

# Who flees? An integration of household characteristics in the White Flight hypothesis.

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## Abstract

*Although there is an extensive field dedicated to the study of ethnic residential segregation, few scholars investigate the importance of household characteristics for understanding this segregation. Considering the White Flight hypothesis as a special case of the Residential Stress theory, we investigate whether there is a link between the presence of four different household types ethnic concentration and segregation. We therefore perform two analyses using the 2001 Census of Belgium: a binary logistic multilevel analysis investigating the chance that a neighbourhood is ethnically concentrated (i.e. has a location quotient higher than 1) and a single level linear regression analysis investigating the dissimilarity score of a city. We find that neighbourhoods with a large share ethnic majority single households and lone parents have a higher chance to be concentrated than neighbourhoods with a lower share of either household type. The same can be said for the percentage cohabitating, childless couples before adding control variables. The percentage families with young children has an inverse relation with neighbourhood concentration before adding control variables. Cities with a higher share families with young children are more segregated than cities with a lower share families with young children. Cities with a high share single households and lone parents, on the other hand, are less segregated than cities with a low share single households or lone parents. We thus conclude that it is important to consider household characteristics when studying White Flight specifically and ethnic residential segregation more general.*

**Key words:** Turkish and North-African minorities, ethnic residential segregation, the White Flight hypothesis, Residential Stress theory, ethnic concentration neighbourhoods.

## Introduction

Ethnic residential segregation is the unequal dispersion of ethnic groups over neighbourhoods within cities (Massey & Denton, 1988). Although segregation is stagnating or slowly declining, cities in both the US and Europe remain (strongly) segregated (Musterd, 2005; Timberlake & Iceland, 2007). For Belgium, recent nationwide measurements of ethnic residential segregation are lacking, but the censuses show that ethnic minorities were overrepresented in (the deprived neighbourhoods of) larger cities in 1991 and 2001 (Eggerickx et al., 1999; Vanneste, Thomas, & Goossens, 2007). More recent studies found declining residential segregation in the last decade for Turks, Maghrebis and Eastern and Central-Europeans in two of Belgium's largest cities, Ghent and Antwerp, but segregation scores remain substantial (Verhaeghe, Oosterlynck, & Schillebeeckx, Working paper; Verhaeghe, Van Der Bracht, & Van de Putte, 2012).

The White Flight hypothesis is one of the theories used to explain ethnic residential segregation. This hypothesis uses the in-group preferences and out-group hostility of ethnic majority members to explain segregation {Crowder, 2000 #440}. Majority members, who can, avoid multi-ethnic neighbourhoods and move away once 'too many' ethnic minorities reside in their neighbourhood,

which can aggregate to perpetuates existing ethnic residential segregation (Clark & Dieleman, 1996b; Crowder, 2000). Although initially only focusing on the percentage Blacks in the neighbourhood (Frey, 1979), it was later extended to include ethnic majority members' avoidance of all racially or ethnically integrated neighbourhoods, and multi-ethnic neighbourhoods in particular. Further developments include the importance of the influence of neighbouring neighbourhoods and increases in the percentage ethnic minorities in the neighbourhood (Crowder, 2000; Pais, South, & Crowder, 2009). Schelling (1971; see also: Card, Mas, & Rothstein, 2008), lastly, showed that even small percentages of ethnic minorities can cause the snowballing outmigration of ethnic majority members once a tipping point is reached.

As the White Flight hypothesis states that majority members take the ethnic composition of a neighbourhood into account when making residential decisions, we believe that it should be integrated into the residential stress theory. This theory states that residential stress arises when people feel that their residential situation no longer suffices to satisfy their needs and preferences and believe these needs and preferences can be better satisfied elsewhere (Brummell, 1981; Clark & Cadwallar, 1973; Hartig, Johansson, & Kylin, 2003). Especially when this stress reaches a certain threshold, people may move to deal with this stress (Hartig et al., 2003; Priemus, 1986). Applied to the White Flight hypothesis, one can say that neighbourhoods with a high or increasing percentage ethnic minority inhabitants cause residential stress for ethnic majority members. This stress will make ethnic majority members look for housing elsewhere, in this case in predominantly ethnic majority neighbourhoods.

When considering the White Flight hypothesis as being a special case of the residential stress theory, it is important to incorporate household characteristics, such as the presence of children or the number of people in the household. These characteristics are an important factor shaping residential needs and preferences. As people's household compositions change, their housing needs and aspirations change accordingly (Clark & Dieleman, 1996a). Not only are larger families in need of more room(s), the amenities that are considered important can change too: when couples (plan to) have children, neighbourhood safety becomes an important factor in the evaluation of their residential situation, while childless couples pay more attention to price, or proximity to work and recreational amenities (Feijten, Hooimeijer, & Mulder, 2008). Divorce, on the other hand, forces households to pay more attention to price again due to a loss of financial means (Feijten & van Ham, 2010).

Many scholars already assume that families with young children are most sensitive to the ethnic composition of their neighbourhood (Goyette, Iceland, & Weininger, 2014; Iceland, Goyette, Nelson, & Chan, 2010), while many childless couples or single households welcome the diversity of mixed neighbourhoods (Bader, 2011). However, empirical evidence for this assumption remains scarce and often focusses on specific household types or remains at the descriptive level. Iceland et al. (2010), for example, calculated segregation scores for different household types and found divergent levels of segregation for these types. In addition, Goyette et al. (2014) found that White households with children younger than 6 were more likely to leave neighbourhoods with increasing percentages of Black residents than other White households, but those households that move, move to the same (White) neighbourhoods. Marsh and Iceland (2010), lastly, looked at the segregation of Black single households and investigated the importance of SES differences to understand their lower segregation from White single households than from White families with children.

However, the sensitivity to the ethnic composition of the neighbourhood is not necessarily related to prejudice against ethnic minorities. Scholars supporting the Racial Proxy Hypothesis (Emerson, Yancey, & Chai, 2001) or the Race-Based Neighbourhood Projection Hypothesis admit (Ellen, 2000) consider economic factors to be the reason why ethnic majority members are averse to ethnically diverse or minority concentrated neighbourhoods. Majority members leave these neighbourhoods to escape poverty or unsafety, not because there are many ethnic minority inhabitants. However, majority members do use the presence of (a large share of) ethnic minorities to evaluate whether a neighbourhood is for example safe to live in or likely to go downhill. So, although these scholars disagree about the underlying cause of White Flight, they agree that households consider the ethnic composition of their neighbourhood to make residential decisions.

With this study, we aim at extending the scientific understanding of the relation between household characteristics and the White Flight hypothesis. By innovatively integrating the White Flight hypothesis into the residential stress theory and adopting an integrative focus on four different household types, we can add to this scientific understanding. To test our hypotheses we will perform multilevel binary logistic analyses and linear regression analyses on the Belgian Census of 2001, taking a dichotomization of the locational quotient and the dissimilarity index as our dependent variables. We choose to focus on four household types: Single and Living Alone Households; cohabitating, unmarried couples; Lone Parents and Households with young children. These are chosen because they are the most mobile household types and because it can be assumed that they have the most divergent residential needs and preferences. As explained above families with young children are often believed to be the most averse towards ethnic minority neighbours. This could be related to prejudice and guarding the social distance between their children and ethnic minorities but also to concerns about neighbourhood safety and school quality (Emerson et al., 2001). Childless couples (not planning to have children soon) and singles, on the other hand, are believed to be the least sensitive to the ethnic composition of their neighbourhood and have more concerns about the price or the ability to find recreational amenities fitting their life style close by (Feijten et al., 2008).

These divergent preferences can be invigorated by the strong association between SES and ethnicity. Many ethnic minorities have a lower SES in Western Europe (Heath, Rethon, & Kilpi, 2008). Lower SES neighbourhoods offer cheaper housing and therefore often attract many ethnic minorities (Hedman, van Ham, & Manley, 2011). Families with young children have a higher household income on average than either single households, who only have one disposable income; or childless, cohabitating couples, who are often younger and therefore had less time to save money and have a lower income. Additionally, divorced and single parents form a special case: although they have the same concerns for their children as families run by two (or more) adults (Rosenblatt & DeLuca, 2012), they are often forced back into cheaper housing due to the loss of a second income. This forces them to compromise on their residential preferences and choose for cheaper housing in more diverse neighbourhoods (Feijten & van Ham, 2010).

As families with young children are the most averse to living in ethnically diverse neighbourhoods; childless, cohabitating couples and single households are less concerned with the ethnic composition of their neighbourhood; and lone parents are forced to compromise on their aversion for ethnic neighbours and choose for cheaper housing, often in diverse neighbourhoods, due to socio-economic constraints; we assume that:

- 1a: Neighbourhoods with a higher percentage families with young children are less likely to be ethnically diverse neighbourhoods than neighbourhoods with a lower percentage families with young children.
- 1b: Neighbourhoods with a higher percentage childless, cohabitating couples are more likely to be ethnically diverse neighbourhoods than neighbourhoods with a lower percentage childless, cohabitating couples.
- 1c: Neighbourhoods with a higher percentage single households are more likely to be ethnically diverse neighbourhoods than neighbourhoods with a lower percentage single households.
- 1d: Neighbourhoods with a higher percentage lone parents are more likely to be ethnically diverse neighbourhoods than neighbourhoods with a lower percentage lone parents.

As individual residential decisions aggregate to broader residential patterns (Clark & Dieleman, 1996b), ethnic majority households avoiding ethnically diverse neighbourhood can be assumed to invigorate (city-wide) segregation with their residential moves. The presence of ethnic majority households not sensitive to the ethnic composition of their neighbourhood, on the other hand, could be assumed to lower segregation as they are more likely to live in the same neighbourhoods as ethnic minorities. We thus assume that:

- 2a: Cities with a high percentage of ethnic majority families with young children are more segregated than cities with a low percentage of ethnic majority families with young children.
- 2b: Cities with a high percentage of ethnic majority childless, cohabitating couples are less segregated than cities with a low percentage of ethnic majority childless, cohabitating couples.
- 2c: Cities with a high percentage of ethnic majority single households are less segregated than cities with a low percentage of ethnic majority families with young children.
- 2d: Cities with a high percentage of ethnic majority lone parent households are less segregated than cities with a low percentage of ethnic majority lone parent households.

## Background

Turkish and North African migrants began arriving in Belgium in the early 1960's as guest labourers, to work in the mining or other heavy industry, like metallurgy and textile. They replaced guest labour streams coming from Southern Europe. The oil crisis of 1974 brought an end to the economic boom and the accompanying high demand for labour forces. Belgium therefore initiated a 'migration stop' and did no longer welcome new guest labourers. The guest labourers who already were in Belgium were forced to choose between settling permanently in Belgium or returning to their country of origin, without being able to return. Many decided to stay and brought their families to Belgium. Additionally, single guest workers could find a bride in their country of origin and bring her over. Family reunification and family-formation thus became the most important channel of migration for Turks and North-Africans after the oil crisis. As the children and grandchildren of these guest workers can also import their brides or grooms from their country of origin, family-formation is up to this day the channel most used for new Turkish and North-African migrants.

This oil crisis also changed the public opinion about these guest workers. Whereas guest labourers used to be seen as a *curiosum*, hostility towards migrants, discrimination and racism rose during and after this crisis. Nowadays, ethnic minorities stemming from North-African countries or Turkey still

face discrimination (Van der Bracht, Coenen, & Van de Putte, 2015) and are socio-economically disadvantaged: ethnic minorities are overrepresented in the unemployment numbers and (especially men) have the highest chance to leave school without a degree (Timmerman, Vanderwaeren, & Crul, 2003). At the same time, the socio-economic diversity increases within ethnic groups and several descendants of these guest workers finish tertiary education and are capable of achieving upward social mobility (Timmerman et al., 2003).

Although we are aware that there are differences between these countries, their migration histories, the socio-demographic characteristics of the initial guest workers coming from these countries (Reniers, 1999) and the migrant groups currently in Belgium, we will analyse these groups as one because there still are similarities between their situations (see for example: Timmerman et al., 2003; Verhaeghe, Van der Bracht, & Van de Putte, 2015); they are considered as an entity in the public opinion (Gruner, 2010; Schuermans, Meeus, & De Decker, 2015); and there are other researchers in similar contexts who perform analyses on these combined groups as well (e.g.: Dujardin, Selod, & Thomas, 2008).

## Data and methods

### Data

The dataset used in this study is based on a combination of the Belgian Census of 2001<sup>1</sup> and the National Register of Belgium. The Census collects data about all officially registered inhabitants of Belgium. The combination of these two data sources offers highly accurate information about demographic characteristics, the country of birth and the nationality when first inscribed in the national register, socio-economic status, household composition, housing conditions and the place of residence (i.e. the census tracts) for nearly all official inhabitants of Belgium. However, some remarks should be made and kept in mind when discussing the results. Due to budget-cuts, the Census 2001 was collected using post surveys that people had to send back by mail. This in contrast to previous years where the Census was collected with door-to-door surveys. In the first round, 75% of the respondents replied. Others were sent registered reminder letters. These letters urged respondents to reply and explained that people who would still not reply, could expect a visit from an inspector to collect the filled-in questionnaire and a fine. These threats, along with questions about the relevance and the protection of the privacy, led to discussions in the newspapers. Both factors had an impact on the quality of the responses of the Census: some people sent back incomplete or inaccurate questionnaires, others did not reply at all. However, over 95% of all questionnaires were sent back. Although the National Register is kept up to date by municipal officers, there are some inaccuracies. These arise when people delay the declaration of changes to be registered in the National Register or when these officers file inaccurate information<sup>2</sup>.

### Neighbourhoods and cities

To construct our dataset, variables were aggregated from the individual and household level to the neighbourhood and/or city level. The demarcation of the statistical sectors is used to determine what

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<sup>1</sup> The official name is the Socio-Economic Survey of 2001.

<sup>2</sup> As an example, it is impossible to divide between people coming from the Republic of Congo (Congo-Brazzaville) and the Democratic Republic of Congo (Congo-Kinshasa). However, both have a significantly different relation with Belgium, Congo-Kinshasa is a former colony of Belgium, and thus a significantly different migration history.

neighbourhoods are. These resemble the census tracts used in Anglo-Saxon research. These statistical sectors were demarcated based on the census of 1970 and updated for every new census. Although the researchers tried to base their demarcation on social, economic, urban and morphological characteristics, they were forced to make several pragmatic choices (Jamagne, Lebrun, & Sajotte, 2012; Van Der Haegen & Brulard, 1972). Neighbourhoods will be used as synonyms for statistical sectors in the remainder of this paper. Municipalities were used as cities, and both words will be used as synonyms for the remainder of this paper. These form an administrative and political demarcation of cities. However, this has two drawbacks: first, these diverge from metropolitan areas, as central cities and their respective commuter cities are not combined and second, the capital, Brussels, is treated as 19 different (unrelated) municipalities as they all have their own city council.

Belgium has 589 municipalities and 19 011 statistical sectors, with 32.28 neighbourhoods on average in each city ( $\sigma$ : 27.05). From these 589 municipalities, all cities with more than 100 inhabitants with roots in North-African countries or Turkey were selected. Municipalities with a smaller amount of ethnic minorities stemming from these countries were removed. Within these municipalities, all neighbourhoods with more than 100 inhabitants were kept for analysis. Smaller sectors were dropped to avoid that individuals have a too large impact on aggregated sector-variables. We thus retain 7 299 neighbourhoods (38.394%) in 189 cities (32.088%) and 5 604 222 inhabitants (which relates to 54.429% of the total population of Belgium in 2001). These neighbourhoods have on average 767.81 inhabitants ( $m$ : 557,  $\sigma$ : 665.19), with a minimum of 101 and a maximum of 5 867, while the cities have on average 30 025.47 inhabitants ( $m$ : 20 574,  $\sigma$ : 37 738.61), with a maximum of 391 419 inhabitants and a minimum of 4 037 inhabitants.

## Variables

### Dependent variables

#### *Location Quotient*

The Location Quotients (Brown & Chung, 2006) for first and second generation ethnic minorities coming from North-African countries or Turkey were calculated and dichotomized as the dependent variable: neighbourhoods with a score greater than 1 score 1 on the dependent variable and are considered concentration neighbourhoods, all other neighbourhoods score 0. Neighbourhoods without inhabitants coming from North-Africa or Turkey are included in this last category. This Location Quotient is calculated with the following formula:

$$LQ = (EM_i/t_i) / (EM/T)$$

where  $EM_i$  and  $t_i$  are the ethnic minority population, here with roots in North-African countries or Turkey, and total population of the neighbourhood and  $EM$  and  $T$  represent the ethnic minority population, again with roots in North-African countries or Turkey, and total population of the city. This Location Quotient gives the relation between the percentage ethnic minorities in the neighbourhood and in the city. The LQ will be equal to 1 if the percentage ethnic minorities in the neighbourhood is equal to that in the city, greater than 1 if there is a higher percentage ethnic minorities in the neighbourhood than in the city and smaller than 1 if it is the other way round. This quotient measures the evenness dimension of segregation (Brown & Chung, 2006; Massey & Denton, 1988)

The average score on the Location Quotient is 0.837, which means that the average neighbourhood has a share of ethnic minority inhabitants that is 16.3% smaller than the city share. The standard deviation is 1.171. The median LQ is 0.440, which means that the share of ethnic minorities in the median neighbourhood is 56% lower than in the city. The minimum LQ score is 0, the maximum 13.443. However, 25.798% of all neighbourhoods have a LQ equal to 0. Excluding neighbourhoods without any ethnic minority inhabitants from North-Africa or Turkey, the minimum Location Quotient is 0.009. The mean is 1.128, with a standard deviation of 1.233. This means that in the average neighbourhood, after removing those neighbourhoods without ethnic minority inhabitants, the share ethnic minorities is 12.8% higher than in the city. The median is 0.742. This means that most neighbourhoods have a smaller share of ethnic minority inhabitants than their cities.

As mentioned, all neighbourhoods having a Location Quotient above 1 are scored 1 on the dependent variable. This category includes 2 121 neighbourhoods (29.059%). The second category comprises the 1 883 neighbourhoods without ethnic minority inhabitants and the 3 295 neighbourhoods with a Location Quotient smaller than 1 (25.798% and 45.143% respectively or 70.941% together).

### *Dissimilarity index*

The dissimilarity index measures the percentage of the ethnic minorities in the city that would have to move in order to get a perfectly even distribution of the ethnic minority population over all neighbourhoods of the city. This is calculated for the ethnic minorities with roots in North-Africa or Turkey using the following formula:

$$D = \sum [t_i * |p_i - P| / (2TP(1-P))]$$

In this formula,  $t_i$  refers to the total population of neighbourhood  $i$ ,  $p_i$  the percentage ethnic minorities (with North-African or Turkish roots) in the neighbourhood and  $P$  their percentage in the city.  $T$  refers to the total population of the city. The scores on the dissimilarity index fall between 0 and 1. The dissimilarity index here is multiplied by 100 to achieve percentages.

The average score on the dissimilarity index is 41.92%, meaning that on average 41.92% of the ethnic minority members with roots in North-Africa or Turkey have to move within their city to achieve perfect evenness. The standard deviation is 10.09%, the median is 43.17%. The dissimilarity indices have a minimum of 13.06% and a maximum of 69.35%.

### *Independent variables*

Four household types are discussed in the theoretical framework: single households, childless couples, families with young children and households headed by a lone parent. Someone is considered to be living in a *single* household when that person their marital status is single, thus excluding divorced, widowed and married and their household size is 1. *Cohabiting, childless couples* are those households existing of 2 persons who indicated that they are each other's partner<sup>3</sup> and of whom neither has given birth to a living child in their live. Families with young children are those families of whom the oldest child is no older than 3years old<sup>4</sup> and who do not have any other household members than the parents and their children. *Lone parents* are all those households headed by only one parent, whose children are younger than 25 and who do not have any other

<sup>3</sup> As this is not an official marital status, this had to be indicated in the Census survey.

<sup>4</sup> This is the age at which children can start attending kindergarten.

household members than the parent and their children<sup>5</sup>. We only focus on Belgian households and calculate the shares of these households on the total of all Belgian households. All shares are included as continuous variables. A household is considered Belgian when both the head of household and their partner (if present) have the Belgian ethnicity, meaning that they themselves and all their parents are born in Belgium and had the Belgian nationality when first inscribed in the National Register.

There are 2 085 512 Belgian households in the selected neighbourhoods, 262 991 of these are single households, 46 464 cohabitating, childless couples, 72 150 families with young children and 140 189 single parents. The descriptive analyses are shown in table 1.

[TABLE 1 AROUND HERE]

### Control variables

We include 6 control variables: 2 on the neighbourhood level and 4 on the city level. All are continuous variables. All descriptive statistics are presented in table 2.

The *proportion (semi-)detached housing* measures the percentage of households who live in a detached or semi-detached house. Neighbourhoods with a high percentage (semi-)detached housing are usually found in the suburbs and are considered safer to raise children in and of better quality (Meeus, De Decker, & B., 2013).

The *proportion higher degree holders* offers a measure of the proportion of all neighbourhood inhabitants that have a degree in tertiary education: either a college or university degree.

The *proportion ethnic minorities* measures the proportion first and second generation minorities coming from North-Africa or Turkey of the total population in the city.

The number of *inhabitants* are included as a second city-level control variable. These numbers are divided by 1000 to make the order of magnitude of the variance in accordance with the other independent variables (Hox, 2010)<sup>6</sup>.

The *educational ratio* is calculated by taking the ratio of the average of the number of years that are necessary to graduate for the highest educational degree a person holds for both ethnic Belgians and Turkish and North-African ethnic minorities. To bring this in accordance with the other percentages, this ratio was multiplied by 100. A ratio larger than 100 thus means that the ethnic minorities are, on average, better educated than the ethnic Belgian inhabitants of a city and vice versa. This is added as a measure for SES differences between ethnic majority and minority members. This control variable is based on the spatial assimilation theory {Charles, 2003 #65}.

The last control variable is included based on the Ecological Perspective (Timberlake & Iceland, 2007) and measures the *share of those employed in the secondary sector* (i.e. industry and manufacturing) on the total of employed inhabitants in the city.

[TABLE 2 AROUND HERE]

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<sup>5</sup> It is possible that households included in the *Lone parents* category are also included in the *Families with young children* category.

<sup>6</sup> Not doing so resulted in computational errors in R.

## Methods

Neighbourhoods are clustered within cities. This makes it necessary to perform multi-level analyses. With multi-level analyses, it is possible to correctly measure the influences of city characteristics on neighbourhoods. Performing single level analyses on the neighbourhood level, and adding city characteristics as neighbourhood characteristics would overestimate the effects of city characteristics. Additionally, as our dependent variable is dichotomous, logistic multi-level models were estimated. Both data-preparations and data-analyses were done in R. Analyses were performed using the lme4 package (Bates, Maechler, Bolker, & Walker, 2015). We report both the logodds and, to aid the interpretation, the accompanying odds ratios. These odds express the ratio between the chance of being a concentrated neighbourhood ( $LQ > 1$ ) and not being such a neighbourhood ( $LQ < 1$ ). Most OR will appear small for one percentage point differences, but these effects increase as the percentage point differences increase. To test the city level associations discovered in the multilevel analyses, a single level analysis on the municipality level will be performed too. This is a linear regression with the dissimilarity score as the independent variable. This analysis was performed using the lm command that is included in the basic version of R.

We present four models: two multilevel models with the dichotomized Location Quotient as the dependent variable and two municipality level models with the dissimilarity index as the dependent. For both analyses, we first test the influence of the presence of the four discussed household types. The control variables are then added for the second step.

## Results

Before discussing the effects of the prevalence of certain household types in the neighbourhood and the city, attention is paid to the Null Model and a model that only includes the control variables. The odds for being a concentration neighbourhood in the Null Model are 0.411 (logodds: -0.889,  $p < 0.001$ ). This means that there are 0.411 concentration neighbourhoods for every neighbourhood that does not have a concentration of ethnic minorities with North-African or Turkish roots. This closely resembles the 29.06% concentration neighbourhoods mentioned in the descriptive statistics. This intercept has a city level variance of 0.019, meaning that city level characteristics only explain a small part of the varying odds to be an ethnically diverse neighbourhood.

The percentage single households and the percentage lone parents are significantly related to the odds that a neighbourhood has a concentration of ethnic minorities with North-African or Turkish roots: neighbourhoods with a higher presence of either of these two household types have a higher chance to be concentrated than neighbourhoods with a lower presence of these households (OR for a 1pp. difference: 1.087 and 1.235 respectively,  $p < 0.001$ ). Controlling for the neighbourhood housing stock, neighbourhood SES and city-level demographic characteristics related to the Ecological Perspective and the Spatial Assimilation theory slightly decreases these odds ratio's (to OR for a 1pp. difference: 1.073 and 1.129 respectively), but the associations remain statistically significant (at the  $p < 0.001$  level). Contrary, both the percentage families with young children and the percentage childless, cohabitating couples in the neighbourhood are significantly associated with the chance that a neighbourhood has a concentration of ethnic minorities before adding the control variables but lose their significance after adding these control variables. The percentage childless, cohabitating couples are related to the chance that a neighbourhood is concentrated in the same way as percentage singles or lone parents: neighbourhoods with a higher share cohabitating, childless

couples have a higher chance to be segregated than neighbourhoods with a lower share cohabitating, childless couples (OR for a 1 pp. difference: 1.051,  $p < 0.05$ ). Families with young children, on the other hand, are inversely related: neighbourhoods with a higher share of these families have a lower chance to be concentrated than neighbourhoods with a lower share families with young children (OR for a 1 pp. difference: 0.970,  $p < 0.05$ ).

[TABLE 3 AROUND HERE]

These results support the assumption that there are differences in the tendencies to leave ethnically concentrated neighbourhoods between household types. However, it is yet impossible to say how this aggregates to city-wide residential segregation of ethnic minorities with Turkish or North-African ancestry without risking atomic fallacy. Therefore, additional analyses with the dissimilarity score as the dependent variable were performed. These results are reported in table 4.

[TABLE 4 AROUND HERE]

Contrary to the neighbourhood level analyses, the percentage families with young children is significantly related to the dissimilarity score: in cities with a higher percentage families with young children, more ethnic minorities have to move to achieve a perfect dispersion of ethnic minorities over all its neighbourhoods than in cities with a lower percentage families with a young children (b: 4.779,  $p < 0.01$ ; see model 1, table 4). This means that segregation is higher in cities with many families with young children than in cities with few families with young children. This association remains after adding demographic and spatial assimilation related control variables (b: 5.546,  $p < 0.001$ ; see model 2, table 4) and controlling for the housing stock (b: 3.96,  $p < 0.01$ ; see model 3, table 4). The percentage cohabitating, childless couples, on the other hand, is not associated with segregation, in none of the 3 models. This is in accordance with the neighbourhood level analyses.

The percentage lone parents and the percentage single households are significantly associated with the dissimilarity score when controlling for demographic and spatial assimilation related characteristics: cities with a higher percentage of either household type are less segregated (i.e. have a lower dissimilarity score) than cities with a lower percentage of these households (b: -0.950,  $p < 0.05$  and -0.487,  $p < 0.01$  respectively; see model 2, table 4). This means that the presence of single households or lone parents is inversely related to segregation than it is to neighbourhood level concentration: cities with many single households are less segregated than cities with few singles, but neighbourhoods with many singles have a higher chance to be concentrated than neighbourhoods with few singles. Before adding any control variables, only the percentage lone parents is related to the dissimilarity score of a city (b: -1.782,  $p < 0.001$ ), not the percentage single households.

## Discussion

Two hypotheses per household type were formulated, one linking the presence of the household type in the neighbourhood to the chance that a neighbourhood has a concentration of ethnic minorities and an additional one linking the presence of the household type to city-wide ethnic residential segregation. It is neither possible to confirm nor reject the neighbourhood hypothesis for families with young children (H1a): the percentage of families with young children in the neighbourhood is only related to the chance that a neighbourhood is concentrated before adding the control variables. Still, the percentage families with young children in city is related to segregation

before and after adding control variables: cities with a higher percentage families with young children are also more segregated than cities with a lower percentage. This confirms the city level hypothesis for this household type (H2a).

The presence of cohabitating, childless couples is only related to the chance that a neighbourhood is concentrated before adding the control variables: neighbourhoods with a higher share of this household type have a higher chance to be concentrated than neighbourhoods with a smaller share of these couples. However, neither their city level representation, nor their share in the neighbourhood after adding the control variables were significantly related to segregation or concentration. It was thus impossible to confirm the two hypothesis for cohabitating, childless couples (H1b and H2b), their presence does not play a role on either the neighbourhood or the city level.

The neighbourhood level hypotheses for single households (H1c) and lone parent households (H1d) can be confirmed. Both are positively related with the chance that a neighbourhood is concentrated: neighbourhoods with a higher percentage of either of the two household types, have a higher chance to be segregated than neighbourhoods with a smaller presence of these household types. The city level counterpart for the hypothesis about the presence of lone parents in the neighbourhood (H2d) can be confirmed too. Cities with a higher share lone parents among the ethnic majority households are less segregated than cities with a lower share lone parents. The city level counterparts of the hypothesis for single households, however, is more difficult to confirm or reject. The presence of both household types was related to segregation when controlling for the percentage ethnic minorities in the city, the number of inhabitants, the educational difference between ethnic minorities and the majority and the share of the active population employed in the second sector, after adding control variables. This confirms the city level hypotheses (H2c), although prudence is necessary. As these household types have a higher chance to live in the same neighbourhoods as ethnic minorities, these household types help to desegregate cities because ethnic minorities will live less concentrated thanks to the presence of ethnic majority households in their neighbourhoods. This results in the smaller number of ethnic minorities that have to move to achieve perfect evenness.

These results add to other (initial) empirical evidence for the importance of household characteristics in the study of ethnic residential segregation. However, to further develop this scientific understanding, it will be necessary to integrate household characteristics into the other often used theories to explain residential segregation (i.e. Place Stratification and the discrimination theory, Spatial Assimilation and the Ecological Perspective), uncover how these mechanisms work at the level of the individual household and investigate the underlying motives for these movements. Based on the findings here, it is likely that at least a part of these associations are related to different sensitivities to the presence of ethnic minority neighbours. However, other factors, like socio-economic status, socio-economic segregation and the spatial clustering of certain housing types, are also important to take into account.

The findings are also relevant to society because the profound consequences that living in concentrated neighbourhoods have for their inhabitants makes it important to understand why people with different ethnic backgrounds live segregated. Studies link detrimental income effects (Musterd, Andersson, Galster, & Kauppinen, 2008), less social contact and friendship between

minority and majority members (Gijsberts & Dagevos, 2007; Schlueter, 2012), weaker majority language proficiency and less majority language use (Vervoort, 2012), and higher mortality and worse pregnancy outcomes (Grady & Darden, 2012; Kramer & Hogue, 2009) to living in segregated neighbourhoods. However, it should be noted that these neighbourhoods offer their inhabitants certain benefits, like a buffer protecting against discrimination and higher self-rated health (Becares, Nazroo, & Stafford, 2009), while other scholars doubt the magnitude or even the existence of neighbourhood effects and attribute them to selection effects (Cutler, Glaeser, & Vigdor, 2008).

Some remarks should be made too. Firstly, the context imposed certain pragmatic decisions. As Belgium is only a small country all cities with more than a 100 ethnic minority residents were included because a higher threshold would severely limit the number of cities to include. In addition, due to the small number of cities included (189), cities with different functions (e.g.: central cities and commuter towns) were compared to each other in these analyses. It is therefore necessary to further investigate the associations between the presence of different household types and ethnic concentration and residential segregation in cities with a higher threshold or when selecting only a specific type of cities (like central cities). Secondly, the segregation measures used in this study (location quotient and dissimilarity score) are often criticized because these measures are spatially insensitive (Reardon & O'Sullivan, 2004): they neither consider the distances between neighbourhoods nor how they are located to each other. This means that a city where all ethnic minority-concentrated neighbourhoods are lying next to each other is as segregated as a city where ethnic minority-concentrated neighbourhoods are evenly distributed over the city. Thanks to contemporary computational possibilities, several new segregation measures have been developed. However, these often add uncertainty (when all inhabitants are randomly assigned to a spot within the neighbourhood they live in) or based on survey methods instead of census data (when addresses are used). We therefore believe that there is merit in the chosen segregation measures. Lastly, our segregation measures study the evenness dimension formulated by Massey & Denton (Massey & Denton, 1988). This means that they measure the distribution of ethnic minorities over a certain city. A second dimension (i.e. the isolation dimension) looks at the extent to which ethnic minorities share their neighbourhoods with ethnic majority members.<sup>7</sup> Doing the same investigation but looking at measures of the isolation dimension would supplement this study.

## Conclusion

Our results show that household characteristics are, indeed, related to neighbourhood concentration and city wide segregation, but not all household types are related to concentration and segregation at the neighbourhood and the city level to the same extent. We can thus conclude that there is merit in integrating the White Flight hypothesis into the residential stress theory and that it is important to consider household characteristics when studying ethnic residential segregation more generally. However, to know how these associations work specifically, it will be necessary to perform additional analyses looking at individual households and their residential moving behaviour and the underlying motives for these movements.

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<sup>7</sup> Although both will often be related, they do not measure the same. As an (extreme) example, consider a city with only 4 ethnic minorities. All four live in the same neighbourhood, meaning that this city will have a high segregation score (they are not evenly distributed over all neighbourhoods in the city). However, in this neighbourhood, there are also a 100 ethnic majority member inhabitants. Their isolation will therefore be very low.

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Table 1: descriptive statistics of the household proportions within the neighbourhood and the city.

	Mean	SD	Median	Min.	Max.
<i>Within the neighbourhood</i>					
<i>Total number of families</i>	285.726	266.565	200	10	2745
<i>Proportion:</i>					
<i>Singles</i>	10.141%	8.190%	7.839%	0.000%	65.432%
<i>Childless Couples</i>	2.514%	1.665%	2.312%	0.000%	14.286%
<i>Families with young children</i>	3.702%	2.060%	3.448%	0.000%	23.077%
<i>Lone Parents</i>	6.010%	3.477%	5.556%	0.000%	40.385%
<i>Within the city</i>					
<i>Total number of families</i>	11 168.79	15 656.03	7 413	1 527	166 788
<i>Proportion:</i>					
<i>Singles</i>	10.167%	5.380%	8.513%	5.013%	38.359%
<i>Childless Couples</i>	2.121%	0.501%	2.035%	1.011%	3.775%
<i>Families with young children</i>	3.702%	0.652%	3.712%	1.865%	6.454%
<i>Lone Parents</i>	6.237%	1.645%	6.004%	3.214%	10.285%

Table 2: descriptive statistics control variables

	Mean	SD	Median	Min.	Max.
<i>Neighbourhood:</i>					
<i>Proportion (semi-)detached housing</i>	54.08%	32.98%	58.82%	0.00%	100.00%
<i>Proportion tertiary degree holders</i>	24.96%	11.58%	22.86%	0.98%	76.40%
<i>City:</i>					
<i>Proportion ethnic minorities</i>	4.27%	6.55%	2.04%	0.32%	55.44%
<i>Inhabitants (per 1000)</i>	30.03	37.74	20.57	4.04	391.42
<i>Educational ratio</i>	95.67%	5.68%	95.48%	81.32%	112.36%
<i>Proportion employed in the Secondary Sector</i>	26.06%	8.19%	25.98%	11.62%	47.85%

Table 3: results for the multilevel logistic regressions with a dichotomization of the Location Quotient as the dependent.

	Model 1				Model 2			
	Logodds	S.E.	OR	p	Logodds	S.E.	OR	p
Intercept (centered) <sup>1</sup>	-0.916	0.047	0.400	***	-1.170	0.059	0.310	***
Intercept (uncentred)	-2.858	0.120	0.057	***	2.921	1.060	18.560	**
% of the HH type in the neighbourhood								
Families with young children	-0.030	0.015	0.970	*	0.004	0.016	1.004	
Childless, cohabitating couples	0.050	0.021	1.051	*	-0.001	0.022	0.999	
Single Households	0.077	0.005	1.080	***	0.109	0.011	1.115	***
Lone Parents	0.191	0.010	1.210	***	0.059	0.006	1.061	***
Control variables:								
Neighbourhood level								
% (semi-) detached housing					-0.024	0.002	0.976	***
% 3 <sup>rd</sup> degree holders					-0.059	0.004	0.943	***
Municipality level								
% EM					-0.068	0.009	0.934	***
# inhabitants (per 1000)					-0.007	0.001	0.993	***
Educational ratio					-0.016	0.010	0.984	
% employed in 2 <sup>nd</sup> sector					-0.014	0.008	0.986	°
Municipality level variance	0.224				0.283			

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ° p<0.1

<sup>1</sup>The centred intercept is added to give a meaningful intercept. The coefficients are reported are those for the uncentered analysis, but these are (nearly) identical to the coefficients of the centred analysis.

Note: Neighbourhoods have a higher chance to be ethnically concentrated when the presence of single households, lone parents or cohabitating, childless couples in the neighbourhood is high, in comparison with neighbourhoods with a smaller presence of these household types, and when the presence of families with young children is low compared to neighbourhoods with many families with young children. However, these last two associations are only significant before adding control variables.

Table 4: municipality level analysis with the Dissimilarity index as the dependent.

	Model 1			Model 2		
	b	S.E.	p	b	S.E.	p
Intercept (centered) <sup>1</sup>	41.923	0.710	***	41.923	0.620	***
Intercept (uncentered)	36.239	8.645	***	106.183	15.324	***
% Families with young children	4.779	1.450	**	5.546	1.334	***
% cohabitating, childless couples	-0.197	1.652		-1.338	1.496	
% single households	-0.047	0.168		-0.487	0.186	**
% lone parents	-1.782	0.513	***	-0.950	0.481	*
% EM				0.192	0.131	
# inhabitants (per 1000)				0.059	0.018	**
% employed in 2 <sup>nd</sup> sector				-0.046	0.101	
Educational ratio				-0.758	0.127	***
Adjusted R square	0.195			0.386		

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ° p<0.1

<sup>1</sup>The centred intercept is added to give a meaningful intercept. The coefficients are reported are those for the uncentered analysis, but these are (nearly) identical to the coefficients of the centred analysis.

Note: cities with more families with young children or less single households and lone parents have a higher dissimilarity score than cities with few families with young children or many of these other two household types. However, the association between the dissimilarity score and the percentage single households is only significant after adding control variables.