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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

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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.

Objective: This study examines the varying effect of housing tenure on 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 to study suicide rates in the population aged 20 to 69 years in 2002, separately by sex.

Results: We find a negative association of homeownership on 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 increases the 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 childless women are at highest risk of suicide in mid-life when renting.

Conclusions: Homeownership is associated with a lower suicide risk for middle-aged populations, more specifically for married men, unpartnered women, and individuals living with children.

Contribution: Suicide risk is higher for tenants, especially those for whom the social expectation of homeownership is the highest.

Keywords: Housing tenure; suicide; mental health; mortality; socioeconomic inequalities; social norms; life course.

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 rate¹, i.e., about 17 suicides per 100,000 inhabitants (EU-28 average: 11).

Studies 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 that affect suicide risk, housing conditions and living environment are poorly studied due to a lack of good-quality data, with existing studies often reducing housing tenure to economics (e.g., Lorant et al. 2005). Both suicide and homeownership are influenced by socioeconomic circumstances and reflect well-being, but they are also subject to social norms related to gender, age, life events, and living arrangements

¹ After Lithuania, Latvia, Slovenia, and Hungary.

(Ellaway, Macdonald, and Kearns 2016; Lorant et al. 2005). This study aims to provide a more nuanced view of the link between homeownership and suicide. We ask whether men and women are more disadvantaged by their tenant status between their mid-30s and late 50s than at other times in their lives, in terms of increased suicide risk.

Previous research has demonstrated that homeownership is 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 can be interpreted as a failure and may increase the risk of poor mental health (Cleary 2012), to a different extent for men and women, according to age and household composition.

This study focuses on the link between housing tenure, age, and suicide risk among the working-age population (20 to 69 years old). Our objective is to evaluate whether the effect of housing tenure on suicide differs according to age and living arrangements, considering the social norm of homeownership in the life course.

LITERATURE REVIEW

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 is 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 other

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 risks of depression and suicidal behaviours (De Silva et al. 2005; Heikkinen, Aro, and Lönnqvist 1993; Joiner 2005; Silva, Loureiro, and Cardoso 2016; Stanley et al. 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 within a community.

Social determinants of suicide

Recent studies affirmed and extended 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 potentially 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. Individuals in their decisions 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 age (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 for 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 transgression of norms less common. For example, an analysis of 38 countries showed that being divorced was more detrimental to well-being in countries where divorce was rare (Kalmijn 2010). Another study on 24 European countries showed that childlessness was associated with poorer psychological well-being in countries where family norms were more rigid (Huijts, Kraaykamp, and Subramanian 2013). 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, Lopez-Castroman et al. 2016; Conejero, Olié et al. 2018). Being involved in an active social life or in a family life and living with a partner or with children (Conejero, Lopez-Castroman et al. 2016; Conejero, Olié et al. 2018; Hooghe and Vanhoutte 2011) are associated with better physical and mental health (William 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 their life satisfaction (Dykstra and Keizer 2009) and their suicide rate (Bruce and Kim 1992).

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 better confidence in the future. As a consequence, homeowners may adopt a healthier lifestyle, leading to a longer life and better physical and mental health (Ignatieff 1996; Marmot 2004).

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

Homeownership has a positive effect on the well-being of the individual (Herbert and Belsky 2008), except for those in low-income households who in becoming owners sacrifice their comfort and their ability to pay their bills (Mulder and Lauster 2010). Homeownership is often associated with a better situation than rented housing (Ineichen 2003; Herbert and Belsky 2008) in terms of geographical location, environment, and comfort (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) applied the concept of ontological security to refer to well-being associated with homeownership. The majority of the 43 homeowners and tenants they interviewed reported homeownership as a social achievement and an investment in their future well-being and that of their offspring. Homeowners reported living in a more secure neighbourhood, more self-esteem and confidence for the future, and a better appreciation of life in general (Hiscock et al. 2001). The advantages associated with homeownership are apparent for all household members – adults, children, teenagers, and young adults (Galster et al. 2007).

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; Smith et al. 2003). The therapeutic effect, or the 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 a long-term financial obligation (Macintyre et al. 1998; Smith et al. 2003); however, it does provide better housing quality and a higher social standing (Herbert and Belsky 2008; Hiscock et al. 2001).

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 in suicide risk, among other socioeconomic factors such as education and occupational category. In Norway, Finland, Denmark, Belgium, and England/Wales, higher risks of suicide were 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.

Situation in Belgium

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). Unlike other Western European countries, Belgium's suicide rate remains

high for working-age adults, 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 provided legal pathways for both euthanasia and assisted suicide – considered respectively as non-administration of surgical and medical care (Y66) and suicide (X60–X84) by the 10th revision of the International Classification of Diseases (ICD) – but international comparisons do not confirm this hypothesis.

Housing tenure

For the following, we draw on recent work by Schnor and Mikolai (2020), who provided a detailed description of Belgium's housing market. Belgium's housing structure is marked by a high prevalence of homeownership (72%) and a 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 on 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 advantageous for homeowners compared to tenants, but 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 has 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 is estimated to be on average 5.6 years longer for males and 3.6 for females than for their tenant counterparts

(Eggerickx et al. 2018; Van Aerden et al. 2019). In Belgium, where the majority are homeowners, being a tenant 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).

Research hypotheses

Homeownership is associated with positive feelings and experiences such as safety, stability, pride, involvement, and achievement. It involves short-term and long-term expenses that depend on financial means and social capital. Consequently, socioeconomic status is a potential confounding factor in the relation between housing tenure and suicide. Homeownership also has positive effects on mental health, from a sense of achievement and belonging to ontological security. One contribution of this research is to test our *first hypothesis*, which assumes that homeownership, besides its indirect effects on suicide (through individual socioeconomic resources), has a direct downward impact on an individual's suicide risk.

Homeownership is seen as a major achievement in terms of residential experience and becomes normative for those who are expected to have achieved financial stability, that is, 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.

Moreover, we do not expect homeownership to have the same impact for men and women. As homeownership highly depends on economic resources, men, who are traditionally seen as the breadwinner, are expected to take responsibility for the material comfort of their partner and/or

children and to feel some 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 when living with a partner and with children. 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 of the sense of belonging and trust in the future it provides. 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 are more at risk of committing suicide if they are tenants compared to owning their dwelling.

DATA

We use data from the Demobel database provided by Statistics Belgium for the CAUSINEQ project (Statbel 2019). The data combines socioeconomic information from the 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, including self-reported health level, that are not available in more recent data 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 persons domiciled in Belgium. The survey 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. We include young adults who live in their parents' dwelling, as they are also affected by the advantages and disadvantages of housing tenure.

Analytical sample. As our data on homeownership stems 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 A-M1). We concentrate on the adult population aged 20–69 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. Contrary to older people, working-age adults are less exposed to extreme isolation due to their work activities, are more frequently exposed to friend and family relationships, and have greater mobility. Similarly, health problems are less prevalent and less of a source of mobility deprivation. For young people under the age of 20, as they most often live with their parents, it makes little sense to consider their housing tenure. Our analytical sample includes N=3,317,599 men (1,167 suicides in 2002) and N=3,316,355 women (456 suicides).

Variables. In the housing questionnaire, the household reference 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 characteristics, 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.

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

Living arrangements were reconstructed based on information on the relationship of each member of the household to the reference member and on the civil status of all household members available in the National Register. The parental relationship is here 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 within the household, we assume an unmarried partnership, a broad way of defining a coresident couple that can also include situations of flat sharing and thus overestimate the phenomenon. Other covariates are considered, such as the nationality of the person (Belgian, other European, non-European), region of residence (Flanders, Wallonia, Brussels), area of residence (urban, suburban, rural), educational attainment (primary, low secondary, high secondary, higher education), and occupational sector and type of contract (unemployed, public sector employee with a permanent contract, private sector employee with a permanent contract, manual worker with a permanent contract, public sector employee with a temporary contract, private sector employee with a temporary contract, manual worker with a temporary contract, independent, inactive, retired). The 2001 census also yields information about the individual's subjective health status based on a five-level scale (very good, good, intermediate, bad, very bad).

METHODS

We use logistic regressions to estimate the likelihood of dying by suicide in 2002. Our dependent variable distinguishes suicide (1) versus survival or death from other causes (0). We build up our model stepwisely. Model 1 estimates the relation between housing tenure and

suicide, controlling for age. In Model 2, we additionally control for living arrangements, nationality, region, and area of residence. We add educational attainment and occupational categories, as measures of socioeconomic background, to Model 3.

In a second series of models, we check whether our results remain robust when we include information on housing quality (Model 4) – measured by the presence of a bathroom, the presence of central heating, and density of occupancy – and on subjective health level (Model 5). As subjective health is highly related to suicide rates (see Appendix, Figure A4), we prefer to estimate interaction models building on Model 4. Models presented in this section are defined by a linear specification with a quadratic term of age. More flexible models, based on five-year age groups, are presented in the methodological appendix (Appendix A-M2).

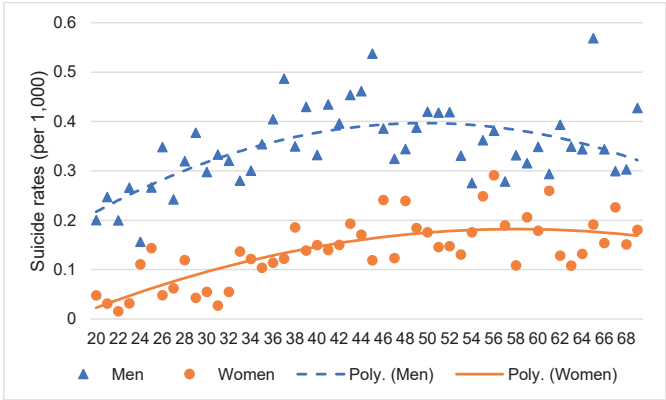
We estimated interaction effects between age and housing tenure, to test our hypothesis of the age-dependent social norm of homeownership on the risk of suicide in Belgium. Finally, we estimated a threefold interaction between age, housing tenure, and living arrangements to address the question of whether specific household configurations increase individual vulnerability. To do so, we calculated 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).

RESULTS

Suicide and age

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



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

Figure 1 shows age-specific suicide rates for men and women. These rates do not follow a clear linear pattern; there is a rise in young adulthood, from approximately 20 to 35, followed by a peak in the 40s and the 50s for men and women, and then a subsequent 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, put forward by Horiuchi (2003) to assess the acceleration of human mortality among the middle-aged adult population.

Homeownership, age, and household composition

In 2001, throughout all adult ages, the majority of women and men residing in Belgium were homeowners (see Appendix, Figure A1). The proportion of young owners in their early 20s is

very high, reflecting the fact that many young adults live in their parents’ home. From 20 to 29, young people start to get independent, hence a drop in homeownership. At 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 thereafter it remains high. Men and women show similar patterns.

We observe that the proportion of homeowners is substantially lower among singles and cohabiting couples than among married couples (Table A1, Appendix). When it comes to residence with children, we see that 78.1% of men and 73.7% of women living with their children are owners. Among people living without children, the proportion of homeowners is lower (57.7% for men and 62.6% for women).

Main effects

Regression model results are presented as odds ratios in Table 1 for men and in Table 2 for women, including the main variables of interest, namely housing tenure, age, and household type. Complete model results that include all control variables are added in the Appendix, Tables A2 and A3. 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 to Model 5). In addition, we observe that age increases the risk of suicide among men and women. The effect of household type is gendered. Men have an increased 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 risks. 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.

Table 1 – Logistic regression results (odds ratios [OR]) on the likelihood of suicide in 2002 (vs. survival or other cause of death), male population aged 20–69.

	Model 1 OR [95% CI]	Model 2 OR [95% CI]	Model 3 OR [95% CI]	Model 4 OR [95% CI]	Model 5 OR [95% CI]
Housing tenure (ref. Owner)					
Tenant	1.71 [1.50–1.94]	1.47 [1.28–1.69]	1.36 [1.17–1.58]	1.34 [1.06–1.69]	1.28 [1.11–1.49]
Unknown ^a	2.74 [2.30–3.26]	2.54 [2.11–3.06]	1.85 [1.43–2.38]	1.9 [1.23–2.92]	1.18 [0.79–1.74]
Age	1.08 [1.05–1.11]	1.08 [1.05–1.11]	1.12 [1.08–1.17]	1.17 [1.09–1.24]	1.09 [1.05–1.13]
Age ²	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]
Household type (ref. Married with children)					
Married without children		1.10 [0.91–1.34]	1.01 [0.82–1.24]	0.99 [0.81–1.23]	0.96 [0.78–1.19]
Unmarried with children		1.56 [1.15–2.10]	1.38 [0.99–1.93]	1.39 [0.99–1.93]	1.37 [0.98–1.91]
Unmarried without children		1.64 [1.28–2.11]	1.44 [1.09–1.90]	1.44 [1.09–1.90]	1.35 [1.03–1.79]
Single person		2.28 [1.93–2.69]	2.02 [1.70–2.39]	1.93 [1.61–2.32]	1.75 [1.46–2.10]
Lone parent		1.86 [1.46–2.36]	1.65 [1.29–2.11]	1.6 [1.24–2.07]	1.5 [1.16–1.94]
Other ^b		1.41 [1.13–1.77]	1.32 [1.04–1.67]	1.25 [0.98–1.59]	1.2 [0.94–1.55]
N	3,317,599	3,317,599	3,317,599	3,317,599	3,317,599

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Notes: Model 1 controls for age and quadratic term of age; Model 2 controls for age, quadratic term of age, household type, region, area of residence, and nationality; Model 3 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, and occupational category; Model 4 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; Model 5 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, density of occupancy, and subjective health.

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

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

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Table 2 – Logistic regression results (odds ratios [OR]) on the likelihood of suicide in 2002 (vs. survival or other cause of death), female population aged 20–69.

	Model 1	Model 2	Model 3	Model 4	Model 5
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Housing tenure (ref. Owner)					
Tenant	1.96 [1.60–2.40]	1.48 [1.19–1.85]	1.57 [1.25–1.97]	1.56 [1.24–1.96]	1.34 [1.06–1.69]
Unknown ^a	3.25 [2.44–4.33]	2.96 [2.20–3.99]	2.24 [1.50–3.36]	1.64 [0.88–3.06]	1.49 [0.80–2.76]
Age	1.16 [1.10–1.23]	1.19 [1.12–1.25]	1.22 [1.15–1.30]	1.23 [1.15–1.31]	1.17 [1.10–1.25]
Age ²	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]
Household type (ref. Married with children)					
Married without children		1.58 [1.17–2.13]	1.53 [1.12–2.08]	1.52 [1.11–2.06]	1.35 [0.99–1.84]
Unmarried with children		1.23 [0.71–2.34]	1.05 [0.51–2.16]	1.05 [0.51–2.16]	1.02 [0.50–2.11]
Unmarried without children		1.55 [0.96–2.52]	1.3 [0.74–2.29]	1.29 [0.73–2.27]	1.09 [0.62–1.93]
Single person		3.45 [2.60–4.57]	3.4 [2.52–4.58]	3.26 [2.41–4.40]	2.56 [1.89–3.48]
Lone parent		1.81 [1.30–2.50]	1.78 [1.27–2.51]	1.78 [1.26–2.51]	1.56 [1.11–2.20]
Other ^b		1.53 [1.03–2.27]	1.47 [0.96–2.23]	1.38 [0.89–2.11]	1.19 [0.76–1.87]
N	3,316,355	3,316,355	3,316,355	3,316,355	3,316,355

20

Notes: Model 1 controls for age and quadratic term of age; Model 2 controls for age, quadratic term of age, household type, region, area of residence, and nationality; Model 3 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, and occupational category; Model 4 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; Model 5 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, density of occupancy, and subjective health.

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

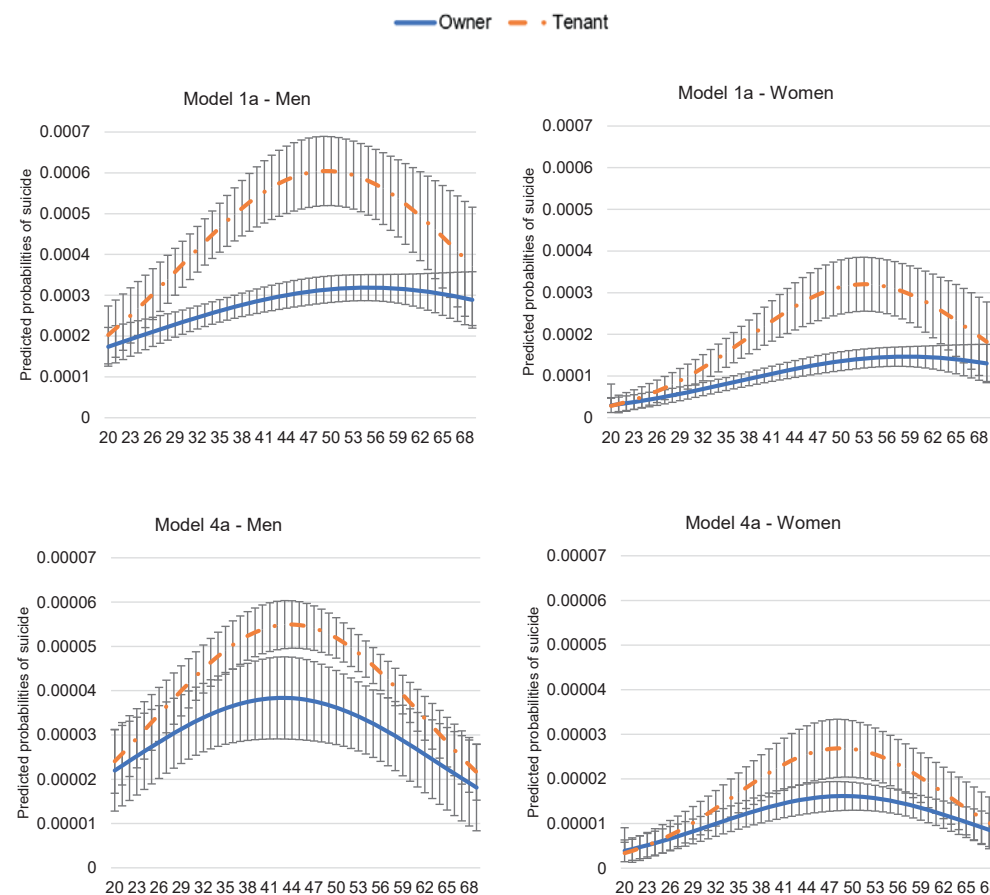
Sources: Census of Belgium 2001 and National Register data, death registers, DEMOBEL; authors' calculations

Interaction between housing tenure and age

Figure 2 illustrates the interaction effects of housing tenure and age in predicted probabilities of suicide, drawing on Model 1 (without other control covariates, results presented in Appendix, Figure A2) and Model 4 (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 had a noticeable impact on confidence intervals. After adding self-reported health, tenants were not more at risk of suicide than owners, even for middle-aged adults (Appendix, Figure A2).

Figure 2 – 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 4a: based on Model 4 (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.

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

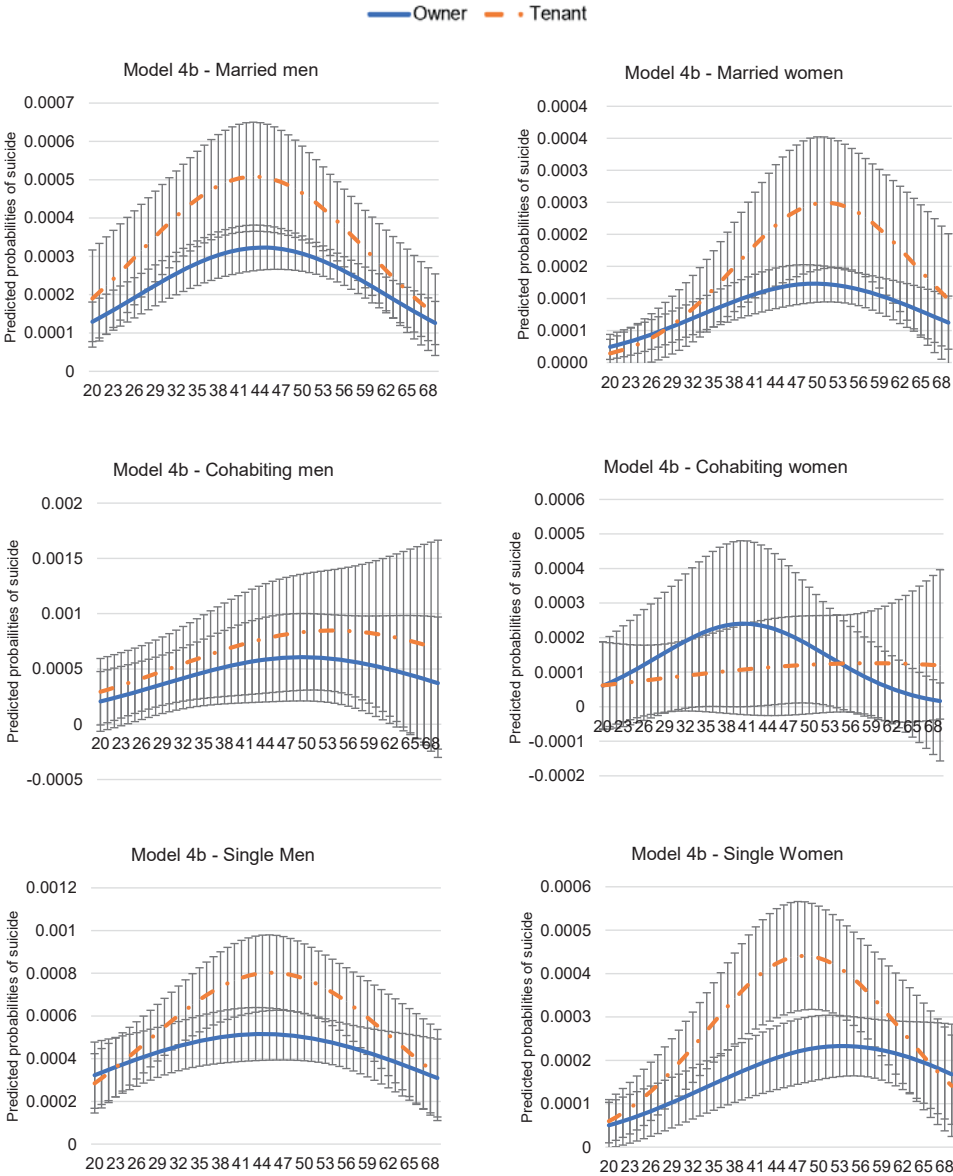
Interaction between housing tenure, age, and marital status

Next we estimated a threefold interaction between housing tenure, age, and marital status. We first modelled this interaction based on Model 1 (without other control covariates, results presented in Appendix, Figure A3) 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 A5), hence the large confidence intervals in our observations requiring 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 A3, Appendix). After controlling for occupational characteristics, the 95% confidence intervals of the predicted probabilities of suicide overlap slightly for renting and owning married middle-age adults (cf. Models 4*b and 4*c, without control for occupational category in Appendix, Figure A5 versus Figure 3).

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 – Logistic regression on the risk of suicide in 2002, predicted probabilities.



Notes: Model 4b, based on Model 4 (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.

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

Interaction between housing tenure, age, and parenthood

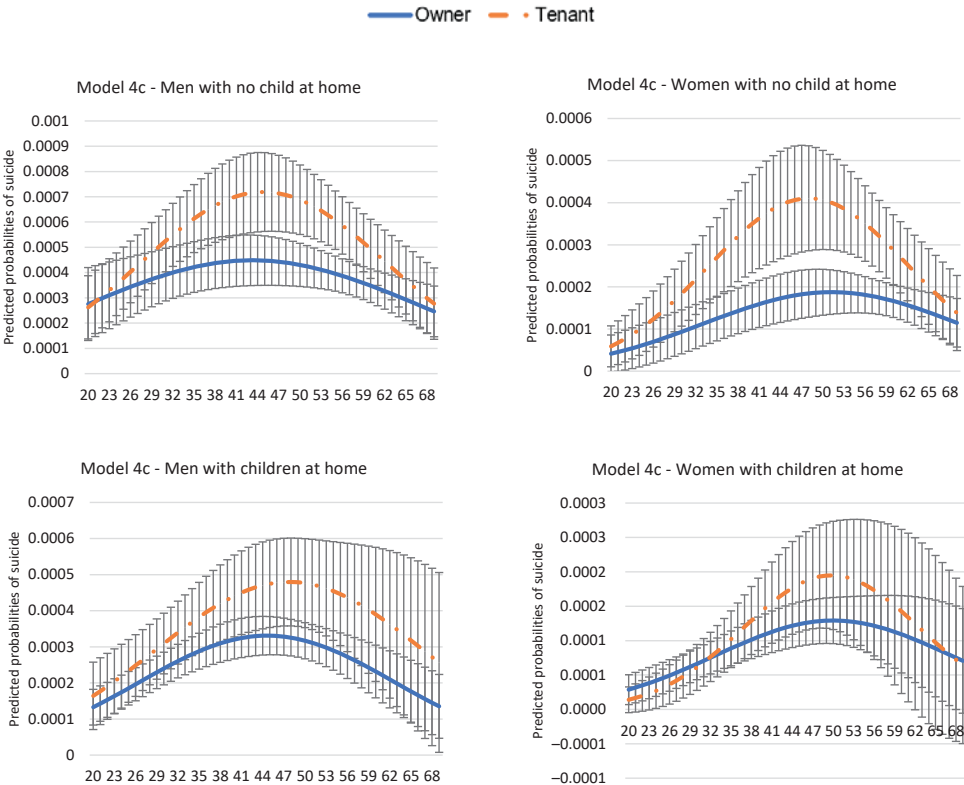
We carried out the same exercise according to parental status, i.e., whether people have children living in the same household. Again, we first model this interaction based on Model 1 (without other control covariates, see Appendix, Figure A4) and then based on Model 3 (with control covariates, see Figure 4).

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 late 40s to their late 50s and for women from their mid-30s to their 60s, both before (Appendix, Figure A4) and after controlling for housing quality, demographics, and socioeconomic variables (Figure 4).

Men living with children also show a higher risk of suicide when they are tenants, but only before controlling for their occupational category (cf. Models 4*b and 4*c, without control for occupational category in Appendix, Figure A5 versus Figure 4).

Lastly, we tested whether household type – the combination of marital and parental status – reveals further insights into the relations. 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 – Logistic regression on the risk of suicide in 2002, predicted probabilities.



Notes: Model 4c, based on Model 4 (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.

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

DISCUSSION & CONCLUSION

This study explored whether housing tenure and suicide risk were associated in the Belgian context, not only considering the possible benefits of owning one's accommodation on mental health but also accounting for the social norm of homeownership. The population of interest for this study was people aged 20 to 69 who lived in Belgium in 2002.

The risk of suicide is higher for tenants than for owners, for both sexes. This result persists even after controlling for demographic and socioeconomic characteristics, which shows the specific relation between housing tenure and suicide risk independently of individual socioeconomic background. This is in accordance with our first hypothesis and with previous research for Belgium (Lorant et al. 2005) and other countries (e.g., the United States: DeBastiani, Norris, and Kerr 2019).

We then aimed at investigating how this relation may be affected by the social norm of homeownership. We found that suicide rates show a peak of suicide in the late 40s and early 50s for men and a bit later for women. The predicted probabilities of suicide are higher for tenants, compared to owners, 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. We thus confirmed our second hypothesis and suggest an interpretation of this result through the prism of Marmot's "status syndrome" (2004). Still, 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 also point to other sources of instability, in terms of job, interpersonal relations, or geographical setting (Mulder and Lauster 2010).

The relation between housing tenure and suicide according to marital configurations are linked to gender norms in Western societies. On the one hand, married men and men living with

children have a higher risk of suicide when they are a tenant – whereas this does not apply to women. This link does, however, disappear after adding occupational category into the models, which shows that men's income and financial security mediate the relation between housing tenure and suicide risk. Traditionally, men are expected to guarantee material security for their family (Dykstra and Keizer 2009; Payne, Swami, and Stanistreet 2008). This result points out the higher suicide risk for men who, owing to unemployment, cannot fulfil this role due to their inability to provide their family with stable, good-quality housing and a long-term investment.

Men and women with no children at home in mid-life have a higher predicted probability of suicide when they are tenants, which persists after controlling for occupational category. This nuances our third hypothesis. We did not expect men's suicide risk to be influenced by their housing tenure when they are not living with children, as the pressure on them to provide security for the whole household would not be so strong. Women and men without children or a dwelling they own may possibly be lacking in a sense of achievement, belonging, and ontological security (Hiscock et al. 2001). Our results may, however, 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 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.

Unpartnered women and women without children – especially during their childrearing years – have a higher risk of suicide when they are tenants. These results persist after controlling for individuals' characteristics. These 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 accommodations. Moreover, women's well-being is highly affected by their parental status

during their childrearing years (Graham 2015): cumulating the absence of children and the absence of homeownership can be detrimental for women's well-being.

The loss of effect strengths for nearly all interaction results after the addition of self-reported health indicate 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 A4) 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.

Four elements limit our interpretation and call for caution. First, the number of suicides in our observation period is low (Appendix, Table A5), especially as we break the population down according to multiple characteristics: gender, age, and household categories. Appendix A-M1 presents models with an additional year of observation (2003), and results remain similar. The only exceptions are the results for married men, for which we no longer observe the impact of housing tenure, and for single men, for which we observe an increased suicide risk among mid-life tenants. Those differences could possibly stem from a change of housing tenure between 2001 and 2003 – married persons and newly separated persons are likelier to change their housing tenure (Mulder and Lauster 2010) – hence a decision to remain as close as possible to the 2001 information and to only consider suicides in 2002. Second, 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. Third, our analyses are cross-sectional.

Future research could take a longitudinal approach, which should allow for a better understanding of how the residential life course, alongside occupational and family trajectories, can affect suicide risk. Finally, accounting for other socioeconomic characteristics such as income level and parents' socioeconomic category may also shed light on inequality of access to homeownership and parental support.

With this study, we contribute to previous research with our focus on the poorly studied age- and family-status-related homeownership norm. Our research allows for a better understanding of gender-specific inequalities and determinants in 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.

REFERENCES

- Ajzen, I., and Fishbein, M. (2005). The influence of attitudes on behavior. In: Albarracín, D., Johnson, B.T., and Zanna, M.P. (eds.), *The handbook of attitudes*. New Jersey: Lawrence Erlbaum Associates Publishers: 173–221.
- Andrews, D., Sánchez, A.C., and Johansson, Å. (2011). *Housing markets and structural policies in OECD countries*. Paris: OECD (OECD Economics Department Working Paper 836). doi:10.1787/5kgk8t2k9vf3-en
- Artazcoz, L., Benach, J., Borrell, C., and Cortès, I. (2004). Unemployment and mental health: Understanding the interactions among gender, family roles, and social class. *American Journal of Public Health* 94(1): 82–88.
- Blair-West, G.W., Cantor, C.H., Mellsop, G.W., and Eyeson-Annan, M.L. (1999). Lifetime suicide risk in major depression: Sex and age determinants. *Journal of Affective Disorders* 55(2–3), 171–178.

Blakely, T., Collings, S.C.D., and Atkinson, J. (2003). Unemployment and suicide: Evidence for a causal association? *Journal of Epidemiology and Community Health* 57(8): 594–600.

Borges, G., Nock, M.K., Abad, J.M.H., Hwang, I., Sampson, N.A., Alonso, J., ... and Kessler, R.C. (2010). Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. *Journal of Clinical Psychiatry* 71(12): 1617–1628.

Bossuyt, N., and Van Casteren, V. (2007). Epidemiology of suicide and suicide attempts in Belgium: Results from the sentinel network of general practitioners. *International Journal of Public Health* 52(3): 153–157.

Bruce, M.L., and Kim, K.M. (1992). Differences in the effects of divorce on major depression in men and women. *American Journal of Psychiatry* 49(7): 914–917.

Bugeja-Bloch, F. (2013). *Logement, la spirale des inégalités. Une nouvelle dimension de la fracture sociale et générationnelle* [Housing, the spiral of inequalities: A new dimension of the social and generational disruption]. Paris: Presses universitaires de France.

Cleary, A. (2012). Suicidal action, emotional expression, and the performance of masculinities. *Social Science & Medicine* 74(4): 498–505.

Conejero, I., Lopez-Castroman, J., Giner, L., and Baca-Garcia, E. (2016). Sociodemographic antecedent validators of suicidal behavior: A review of recent literature. *Current Psychiatry Reports* 18(10): Article 94.

Conejero, I., Olié, E., Calati, R., Ducasse, D., and Courtet, P. (2018). Psychological pain, depression, and suicide: Recent evidences and future directions. *Current Psychiatry Reports* 20(5): 33.

De Silva, M.J., McKenzie, K., Harpham, T., & Huttly, S.R. (2005). Social capital and mental illness: A systematic review. *Journal of Epidemiology & Community Health* 59(8): 619–627.

DeBastiani, S.D., Norris, A.E., and Kerr, A. (2019). Socioeconomic determinants of suicide risk: Monroe County Florida Behavioral Risk Factor Surveillance Survey, 2016. *Neurology, Psychiatry and Brain Research* 33: 56–64.

Durkheim, E. (1951). *Suicide*. London: Routledge. First published in 1897.

Dykstra, P., and Keizer, R. (2009). The wellbeing of childless men and fathers in mid-life. *Ageing and Society* 29(8): 1227–1242.

Ellaway, A., Macdonald, L., and Kearns, A. (2016). Are housing tenure and car access still associated with health? A repeat cross-sectional study of UK adults over a 13-year period. *BMJ Open* 6(11): Article e012268.

Eggerickx, T., Léger, J.F., Sanderson, J.P., and Vandeschrick, C. (2018). L'évolution de la mortalité en Europe du 19e siècle à nos jours. *Espace populations sociétés/Space Populations Societies* (2017/3).

Galster, G., Marcotte, D.E., Mandell, M.B., Wolman, H., and Augustine, N. (2007). The impact of parental homeownership on children's outcomes during early adulthood. *Housing Policy Debate* 18(4): 785–827.

Graeff, P., & Mehlkop, G. (2007). When anomie becomes a reason for suicide: A new macro-sociological approach in the Durkheimian tradition. *European Sociological Review* 23(4): 521–535.

Graham, M. (2015). Is being childless detrimental to a woman's health and well-being across her life course? *Women's Health Issues* 25(2): 176–184.

Halleux, J.M., and Strée, J. (2012). Production de l'habitat et enjeux territoriaux [Habitat production and territorial issues]. Liège: Conférence Permanente du Développement Territorial. https://orbi.uliege.be/bitstream/2268/144127/3/RI5_Annexe.pdf

Hank, K., and Wagner, M. (2013). Parenthood, marital status, and well-being in later life: Evidence from SHARE. *Social Indicators Research* 114(2): 639653.

Heckhausen, J. (2006). *Developmental regulation in adulthood: Age-normative and sociostructural constraints as adaptive challenges*. Cambridge: Cambridge University Press.

Herbert, C.E. and Belsky, E.S. (2008). The homeownership experience of low-income and minority households: A review and synthesis of the literature. *Cityscape* 10(2): 5–59.

Heikkinen, M., Aro, H., and Lönnqvist, J. (1993). Life events and social support in suicide. *Suicide and Life-Threatening Behavior* 23(4): 343–358.

Hiscock, R., Kearns, A., MacIntyre, S., and Ellaway, A. (2001). Ontological security and psycho-social benefits from the home: Qualitative evidence on issues of tenure. *Housing, Theory and Society*, 18(1–2): 50–66.

Holupka, S. and Newman, S.J. (2012). The effects of homeownership on children's outcomes: Real effects or self-selection? *Real Estate Economics* 40(3): 566–602.

Hooghe, M. and Vanhoutte, B. (2011). An ecological study of community-level correlates of suicide mortality rates in the Flemish region of Belgium, 1996–2005. *Suicide and Life-Threatening Behavior* 41(4): 453–464.

Horiuchi, S. (2003). Interspecies differences in the life span distribution: Humans versus invertebrates. *Population and Development Review* 29(1): 127–151.

Horne, C. (2003). The internal enforcement of norms. *European Sociological Review* 19(4): 335–343.

Huijts, T., Kraaykamp, G., and Subramanian, S.V. (2013). Childlessness and psychological well-being in context: A multilevel study on 24 European countries. *European Sociological Review* 29(1): 32–47.

Ignatieff, M. (1996). There's no place like home: The politics of belonging. In: Dunant, S. and Porter, R. (eds.), *The age of anxiety*. London: Virago: 85–106.

Ineichen, B. (2003). *Homes and health: How housing and health interact*. Routledge.

Institute for Health Metrics and Evaluation (IHME). (2017). GBD compare. University of Washington. <http://vizhub.healthdata.org/gbd-compare>

Jalles, J.T. and Andresen, M.A. (2015). The social and economic determinants of suicide in Canadian provinces. *Health Economics Review* 5(1): Article 1.

Joiner, T.E. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.

Kalmijn, M. (2010). Country differences in the effects of divorce on well-being: The role of norms, support, and selectivity. *European Sociological Review* 26(4): 475–490.

Lahaye, W., Pannecoucke, I., Vrancken, J., and Van Rossem, R. (2013). *Pauvreté en Belgique* [Poverty in Belgium]. Acco: Leuven/Den Haag.

Liefbroer, A.C. and Billari, F.C. (2010). Bringing norms back in: A theoretical and empirical discussion of their importance for understanding demographic behaviour. *Population, Space and Place* 16(4): 287–305.

López-Contreras, N., Rodríguez-Sanz, M., Novoa, A., Borrell, C., Muñoz, J.M., and Gotsens, M. (2019). Socioeconomic inequalities in suicide mortality in Barcelona during the economic crisis (2006–2016): A time trend study. *BMJ Open* 9(8): Article e028267.

Lorant, V., Kunst, A.E., Huisman, M., Costa, G., and Mackenbach, J. (2005). Socio-economic inequalities in suicide: A European comparative study. *British Journal of Psychiatry* 187(1): 49–54.

Macintyre, S., Ellaway, A., Der, G., Ford, G., and Hunt, K. (1998). Do housing tenure and car access predict health because they are simply markers of income or self esteem? A Scottish study. *Journal of Epidemiology & Community Health* 52(10): 657–664.

Macintyre, S., Ellaway, A., Hiscock, R., Kearns, A., Der, G., and McKay, L. (2003). What features of the home and the area might help to explain observed relationships between housing tenure and health? Evidence from the west of Scotland. *Health & Place* 9(3): 207–218.

Machado, D.B., Rasella, D., and Dos Santos, D.N. (2015). Impact of income inequality and other social determinants on suicide rate in Brazil. *PLOS One* 10(4): Article e0124934.

Mäki, N. and Martikainen, P. (2012). A register-based study on excess suicide mortality among unemployed men and women during different levels of unemployment in Finland. *Journal of Epidemiology and Community Health* 66(4): 302–307.

Marmot, M.G. (2004). *The status syndrome: How social standing affects our health and longevity* (1st American edn.). New York: Owl/Henry Holt.

Milner, A., McClure, R., and De Leo, D. (2012). Socio-economic determinants of suicide: An ecological analysis of 35 countries. *Social Psychiatry and Psychiatric Epidemiology* 47(1): 19–27.

Milner, A., Spittal, M.J., Pirkis, J., and LaMontagne, A.D. (2013). Suicide by occupation: Systematic review and meta-analysis. *British Journal of Psychiatry* 203(6): 409–416.

Min, K.B., Park, S.G., Hwang, S.H., and Min, J.Y. (2015). Precarious employment and the risk of suicidal ideation and suicide attempts. *Preventive Medicine* 71: 72–76.

Mulder, C.H. and Lauster, N.T. (2010). Housing and family: An introduction. *Housing Studies* 25(4): 433–440.

Niederlaender, E. (2006). Causes of death in the EU. Statistics in focus. Population and social conditions. Eurostat report. <https://ec.europa.eu/eurostat/documents/3433488/5440941/KS-NK-06-010-EN.PDF/2a6372ce-2b38-4b2a-bdb1-0de9cd48fa5c>

O'Connor, R.C. and Nock, M.K. (2014). The psychology of suicidal behaviour. *The Lancet Psychiatry* 1(1): 73–85.

OECD (2015). OECD Economic Surveys: Belgium. Paris: OECD Publishing. https://doi.org/10.1787/eco_surveys-bel-2015-en

OECD (2017). OECD Economic Surveys: Belgium. Paris: OECD Publishing. https://doi.org/10.1787/eco_surveys-bel-2017-en

Payne, S., Swami, V., and Stanistreet, D.L. (2008). The social construction of gender and its influence on suicide: A review of the literature. *Journal of Men's Health* 5(1): 23–35.

Du Prel, J.B., Hommel, G., Röhrig, B., and Blettner, M. (2009). Confidence interval or p-value? Part 4 of a series on evaluation of scientific publications. *Deutsches Ärzteblatt International* 106(19): 335–339.

Schnor, C. and Mikolai, J. (2020). Remain, leave, or return? Mothers' location continuity after separation in Belgium. *Demographic Research* 42(Article 9): 245–292.

Shaw, M. (2004). Housing and public health. *Annual Review of Public Health* 25: 397–418.

Silva, M., Loureiro, A., and Cardoso, G. (2016). Social determinants of mental health: A review of the evidence. *European Journal of Psychiatry* 30(4): 259–292.

Smith, S.J., Easterlow, D., Munro, M., and Turner, K.M. (2003). Housing as health capital: How health trajectories and housing paths are linked. *Journal of Social Issues* 59(3): 501–525.

Stanley, J., Stanley, J., and Hensher, D. (2012). Mobility, social capital and sense of community: What value? *Urban Studies* 49(16): 3595–3609.

Stansfeld, S.A., Head, J., and Marmot, M.G. (1997). Explaining social class differences in depression and well-being. *Social Psychiatry and Psychiatric Epidemiology* 33(1): 1–9.

Stack, S. (1982). Suicide: A decade review of the sociological literature. *Deviant Behavior* 4(1): 41–66.

Stack, S. (2000). Suicide: A 15-year review of the sociological literature. Part II: modernization and social integration perspectives. *Suicide and Life Threatening Behavior* 30(2):163–176.

Statbel (2019). Demobel: New demographic database. <https://statbel.fgov.be/en/news/demobel-new-demographic-database>

Van Aerden, K. (ed.), Balogh, R., Dal, L., Damiens, J., De Moortel, D., Eggerickx, T., Gourbin, C., Haegedoorn, P., Huegaerts, K., Majérus, P., Masquelier, B., Sanderson, J-P., Van Cleemput, O., Vandeschrick, C., Vanroelen, C., Vanthomme, K., Willaert, D., and Gadeyne, S. (2019). CAUSINEQ: Causes of health and mortality inequalities in Belgium: Multiple dimensions, multiple causes. Final Report. Brussels: Belgian Science Policy Office (BRAIN-be: Belgian Research Action through Interdisciplinary Networks).

Van der Heyden, J.H.A., Gisle, L., Hesse, E., Demarest, S., Drieskens, S., and Tafforeau, J. (2009). Gender differences in the use of anxiolytics and antidepressants: A population based study. *Pharmacoepidemiology and Drug Safety* 18(11): 1101–1110.

Vanneste, D., Thomas, I., Goossens, L., and De Decker, P. (2007). Le logement en Belgique [Housing in Belgium]. Brussels: SPF Economie, PME, Classes moyennes et Énergie, Direction générale Statistique et Information économique. https://statbel.fgov.be/sites/default/files/Over_Statbel_FR/Enquete%20SocEco%202001%20-%20Monographie%20%20Le%20logement%20en%20Belgique.pdf

Williams, M. (1997). *Cry of pain: Understanding suicide and self-harm*. London: Penguin Books.

APPENDIX

Tables

Table A1 – Observations and proportion of homeowners according to marital situation and parenthood in population aged 20–69.

	Men		Women	
	N	% Homeowners	N	% Homeowners
Single	896,770	47.3%	950,109	48.8%
Married couple	2,130,986	80.7%	2,090,035	80.4%
Cohabiting couple	291,010	49.3%	276,667	50.8%
No child at home	1,500,196	57.7%	1,450,170	62.6%
Children at home	1,818,570	78.1%	1,866,641	73.7%
<i>Total population</i>		<i>100%</i>		<i>100%</i>

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

Table A2 – Logistic regression (odds ratios [OR]) on the risk of suicide (vs. survival or other cause of death) in 2002, in male population aged 20–69.

	Model 1	Model 2	Model 3	Model 4	Model 5
	OR [CI 95%]	OR [CI 95%]	OR [CI 95%]	OR [CI 95%]	OR [CI 95%]
Housing tenure (ref. Owner)					
Tenant	1.71 [1.50–1.94]	1.47 [1.28–1.69]	1.36 [1.17–1.58]	1.34 [1.06–1.69]	1.28 [1.11–1.49]
Unknown ^a	2.74 [2.30–3.26]	2.54 [2.11–3.06]	1.85 [1.43–2.38]	1.9 [1.23–2.92]	1.18 [0.79–1.74]
Age	1.07 [1.05–1.11]	1.08 [1.05–1.11]	1.12 [1.08–1.17]	1.17 [1.09–1.24]	1.09 [1.05–1.13]
Age ²	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]	0.99 [0.99–1.00]
Household type (ref. Married w children)					
Married w/o children		1.10 [0.91–1.34]	1.01 [0.82–1.24]	0.99 [0.81–1.23]	0.96 [0.78–1.19]
Cohabiting w children		1.56 [1.15–2.10]	1.38 [0.99–1.93]	1.39 [0.99–1.93]	1.37 [0.98–1.91]
Cohabiting w/o children		1.64 [1.28–2.11]	1.44 [1.09–1.90]	1.44 [1.09–1.90]	1.35 [1.03–1.79]
Single w/o children		2.28 [1.93–2.69]	2.02 [1.70–2.39]	1.93 [1.61–2.32]	1.75 [1.46–2.10]
Lone parent		1.86 [1.46–2.36]	1.65 [1.29–2.11]	1.6 [1.24–2.07]	1.5 [1.16–1.94]
Other ^b		1.41 [1.13–1.77]	1.32 [1.04–1.67]	1.25 [0.98–1.59]	1.2 [0.94–1.55]
Nationality (ref. Belgian)					
Other European		0.38 [0.28–0.52]	0.36 [0.25–0.52]	0.31 [0.15–0.63]	0.36 [0.25–0.53]
Non-European		0.25 [0.13–0.47]	0.21 [0.11–0.40]	0.21 [0.09–0.50]	0.22 [0.11–0.48]
Region (ref. Flanders)					
Wallonia		1.28 [1.13–1.45]	1.25 [1.10–1.43]	1.22 [1.07–1.40]	1.15 [1.00–1.32]
Brussels		0.80 [0.63–1.03]	0.85 [0.66–1.09]	0.87 [0.66–1.13]	0.84 [0.64–1.11]
Area (ref. Urban)					
Suburban		1.03 [0.89–1.20]	1.06 [0.82–1.27]	1.02 [0.52–1.10]	1.04 [0.84–1.30]
Rural		1.26 [1.09–1.46]	1.11 [0.94–1.32]	1.1 [0.92–1.31]	1.1 [0.92–1.32]
Educational level (ref. Higher secondary)					
Primary			0.88 [0.74–1.09]	0.89 [0.74–1.09]	0.95 [0.78–1.15]
Lower secondary			0.73 [0.61–0.92]	0.75 [0.61–0.93]	0.82 [0.67–1.02]
Higher non-tertiary and tertiary			0.55 [0.43–0.70]	0.55 [0.43–0.71]	0.65 [0.51–0.89]
Unknown			0.84 [0.60–1.08]	0.84 [0.66–1.07]	0.85 [0.66–1.08]
Occupational category (ref. Unemployed)					
Permanent, public			0.7 [0.56–0.88]	0.71 [0.75–1.19]	0.94 [1.04–1.71]
Permanent, private			0.45 [0.35–0.59]	0.46 [0.35–0.59]	0.61 [0.47–0.80]
Permanent, manual			0.67 [0.55–0.82]	0.68 [0.55–0.83]	0.88 [0.71–1.08]
Temporary, public			0.27 [0.08–0.83]	0.27 [0.09–0.83]	0.34 [0.11–1.06]
Temporary, private			0.99 [0.51–1.92]	0.99 [0.51–1.93]	1.23 [0.63–2.40]
Temporary, manual			1.13 [0.75–1.79]	1.14 [0.76–1.71]	1.4 [0.91–2.07]
Liberal and independent			0.66	0.67	0.91

		[0.51–0.86]	[0.52–1.87]	[0.70–1.19]
	Inactive, retired	1.11	1.12	1.34
	Unknown	[0.85–1.44]	[0.86–1.45]	[1.03–1.73]
		0.66	0.66	0.86
		[0.48–0.90]	[0.49–0.91]	[0.63–1.18]
Housing quality indicators				
Bathroom				
	No bathroom	0.97	0.92	
		[0.73–1.28]	[0.70–1.21]	
Central heating				
	No central heating	1.03	0.99	
		[0.89–1.19]	[0.86–1.15]	
	Unknown	1.38	1.37	
		[0.96–1.99]	[0.95–1.96]	
Density of occupancy ^c				
		1	1.01	
		[1.00–1.01]	[0.99–1.01]	
Subjective health (ref. Intermediate)				
	Very good		1.61	
			[1.32–1.96]	
	Good		2.92	
			[2.34–3.64]	
	Bad		5.73	
			[4.43–7.42]	
	Very bad		5.08	
			[3.43–7.52]	
N	3,317,599	3,317,599	3,317,599	3,317,599

Notes: Model 1 controls for age and quadratic term of age; Model 2 controls for age, quadratic term of age, household type, region, area of residence, and nationality; Model 3 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, and occupational category; Model 4 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; Model 5 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, density of occupancy, and subjective health.

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

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

Table A3 – Logistic regression (odds ratios [OR]) on the risk of suicide (vs. survival or other cause of death) in 2002, in female population aged 20–69.

	Model 1	Model 2	Model 3	Model 4	Model 5
	Coef [CI 95%]	Coef [CI 95%]	Coef [CI 95%]	Coef [CI 95%]	Coef [CI 95%]
Housing tenure (ref. Owner)					
Tenant	1.96	1.48	1.57	1.56	1.34
	[1.60–2.40]	[1.19–1.85]	[1.25–1.97]	[1.24–1.96]	[1.06–1.69]
Unknown ^a					
	3.25	2.96	2.24	1.64	1.49
	[2.44–4.33]	[2.20–3.99]	[1.50–3.36]	[0.88–3.06]	[0.80–2.76]
Age					
	1.16	1.19	1.22	1.23	1.17
	[1.10–1.23]	[1.12–1.25]	[1.15–1.30]	[1.15–1.31]	[1.10–1.25]
Age ²					
	0.99	0.99	0.99	0.99	0.99
	[0.99–1.00]	[0.99–1.00]	[0.99–1.00]	[0.99–1.00]	[0.99–1.00]
Household type (ref. Married w children)					
Married w/o children		1.58	1.53	1.52	1.35
		[1.18–2.13]	[1.12–2.08]	[1.11–2.06]	[0.99–1.84]
Cohabiting w children					
		1.29	1.05	1.05	1.02
		[0.71–2.34]	[0.51–2.16]	[0.51–2.16]	[0.50–2.11]
Cohabiting w/o children					
		1.55	1.3	1.29	1.09
		[0.96–2.52]	[0.74–2.29]	[0.73–2.27]	[0.62–1.93]
Single w/o children					
		3.45	3.4	3.26	2.56
		[2.60–4.58]	[2.52–4.58]	[2.41–4.40]	[1.89–3.48]
Lone parent					
		1.81	1.78	1.78	1.56
		[1.30–2.50]	[1.27–2.51]	[1.26–2.51]	[1.11–2.20]
Other ^b					
		1.53	1.47	1.38	1.19
		[1.03–2.27]	[0.96–2.23]	[0.89–2.11]	[0.76–1.87]
Nationality (ref. Belgian)					
Other European		0.30	0.29	0.28	0.3
		[0.17–0.54]	[0.14–0.58]	[0.14–0.57]	[0.15–0.61]
Non-European					
		0.37	0.49	0.46	0.52
		[0.15–0.91]	[0.20–1.20]	[0.18–1.14]	[0.21–1.28]
Region (ref. Flanders)					
Wallonia		1.31	1.22	1.22	1.03
		[1.07–1.61]	[0.99–1.51]	[1.07–1.40]	[0.83–1.28]
Brussels					
		0.75	0.71	0.7	0.65
		[0.53–1.08]	[0.48–1.04]	[0.48–1.03]	[0.44–0.95]
Area (ref. Urban)					
Suburban		0.75	0.74	0.74	0.76
		[0.59–0.94]	[0.51–1.06]	[0.51–1.06]	[0.52–1.10]
Rural					
		0.77	0.85	0.84	0.87
		[0.61–0.99]	[0.65–1.09]	[0.65–1.09]	[0.67–1.13]
Educational level (ref. Higher secondary)					
Primary			1.06	1.07	1.18
			[0.77–1.47]	[0.77–1.48]	[0.85–1.64]
Lower secondary					
			1.26	1.27	1.55
			[0.91–1.76]	[0.91–1.77]	[1.11–2.17]
Higher non-tertiary and tertiary					
			1.43	1.43	1.99
			[1.01–2.04]	[1.00–2.04]	[1.37–2.86]
Unknown					
			0.98	0.97	0.93
			[0.66–1.48]	[0.65–1.46]	[0.62–1.41]
Occupational category (ref. Unemployed)					
Permanent, public			0.67	0.68	1.01
			[0.47–0.95]	[0.47–0.96]	[0.70–1.43]
Permanent, private					
			0.37	0.37	0.58
			[0.25–0.55]	[0.25–0.56]	[0.39–0.89]
Permanent, manual					
			0.41	0.42	0.62
			[0.22–0.79]	[0.22–0.79]	[0.32–1.18]
Temporary, public					
			0.43	0.43	0.63
			[0.16–1.16]	[0.16–1.16]	[0.23–1.71]
Temporary, private					
			0.29	0.29	0.42
			[0.07–1.16]	[0.07–1.16]	[0.10–1.73]
Temporary, manual					
			0.26	0.26	0.36
			[0.06–1.04]	[0.06–1.04]	[0.05–1.14]
Liberal and independent					
			0.62	0.62	0.99

		[0.06–1.04]	[0.36–1.07]	[0.57–1.72]
	Inactive, retired	0.97	0.97	1.09
	Unknown	[0.69–1.36]	[0.69–1.37]	[0.57–1.72]
		0.69	0.69	0.98
		[0.42–1.13]	[0.42–1.14]	[0.59–1.62]
Housing quality indicators				
Bathroom				
	No bathroom		1.39	1.25
			[0.89–2.16]	[0.80–1.94]
Central heating				
	No central heating		1.00	0.94
			[0.79–1.26]	[0.74–1.19]
	Unknown		0.74	0.74
			[0.39–1.45]	[0.38–1.42]
Density of occupancy ^c				
			1.00	1.01
			[0.99–1.01]	[0.99–1.01]
Subjective health (ref. Intermediate)				
	Very good			1.78
				[1.21–2.61]
	Good			4.63
				[3.11–6.91]
	Bad			13.14
				[8.55–20.01]
	Very bad			17.58
				[10.31–29.98]
N	3,316,355	3,316,355	3,316,355	3,316,355

Notes: Model 1 controls for age and quadratic term of age; Model 2 controls for age, quadratic term of age, household type, region, area of residence, and nationality; Model 3 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, and occupational category; Model 4 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; Model 5 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, density of occupancy, and subjective health.

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

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

Table A4 – Analysis of variance of 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	197.52	0.000
Intermediate	0.0003685		
Bad	0.0009339		

Very bad 0.0010379

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

Table A5 – Number of suicides and total number of men and women according to their household composition.

		Number of suicides	Total
Men	Married couple	490	896,770
	Unmarried couple	550	2,130,986
	No couple	127	291,010
	Children at home	657	1,500,196
	No children at home	510	1,818,570
Women	Married couple	219	950,109
	Unmarried couple	205	2,090,830
	No couple	32	27,667
	Children at home	274	1,450,170
	No children at home	510	1,866,641

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

Figures

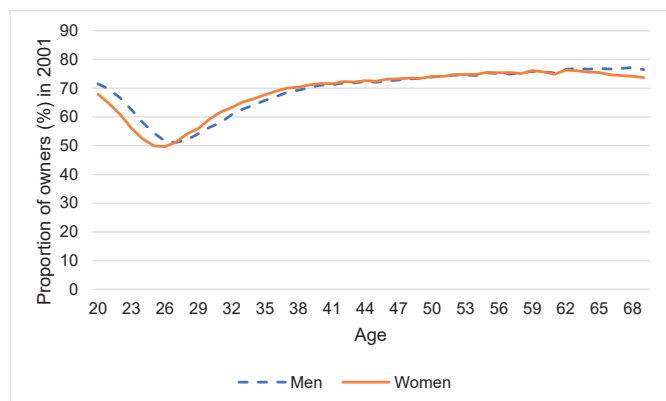
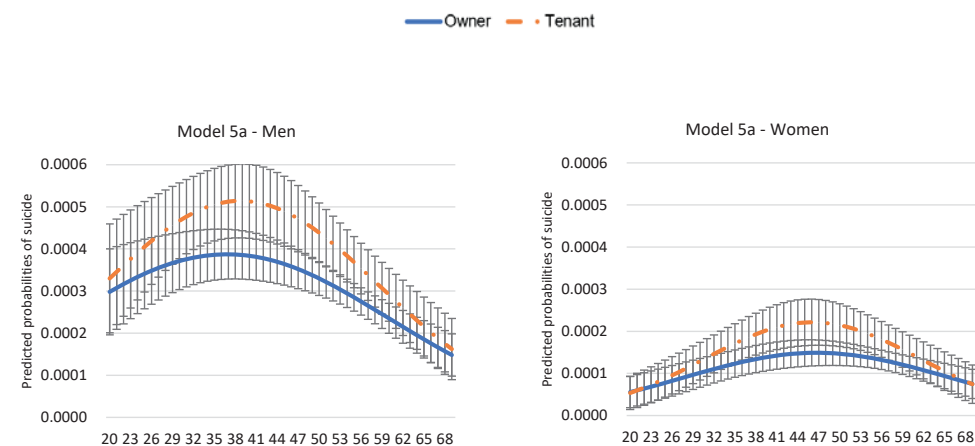


Figure A1 – Percentage of owners per age in Belgium, population aged 20–69, 2001.

Source: Census of Belgium 2001 data; authors' calculations

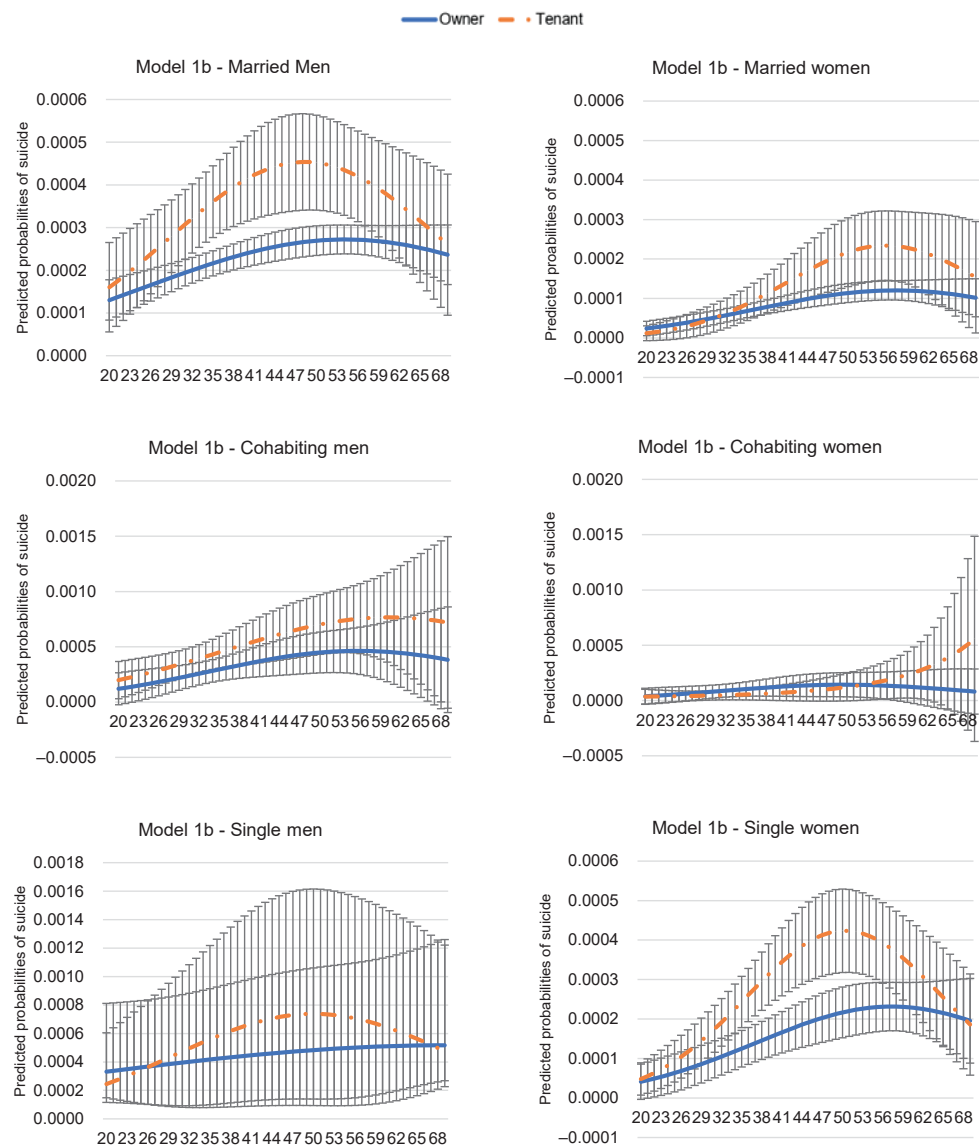
Figure A2 – Logistic regression on the risk of suicide in 2002, predicted probabilities.



Notes: Model 1a, based on Model 1, including an interaction between housing tenure and a quadratic term of age, household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, density of occupancy, and subjective health.

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

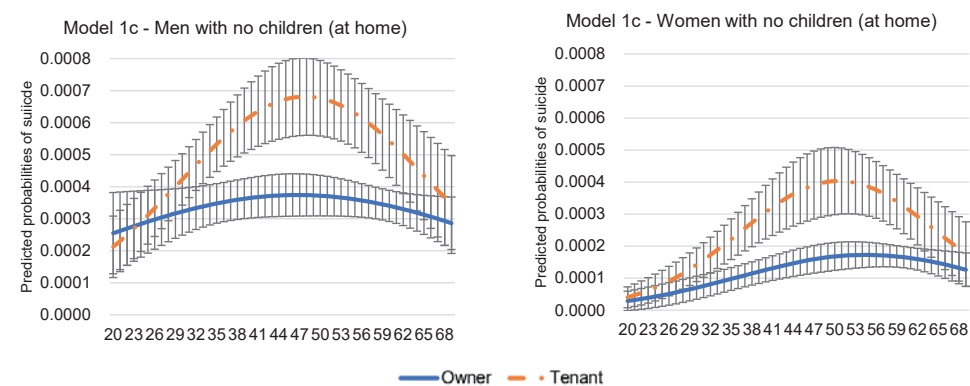
Figure A3 – Logistic regression on the risk of suicide in 2002, predicted probabilities.



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

Notes: Model 1b, based on Model 1, including an interaction between housing tenure and a quadratic term of age.

Figure A4 – Logistic regression on the risk of suicide in 2002, predicted probabilities.



Notes: Model 1c, based on Model 1, including an interaction between housing tenure and a quadratic term of age

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

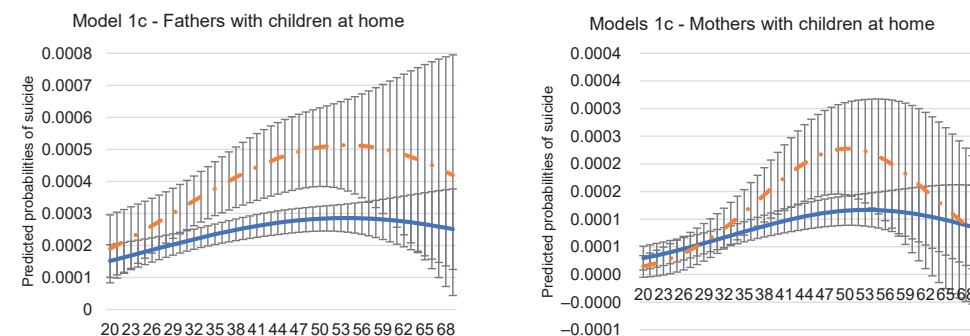
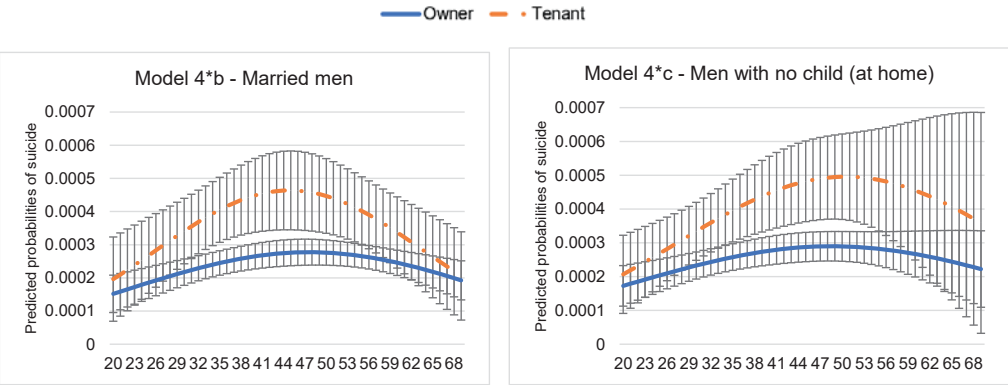


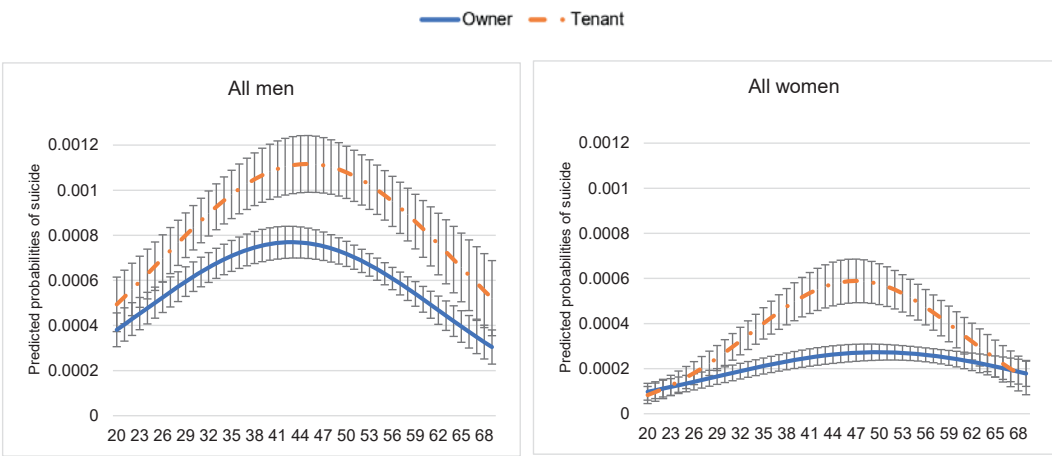
Figure A5 – Logistic regression on the risk of suicide in 2002, predicted probabilities.

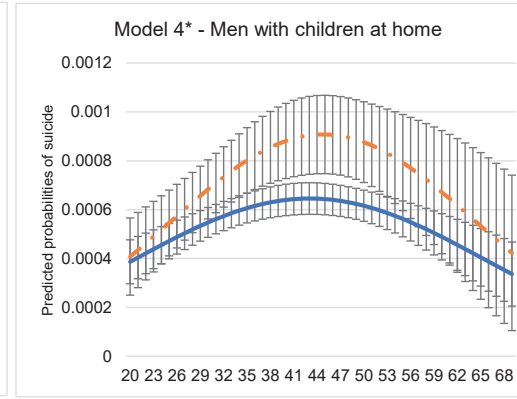
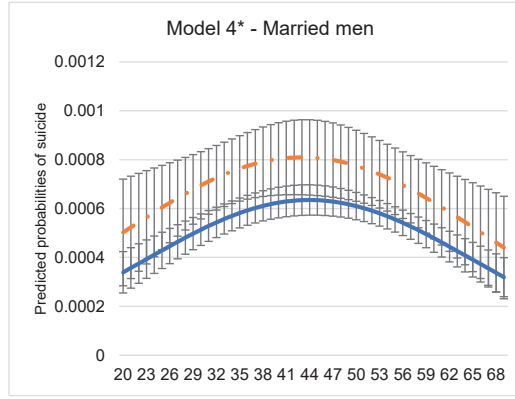
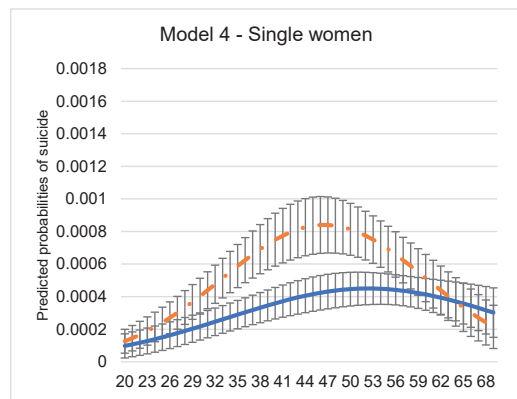
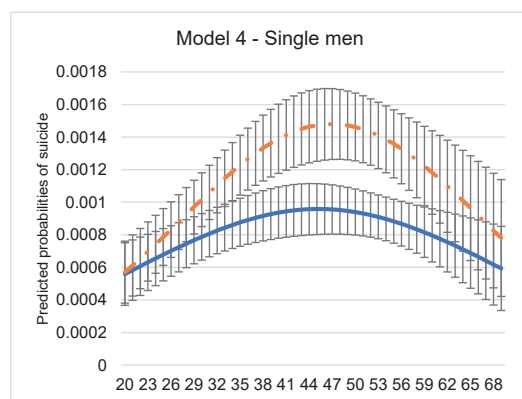
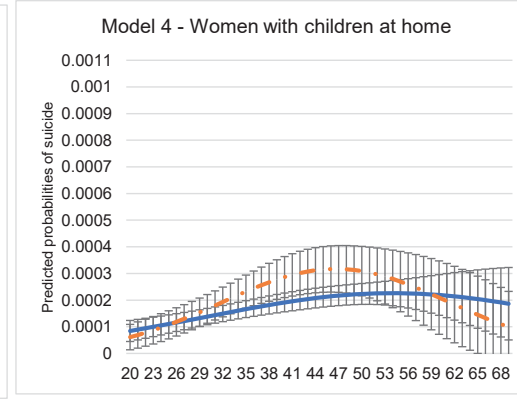
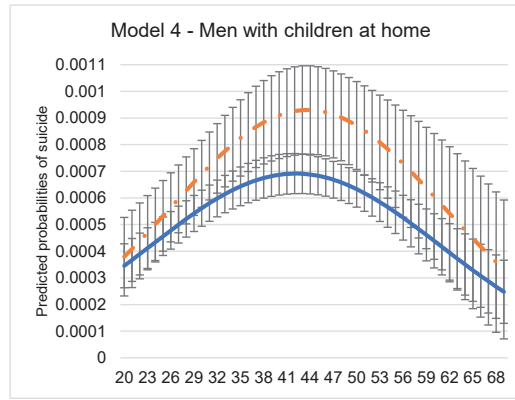
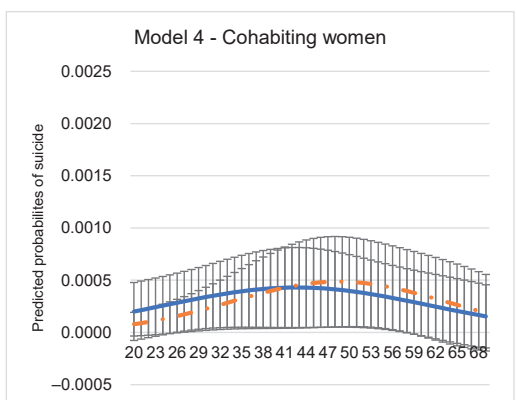
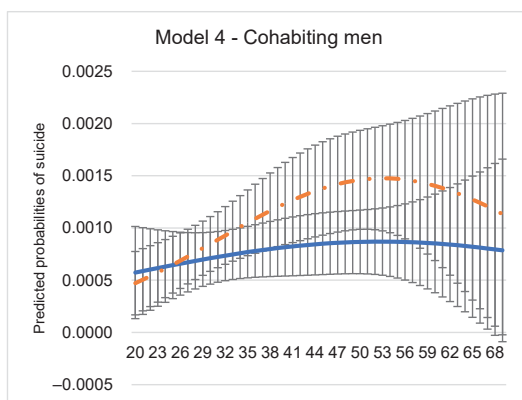
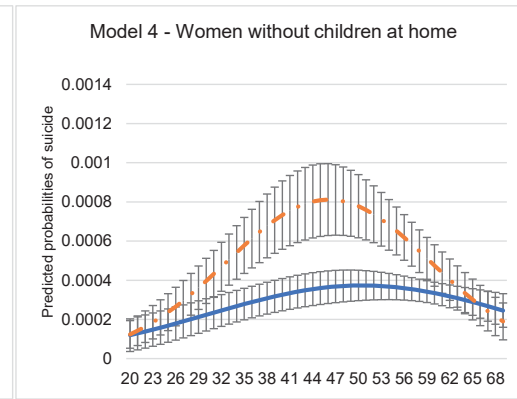
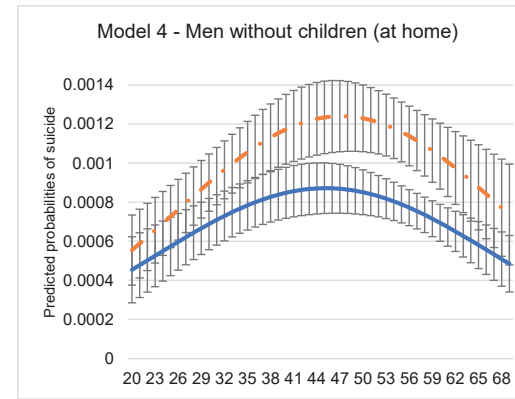
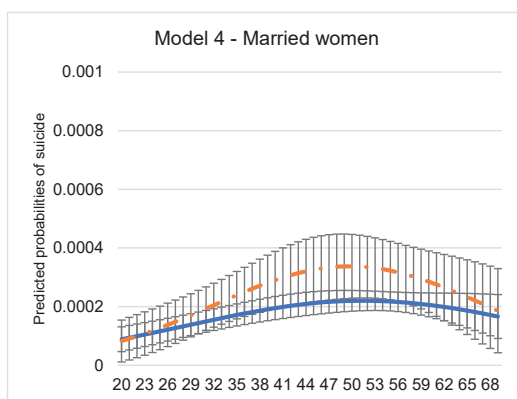
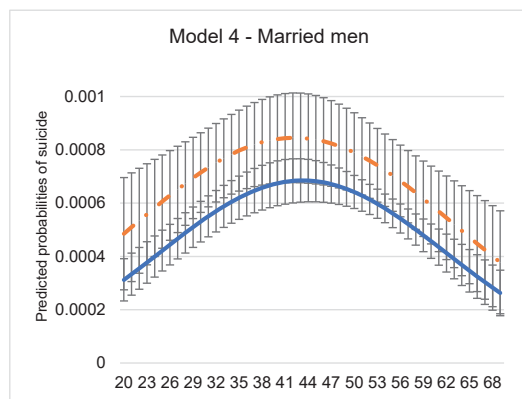


Note: Models 4*b and 4*c are based on Model 4 (controls for age, quadratic term of age, household type, region, area of residence, nationality, education, presence of a bathroom, presence of central heating, and density of occupancy), except without control for occupational category.

Methodological appendix

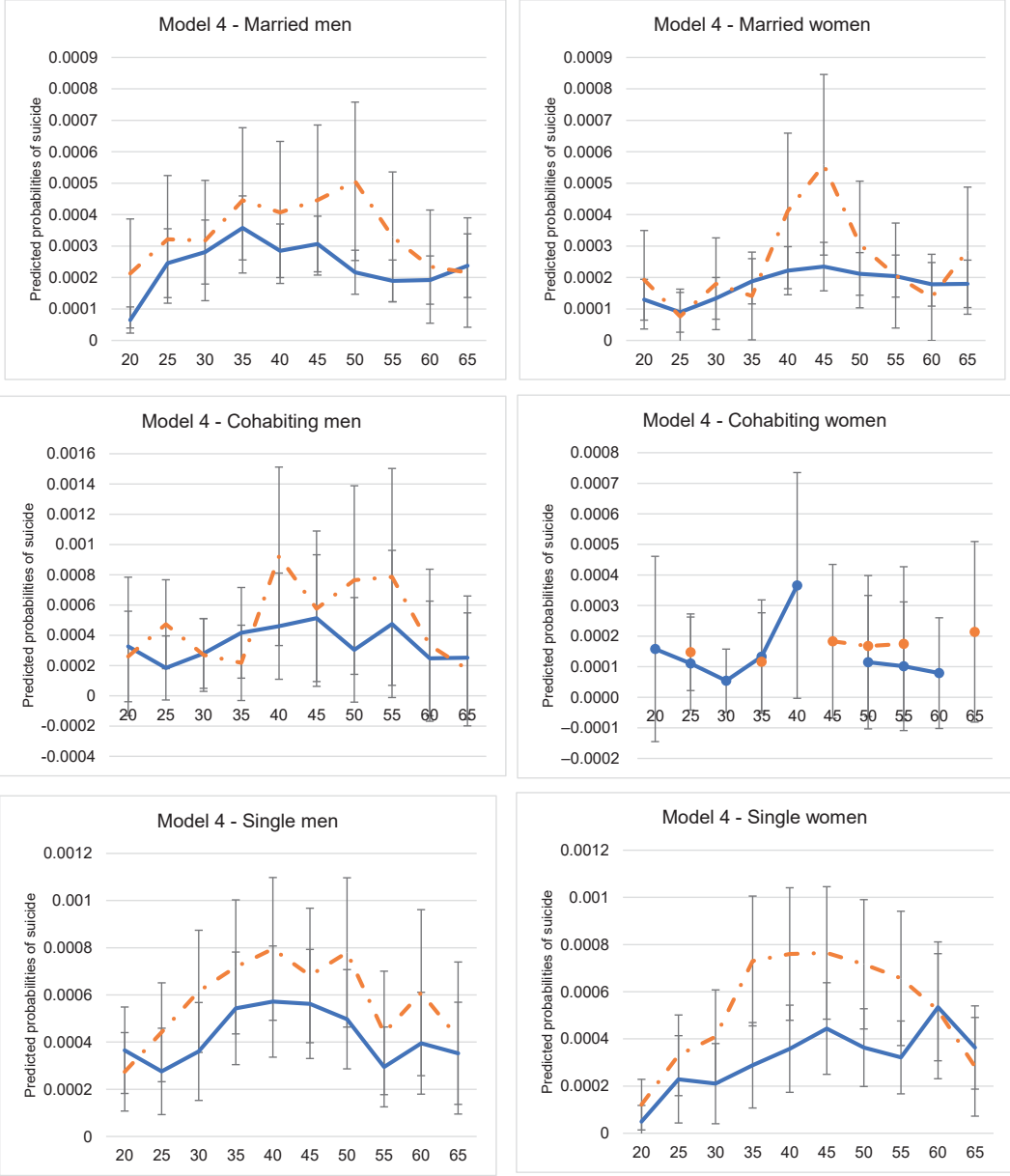
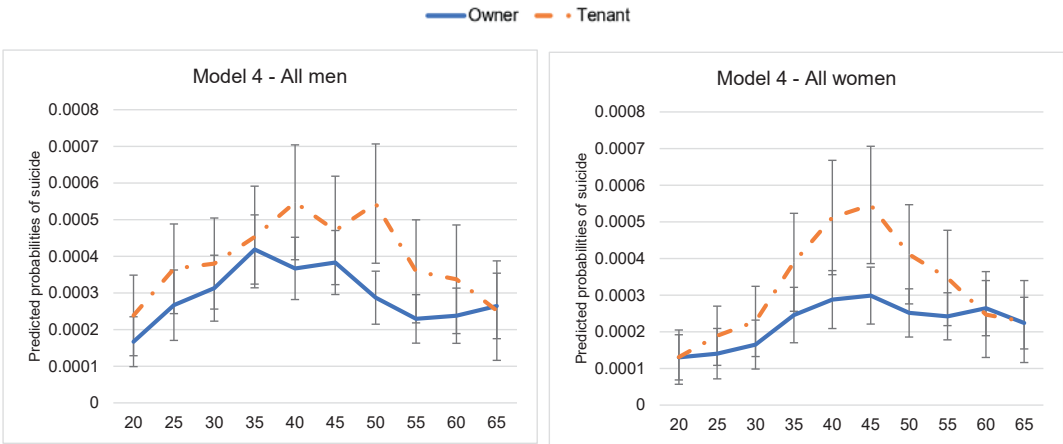
Figure A-M1. Logistic regression on the risk of suicide in 2002 and 2003, predicted probabilities.

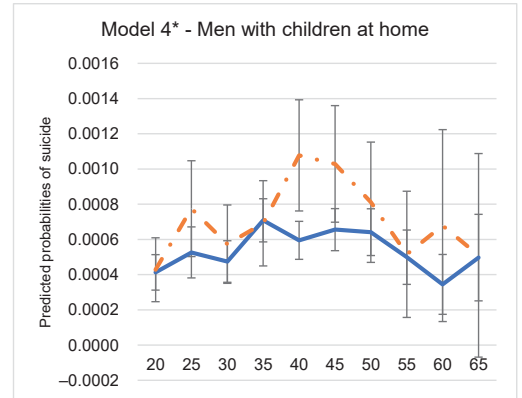
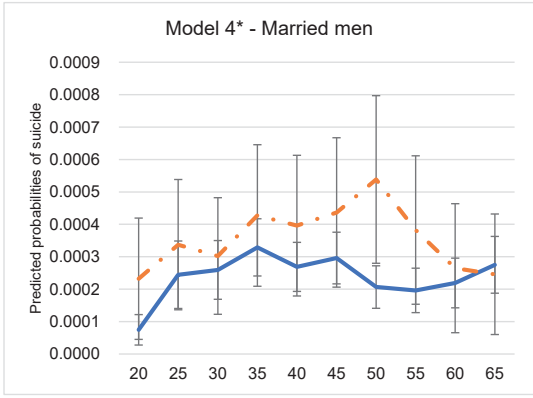
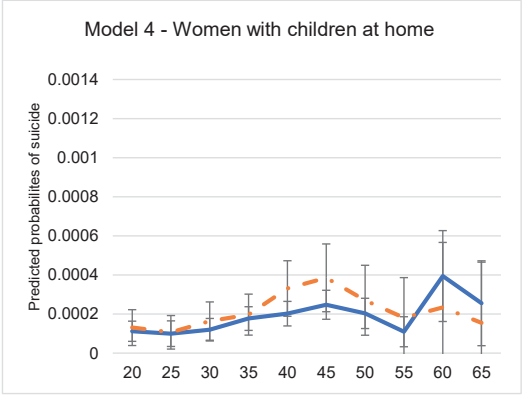
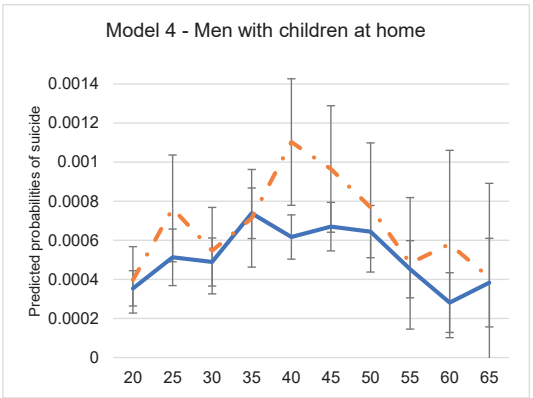
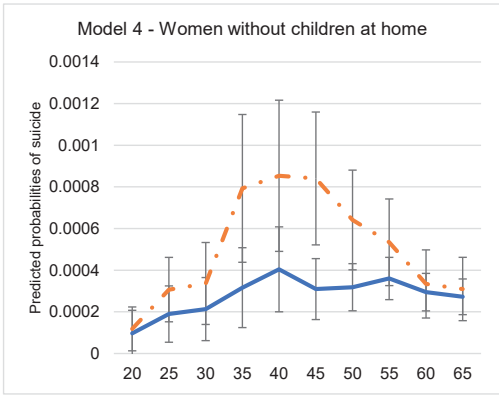
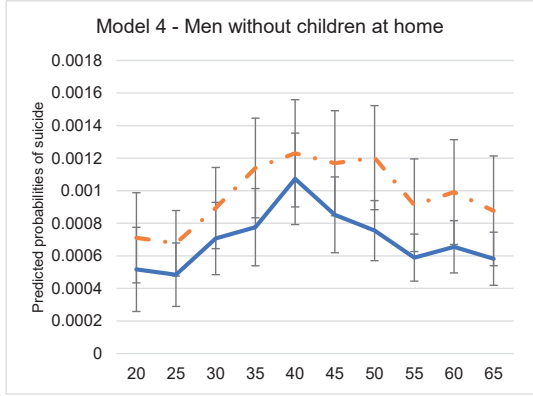




Note: Model 4 controls for age, quadratic term of age, household type, region, area of residence, nationality, education, occupational category, presence of a bathroom, presence of central heating, and density of occupancy. Models 4*b and 4*c are based on Model 4 (controls for age, quadratic term of 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.

Figure A-M2. Logistic regression on the risk of suicide in 2002 and 2003, with age as categorical variable, predicted probabilities.





Note: Model 4 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 4*b and 4*c are based on Model 4 (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.

Comité d'édition

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Responsable

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