2* are based on Model 2 (controls for age, quadratic term of age, household type, region, area of residence, nationality, education, presence of a bathroom, presence of central heating, and density of occupancy), except without control for occupational category.

Individuals who died from causes other than suicide in 2002–2003 were removed from the observation.

Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations.

Figure A-M2: Logistic regression on the risk of suicide in 2002, with age as categorical variable, predicted probabilities

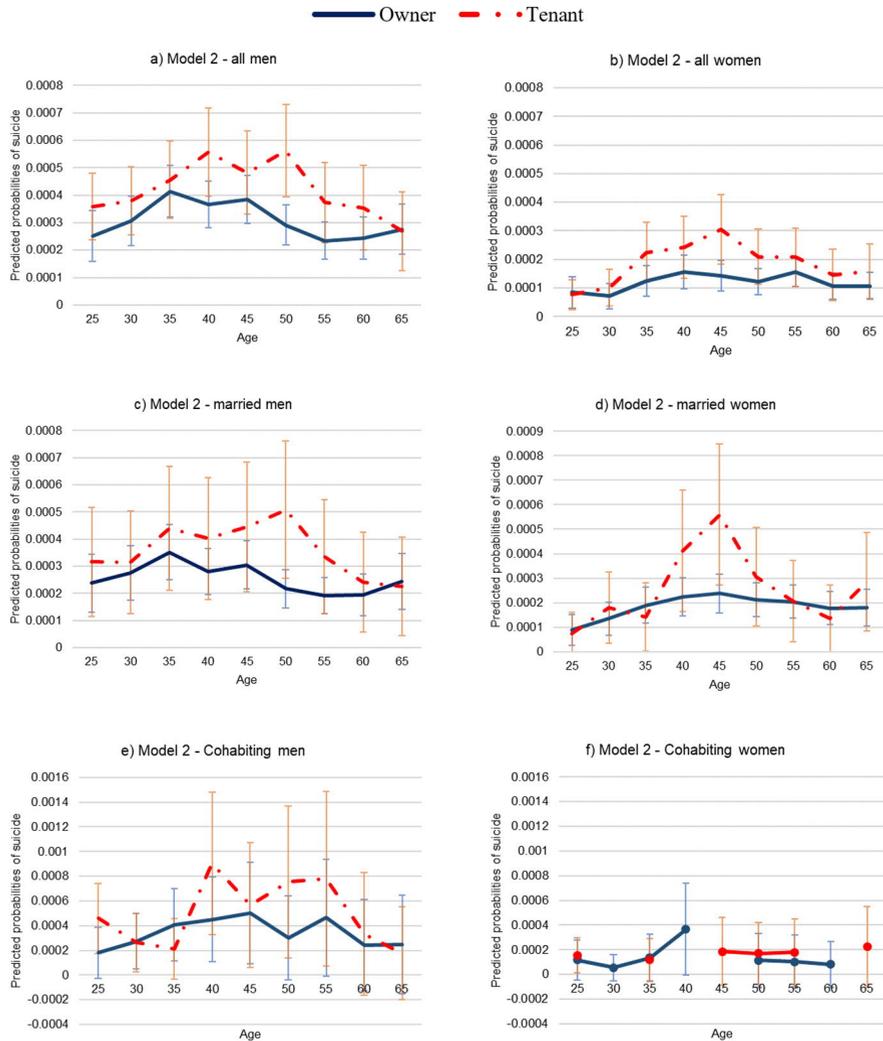
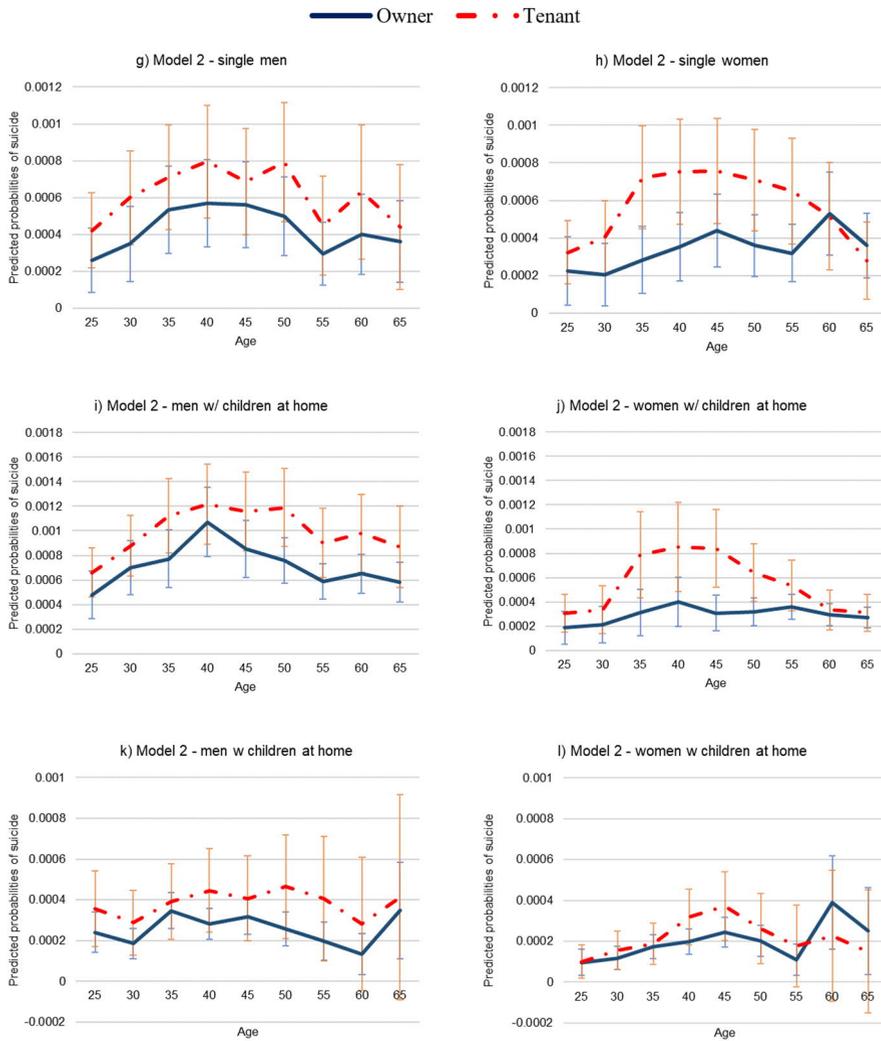


Figure A-M2: (Continued)



Note: Model 2 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, and density of occupancy.
 Source: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations