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The Effects of Gentrification on Residents' Sense of Place and Group Cohesion: A Study of Pittsburgh Neighborhoods

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Abstract

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Many researchers have studied gentrification. Much of the existing research on gentrification has focused on the extent of population displacement and changes in the community economic profile. Others have focused on the experiences of residents during and after gentrification. In this paper, I take the latter approach. Using data from the 2018 Pittsburgh Quality of Life survey, I examine the effects of gentrification on a range of community-related attitudes (e.g. sense of place and group cohesion). Specifically, I compared residents who reside in gentrifying or gentrified neighborhoods with those who live in neighborhoods that have not gentrified. My two main research questions were: 1) Do residents in gentrifying neighborhoods have a decreased sense of place and group cohesion? 2) Does residents' length of residence amplify the effects of gentrification on community attitudes? I found evidence to support the first hypothesis, but the second hypothesis was not supported. I discuss results, implications of the research, and possible directions for future research.

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Introduction

Existing research on gentrification has been divided; some research finds negative impacts on gentrifying communities, while other research finds the process of gentrification to have benefits for the gentrifying communities. Research indicates the benefits that gentrification provides including bringing a life and vibrancy to a community, a reduction in crime, and health and educational benefits (Mehdipanah et al. 2018; Papachristos et al. 2011). There are new places to eat and shop, new places to live, an increase in property values, and new jobs for the community (Byrne 2003). These changes, in turn, offer the potential for an increase in the academic achievement of children living in gentrifying communities (Pearman 2019). Some scholars argue that while gentrification can cause some problems, they are insignificant in comparison to other contemporary urban issues that to study them is a waste of time (Massey 2002).

On the other side, some research condemns gentrification as harmful and destructive to communities and the individuals who reside in them. Critical race scholars in particular are highly critical of gentrification and disagree with Massey's perspective (Omi and Winant 1994; Smith 1996). This research shows that gentrification inordinately impacts those lower in socioeconomic status, both by directly evicting them to make way for what is called progress, and by leading to increased costs of living through rent hikes and the replacement of affordable housing (Betancur 2011; Deener 2012; Hydra 2008; Lloyd 2006; Newman and Wyly 2006; Pattillo 2007; Taylor 2002). Even scholars who have identified beneficial outcomes of gentrification acknowledge potential concerns. As Freeman and Braconi (2004) note, "Even

though urban gentrification may provide benefits to disadvantaged populations, it may also create adverse effects that public policies should seek to mitigate" (p. 51). Research also indicates that another negative impact of gentrification is when it progresses beyond the goals of a community's early gentrifiers (Ocejo 2014).

More recently, research on gentrification has increasingly focused on a key group, the original residents of a gentrifying area and how they navigate the changing social structures around them, from roles in political and social life, to conflicts over the use of public space (Billingham and Kimelberg 2013; Colic-Peisker and Robertson 2015; Fraser 2004; García and Rúa 2018; Green et al. 2017; Hyra 2014; Martinez 2010; Shaw and Hagemans 2015; Stanley 2003; Woldoff, Morrison, and Glass 2016). From this research one may take away that long-term residents are often marginalized and find themselves having less of a say about the community in which they reside. In this paper, I will refer to this marginalization as indirect displacement. Indirect displacement is similar to direct displacement, though instead of the individual being uprooted and relocated somewhere new and unfamiliar, the individual remains in the same location while the surrounding area is drastically changed, creating the same effect.

In this paper, I add to the body of literature on gentrification and long-term residents by examining indirect displacement. I do so by comparing the attitudes of residents who reside in gentrifying or gentrified neighborhoods with those who live in neighborhoods that have not gentrified, looking for differences in sense of place and group cohesion, and the impact that length of residence has on these differences.

Literature Review

A Working Definition of Indirect Displacement

Scholars and organizations define indirect displacement in different ways. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) argues that displacement, which results from the development or gentrification of an area, can come in two forms (n.d.). The first form is direct displacement, which results in the physical relocation of residents from their homes. The second type is indirect displacement, which is concerned with the loss of livelihood, and is economic in nature. Davidson (2008) agrees with this definition, referring to concerns about livelihood as indirect economic displacement, and uses the terms "community displacement" and "neighborhood resource displacement" to refer to a loss of sense of place and a change in the existing structure of a neighborhood, respectively. Shaw and Hagemans (2015) take a different approach, simply using two different terms; physical displacement, referring to direct displacement, and displacement, referring to displacement which is not direct. García and Rúa (2018) take a third approach, using direct and indirect displacement, where direct displacement matches the existing UNESCO use, but indirect displacement is used to tie back to Davidson's definition of neighborhood resource development. For the purposes of this study an inclusive approach will be used, bringing together Davidson's concepts of community displacement and neighborhood resource displacement together under the single term of indirect displacement.

The Link to Gentrification

Studies often describe gentrification as a process of change, where the goal is to take to less appealing and more marginal neighborhoods and build them up to attract new residents of a higher socioeconomic class (Freeman and Braconi 2004; Zukin 1987). Change is at the core of gentrification. This is of particular importance because the core of displacement is also (involuntary) change. Recent studies have confirmed the connection between gentrification and indirect displacement. Shaw and Hagemans' (2015) study of a secure housing community in a gentrifying area of Melbourne, Australia found that there was a connection between gentrification and the indirect displacement of the original, long-term residents. Further, they found that the potential benefits of gentrification do not offset the impact of the indirect displacement. Similarly, García and Rúa's (2018) study of aging Puerto Ricans in gentrifying Chicago neighborhoods found indirect displacement in the form of loss of attachment and identity with a given area as a result of gentrification. This suggests that the potential benefits of gentrification are not equally received by all members of a neighborhood, and that some members are harmed as a result of gentrification. The target populations of the two studies are different in geographic location, racial composition, and neighborhood makeup, among other factors. Yet despite this fact, both found similar results stemming from gentrification. Further, both studies found that the perceived positive changes that came about a result of gentrification did not benefit everyone in the target communities, but instead contributed to the indirect displacement of long-term residents. This would seem to suggest a causal link between gentrification and indirect displacement.

Changes Resulting from Gentrification

The Impact of Gentrification on Physical Location

Gentrification, as a process of change, has tangible, physical impacts on a given area. Davidson (2008) argues that as specific businesses and other public spaces within the neighborhood change as a result of gentrification, so too do the experiences of long-term residents in the form of an increasing disconnect from the physical locale. Numerous studies show positive and negative outcomes from the physical changes that result from gentrification (Atkinson 2004; Byrne 2003; Centner 2008: Deener 2012; Freeman and Braconi 2004; Green et al. 2017; Papachristos et al. 2011; Sullivan and Shaw 2011; Tissot 2015; Zukin 2009; Zukin et al. 2009). Additionally, long-term residents are not uniformly opposed to the physical changes that gentrification brings, finding some beneficial (Green et al. 2017).

The Impact of Gentrification on Existing Social Structures

In addition to changes to the physical structures of an area, gentrification may also impact the existing social structures of a neighborhood. Existing studies show that the impact on the social structures can be significant (Brown-Saracino 2007; Brown-Saracino 2009; Chernoff 1980; Fraser 2004; Gotham 2007; Gotham and Greenberg 2014; Halle and Tiso 2014; Hyra 2014; Martin 2007; Zukin 2009). Zukin (2009), in discussing the gentrification of New York City, suggests that this change can disrupt the very foundations of a community; “In the early years of the twenty-first century, New York City lost its soul” (p. 1).

The change in social structures can also carry into the political sphere as well. Martin (2007), in a study of gentrifying neighborhoods in Atlanta, points out that long-term residents

"expressed concern about the rising political influence and involvement of new residents and worry that long-time residents would lose both power and belonging in their neighborhoods" (p. 623). In Chattanooga, Tennessee, Fraser (2004) found that while there were groups of residents involved in the decision-making process, there were others (i.e., long-term and new residents) that were not. In regard to those not involved, Fraser found that they were "actively fought against and discursively constructed as being obstacles to the dominant image of what the area should be. The work that was done to achieve this definition of the situation included many nonresident groups acting in alignment, albeit temporarily" (p. 454).

In the Martin study, long-term residents were concerned over the loss of power with regards to the direction of the neighborhood, a concern that is realized in the Fraser study. This loss of power and authority can directly impact individuals' perceptions of their own identities in a negative way, increasing alienation. Additionally, the loss of power can have a strong impact on attitudes of the location among long-term residents. Indirectly, this loss of power and authority can lead to the physical changes made earlier, further decreasing neighborhood familiarity and attachment.

Theoretical Grounding

Group Cohesion

I argue that group cohesion is useful for understanding how gentrification affects long-term residents. Group cohesion theory suggests that the existence of a group which individuals belong to acts to unify the members of that group (Lawler, Thye, and Yoon 2000). Specifically, two approaches to group cohesion theory will be used, social and relational cohesion.

Social cohesion looks at the attitudes of individuals in terms of how willing they are to interact with others for mutual benefit (Stanley 2003).While one of the goals of gentrification is changing an area for the better, there is not necessarily a growth of group cohesion; in fact, there is sometimes a decline of social cohesion as a result (Uitermark, Duyvendak, and Kleinhans 2007). Gentrification actually has the direct impact of removing neighborhood aspects which support social cohesion (e.g. informal support networks and participation in local spheres) and replacing them with those which do the exact opposite (e.g. unfamiliarity with neighborhood residents and feelings of exclusion/marginalization), which limit or hinder the development of social cohesion (Colic-Peisker and Robertson 2015).

Social cohesion is also important to consider given that gentrification often occurs in neighborhoods with a high proportion of minority populations. Existing studies have found a positive relationship between the proportion of minority groups in a neighborhood and the perception of neighborhood disorder (Franzini et al. 2007; Sampson 2009; Sampson and Raudenbush 2004). Wickes et al. (2013) found that this connection is partially mediated by the social cohesion present within a neighborhood. Neighborhoods with high proportions of minority groups that are more socially cohesive perceive less disorder. Thus, in gentrifying neighborhoods, as the social structures are changed and the social cohesion is lowered, the perception of disorder will increase. For this reason, social cohesion is important to study as a measure of indirect displacement.

Relational cohesion, unlike social cohesion, is less concerned about the willingness of an individual to act, and more concerned with the belief of individuals that their membership and involvement with the group is what unites them, which in turn strengthens the ties between

members (Lawler and Yoon 1996; Thye, Yoon, and Lawler 2002). The relocation of individuals as a result of gentrification often breaks up the existing group relationships in an area. Relational cohesion is strengthened by power being balanced or relatively equal among group members (Lawler et al. 2000; Lawler and Yoon 1993, 1996, 1998). However, the power balance in a gentrifying neighborhood is typically skewed, as mentioned earlier, which means that the rebuilding of relational cohesion can take longer, if it happens at all.

In much of the existing work studying gentrification, when group cohesion has been examined, it has been done through the lens of social cohesion (Colic-Peisker and Robertson 2015; Forrest and Kearns 2001; Jennings and Bamkole 2019; Kempen and Bolt 2009; Miciukiewicz et al. 2012; Stanley 2003; Uitermark et al. 2007; Wickes et al. 2013). Relational cohesion, by contrast, is used more in social psychology (Lawler et al. 2000; Lawler and Yoon 1993, 1996, 1998; Lizardo 2007; Thye et al. 2002). There is a valid logic to this approach, as social cohesion is focused more on interactions for possible benefits, benefits which gentrification often strips away. Relational cohesion is more concerned with perceived group membership, and the balance of power between individuals. However, as mentioned in the section on gentrification and social structures, gentrification can affect one's membership in various political groups as well as the relative power that an individual has in comparison to newer individuals brought in by gentrification (Fraser 2004; Martin 2007). As such, both social and relational cohesion may be impacted in gentrifying areas, and by acknowledging the potential for both to change, I am able to study group cohesion more holistically.

Sense of Place

In addition to using social cohesion, urban studies of gentrifying communities also often use community attachment as a measure of studying the changes among the community residents (Farahani 2016; Hummon 1992; John, Austin, and Baba 2010; Kasarda and Janowitz 1974; McCool and Martin 1994; Sampson 1988; Theodori and Luloff 2000). Cross (2003) suggests that community attachment is focused on an individual's feelings towards their home and community. Instead of using community attachment directly, I instead choose to use the lens of sense of place, from the literature of social psychology. I do this because community attachment may refer to connections in both the physical/spatial and the social spheres of a community. By also incorporating the social spheres, community attachment brings in the social cohesion of a community. In focusing only on sense of place, rather than community attachment as a whole, I am thus able to distinguish between the impact of gentrification on a community's social sphere of life and the physical sphere. Sense of place allows for a narrower focus on the attachment to the specific spatial location, without taking into account the larger connections inherent in the neighborhood.

In using sense of place, I refer to two specific works. According to Stedman (2002), one's sense of place is determined by the experiences, interactions, and perceptions that one has had and continues to have within a given space, either individually or collectively, and may be determined through examination of identity and area satisfaction. Fullilove (1996) takes a different approach and argues that "this sense of belonging arises from the operation of three psychological processes: familiarity, attachment, and identity" (p. 1518).

While the above references do not specifically refer to indirect displacement, the fact that direct displacement is mentioned allows us to extend the theory. There is a tangible impact on connections for those in gentrifying neighborhoods who are not directly displaced, but still become removed from their communities in other ways (Atkinson 2004; Davidson 2008; Marcuse 1985; Newman and Wyly 2006). Marcuse (1985) referred to this phenomenon as the "pressure of displacement" (p. 207) and used examples that refer to the measures of familiarity and attachment.

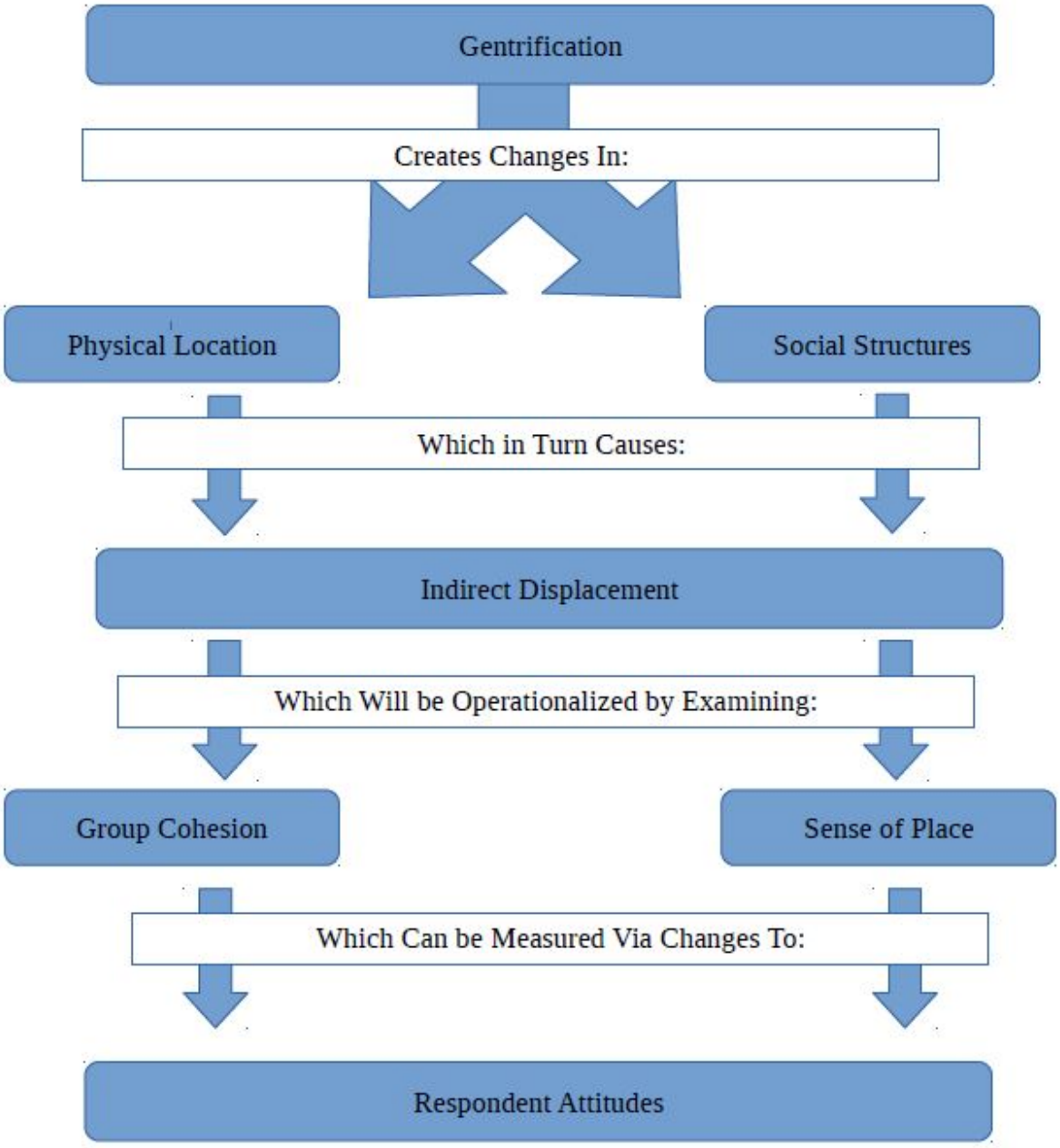
Operationalization

I operationalize indirect displacement through group cohesion and sense of place. Group cohesion looks at residents' perceptions of their social environment, while sense of place focuses on the physical environment. Extrapolating from the above information on group cohesion and sense of place, we can use the attitudes of respondents as a means of measuring their perceptions of each. With regards to group cohesion, an attitude that one is not a part of the group, or an unwillingness to be involved, acts as an indicator of a lower level of group cohesion. As for sense of place, one's attitudes about a given area are reflective of their own experiences and perceptions (in line with Stedman 2002), and act as indicators of one's familiarity and attachment to the area (Fullilove 1996). Thus, negative attitudes about the location would indicate a lower sense of place.

A conceptual diagram (Figure 1) traces the path from gentrification to indirect displacement, accounting for the impact of gentrification on physical and social structures. It

then indicates how indirect displacement will be operationalized (group cohesion and sense of place), and how I propose to identify changes in these measures.

Figure 1: The Impact of Gentrification on Indirect Displacement, and How it Will be Measured



Statement of the Problem

Gentrification can result in indirect displacement (García and Rúa 2018; Shaw and Hagemans 2015). These studies, while useful, have their limitations. The Shaw and Hagemans study focused on a single gated community in Australia. García and Rúa looked at multiple neighborhoods in Chicago but focused only on the elder Latinx population. This narrowed focus limits the generalizability of these studies.

This study advances the literature on indirect displacement by addressing some of the limitations of the existing studies. The sample is not limited to a subset of the population, but instead looks at data collected from residents making up a representative sample of an entire city, regardless of age, race, or other characteristics. This study also examines differences in attitudes among residents from neighborhoods with varying levels of gentrification, which may in turn provide evidence for a causal link between gentrification and indirect displacement.

This study also furthers literature, by taking into account how long respondents have lived in their current neighborhood. This allows me to test whether length of residence has a moderating effect on the relationship between gentrification and indirect displacement.

This leads to the following hypotheses:

H1: Gentrification should be associated with an increase in indirect displacement.

H2: Length of residence will amplify the positive relationship between gentrification and indirect displacement.

Methods

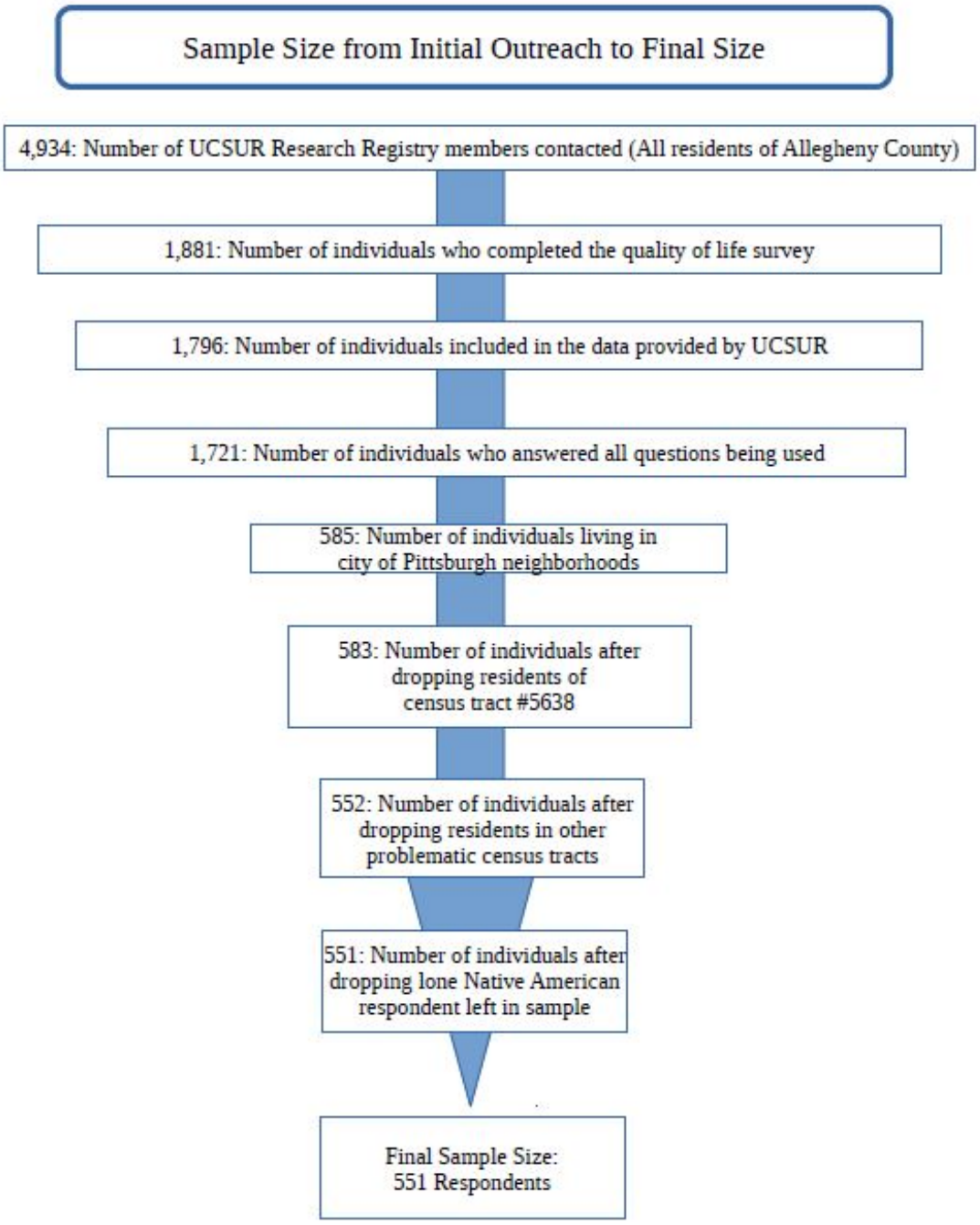
To test my hypotheses, I use the city of Pittsburgh as a case study. I selected the city of Pittsburgh because of the growing importance surrounding gentrification in the city (Alford 2018; Deto 2018; Sheehan 2018a; Sheehan 2018b) and also because Pittsburgh is now one of the most gentrified cities in the United States, ranking in at number eight (Deto 2019). This study uses secondary data from a survey conducted by the University Center for Social and Urban Research (UCSUR) at the University of Pittsburgh, that focused on the quality of life in the city of Pittsburgh (UCSUR n.d.a).

The survey was conducted through the *UCSUR Research Registry*, a registry consisting of individuals who had participated in past UCSUR surveys and agreed to be a part of future research (UCSUR n.d.b). Individuals who resided in Allegheny County and who had an email address on file were contacted via email (4,934 individuals in the registry)(UCSUR, n.d.b). The survey consisted of a total of 101 questions about respondents' quality of life and those who completed the survey were entered in a drawing to win one of four mini-IPADs (UCSUR, n.d.b).

In total, 1,881 residents of Allegheny County completed the survey (UCSUR, n.d.a). The data provided by the UCSUR, which included tract-level indicators for respondents, consisted of 1,796 respondents. The number of respondents dropped further after eliminating those who did not answer the questions used in this research (1,721 respondents). Since this research focuses on the city of Pittsburgh, I removed respondents living in Allegheny County neighborhoods that are not a part of the city of Pittsburgh. There were four such neighborhoods—the Central Business District, Bluff, Chateau, and South Shore (UCSUR 2017) The Central Business District and Bluff neighborhoods were eliminated due to the misallocation of residents of the Allegheny

County jail to those neighborhoods (UCSUR 2017). The neighborhoods of Chateau and South Shore were also excluded, due to a minimal residential population at the time period that the UCSUR report focused on (UCSUR 2017). After these eliminations, the sample size was reduced to 585 respondents, a loss of 1,136 respondents from other areas of Allegheny County. Following this, I eliminated a single census tract (5638) (see pag 26 for additional information), for a loss of two more respondents, leaving a sample of 583 respondents. Additionally, I eliminated nine more tracts (see page 26 for additional information), resulting in a loss of 31 respondents, reducing the sample to 552 respondents. Finally, further tests revealed only a single Native American respondent left in the sample, so this individual was dropped, as the sample size was too small to be representative. This left a final sample size of 551 respondents.

Figure 2: Tracing the Sample Size from Initial Outreach to Final Sample Size



Neighborhood Selection, Categorization

First, I created a list of distinct Pittsburgh neighborhoods, using a report published by the UCSUR, which looked at changes over time in the city of Pittsburgh (2017), including in-depth detail about individual neighborhoods.

Second, I categorized each neighborhood as gentrifying/gentrified or not gentrified/has resisted gentrifying using data from the UCSUR (2017) and from the American Community Survey (ACS).[1]

The UCSUR (2017) report on changes over time looks at demographic data for various neighborhoods, such as race, highest educational attainment, poverty, and age, among others. The report used data from the American Community Survey (ACS) five-year estimates for the years 2006-2010 and 2011-2015. The report presents values for both time periods, as well as the change between the two. I used the reported change between the two time periods when pulling indicator data from this report.

I also used the ACS five-year estimates for median household incomes. I matched this data with the 2006-2010 data in the UCSUR report. I did not use the 2011-2015 household income data because data from 2013-2017 is the most recent data available and better reflects continuing changes in average household incomes resulting from gentrification. Additionally, as the Quality of Life Survey was conducted in 2018, the 2013-2017 data provides a picture of average household incomes only a year before the survey was conducted.

1While the National Community Reinvestment Coalition (NCRC) recently released a report listing gentrified neighborhoods (https://ncrc.org/gentrification/), it uses data from 2000-2010, and as such is not up-to-date. For example, East Liberty, the main focus for the gentrification debate in the city of Pittsburgh, is not listed as gentrifying in the report. Given this, I categorized neighborhoods myself using more up-to-date data.

I classified neighborhoods as either gentrifying, or not gentrifying, using the data from both of these datasets by combining elements of two different well-known approaches, that of Freeman (2005) and Bostic and Martin (2003). The approach used by Freeman identified gentrifiable tracts by looking at both the median income and housing built; those tracts where the income and amount of housing built were less than that of the city were identified as gentrifiable (Barton 2016; Freeman 2005). The approach of Bostic and Martin (2003) for identifying gentrifying neighborhoods consisted of two parts. The first part also looked at median income but borrowed from the earlier work of Hammel and Wyly (1996) in suggesting that only tracts with a median income less than half of that of the larger area could be considered to be gentrifiable (Barton 2016; Bostic and Martin 2003). The second part also built upon Hammel and Wyly (1996) by looking at indicators for education, poverty, racial proportions, and home ownership, among others (Barton 2016; Bostic and Martin 2003).

In considering both approaches to median income, I decided to use Freeman's (2005), rather than Bostic and Martin's (2003), to create a precursor variable. While the Bostic and Martin (2003) approach would have been more desirable, in that it would have provided a smaller list of gentrifiable neighborhoods, it has two shortcomings. First, that approach looks at the median income a decade later, in order to identify gentrified neighborhoods (Barton 2016; Bostic and Martin 2003; Hammel and Wyly 1996). As my datasets for determining gentrification status start by looking at 5-year ACS data for 2006-2010, I would then need to look at data for 2016-2020, which doesn't exist at this time. Second, if I used this approach with a reduced timescale, I would have excluded multiple Pittsburgh neighborhoods identified by the media and public as gentrifying currently, among them East Liberty.

Thus, for this variable, the 2006-2010 5-yr ACS median income of each census tract was examined, in comparison to the median income of the city of Pittsburgh as a whole. Any census tracts that had a median income equal to or greater than that of the city were marked as not being able to gentrify and were excluded from further consideration for gentrifying status. For neighborhoods consisting of more than one census tract, if at least half of the total tracts of the neighborhood were marked as not being able to gentrify, the entire neighborhood was excluded from consideration for gentrification.

I used an approach more in line with Bostic and Martin (2003) for the rest of the work involved in determining the gentrifying status of a neighborhood because Freeman's (2005) approach does not account for gentrification that focuses on improving existing structures, as opposed to constructing completely new ones. Additionally, Bostic and Martin's (2003) approach, because it uses more indicators to identify gentrifying neighborhoods, should be more resistant to potential false positives. To that end, I focused on five specific indicators to identify whether a neighborhood which could potentially gentrify was actually going through the process of gentrification; differences in the racial composition, changes in the local area population of young adults aged 25-44, changes in educational attainment, changes in poverty levels, and changes in the median household income over time. All of these changes were considered in comparison to the trends of Pittsburgh as a whole, and for a neighborhood to be considered gentrifying, it had to show a positive indication on at least three of the five indicators.

The first indicator of gentrification is the racial composition of a neighborhood. Existing research supports the idea that there is a racial component to gentrification (Barton 2016; Bostic and Martin 2003; Cohen and Pettit 2019; Freeman 2005; Freeman and Braconi 2004; Hammel

and Wyly 1996; Marcuse 1985; Spain 1980). More specifically, some of these sources suggest that the racial component involves a new white population replacing existing minorities in a neighborhood (Cohen and Pettit 2019; Freeman 2005; Freeman and Braconi 2004; Marcuse 1985; Spain 1980). I started with the approach used by Freeman and Braconi (2004) and compared the trend in the white population for a tract to the city as a whole. Like New York City in Freeman and Braconi's (2004) study, the city of Pittsburgh was showing a general decline in the white population. Thus, my approach was the same; if a neighborhood showed an increase in the white population, it may be marked as potentially gentrifying. I used a further indicator though to better incorporate the racial component. This data came from the UCSUR (2017) report on changes over time in Pittsburgh. For a neighborhood to be marked as potentially gentrifying, not only did it need to show an increase in the white population, but it also had to show a decline in one or more minority category populations.

The second indicator of gentrification was change in the adult population, aged 25-44. Some studies find that gentrification brings a younger population into a neighborhood (Barton 2016; Bostic and Martin 2003; Cohen and Pettit 2019; Hammel and Wyly 1996; Marcuse 1985). The specific age group examined for this indicator is usually between 30-44 (Barton 2016; Bostic and Martin 2003; Hammel and Wyly 1996), I extended the age group that acted as my indicator to 25-44 because the educational attainment indicator examined next uses aged 25 and older. Changing the lower boundary for age from 30 to 25 allows for greater consistency across indicators. I compared the tract level change in this age group to that of the city. There was a 10 percent increase in individuals aged 25-44 for Pittsburgh. Thus, for a neighborhood to be marked as potentially gentrifying, it needed to have an over 10 percent increase in those aged 25-44.

The third indicator of gentrification was the highest educational attainment for the residents of the neighborhood. Multiple studies find that the educational attainment of residents is related to gentrification (Barton 2016; Bostic and Martin 2003; Cohen and Pettit 2019; Freeman and Braconi 2004; Freeman 2005; Hammel and Wyly 1996; Marcuse 1985). As with the racial element, some research suggests that there is a replacement effect, where those with more education replace those with less (Cohen and Pettit 2019; Freeman 2005; Freeman and Braconi 2004; Marcuse 1985). For this indicator, the general trend in the city of Pittsburgh was an increase in the number of residents with some form of continuing education degree, and a decrease in those with a high school education or less. This indicator, like the two that preceded it, used data from the UCSUR (2017) report on changes over time in Pittsburgh. As mentioned earlier, Pittsburgh has been identified as a gentrifying city. Thus, for a neighborhood to be identified as potentially gentrifying, it had to show a similar trend. A neighborhood was considered potentially gentrifying, if it showed an increase in continuing education degrees, relative to those with a high school education or less. A neighborhood with an increase in continuing education degrees and also an increase in those with a high school education or less was still considered gentrifying, provided the gain in continuing education degrees was larger. I did this to account for residents who may have resided in the census tract for the earlier 5-yr period, but weren't old enough at the time (<25) to be included in the official data.

The fourth indicator uses data on the neighborhood population living in poverty. Existing literature suggests poverty as a gentrification indicator, with a reduction in poverty being indicative of potential gentrification (Barton 2016; Bostic and Martin 2003; Cohen and Pettit 2019; Freeman and Braconi 2004; Hammel and Wyly 1996). According to the UCSUR (2017)

changes over time report, Pittsburgh as a whole has seen an increase in the number of individuals who fall under the poverty threshold. As such, neighborhoods which were identified as potentially gentrifying according to this indicator were those which show a trend in the opposite direction, a decrease in the number of individuals under the poverty threshold.

The fifth and final indicator examined the median household income of residents within the neighborhoods. Median income is widely acknowledged as a valid indicator of gentrification in an area (Barton 2016; Bostic and Martin 2003; Cohen and Pettit 2019; Freeman 2005; Freeman and Braconi 2004; Hammel and Wyly 1996; Marcuse 1985; Papachristos et al. 2011). As mentioned earlier in the precursor variable section, two well-known approaches to identifying gentrification, Freeman's (2005) and Bostic and Martin's (2003), both look at median household income to identify the potential for gentrification. For this indicator, I took the approach used by Freeman and Braconi (2004) and compared the median household income of the census tract to that of the larger city, for the same period of time. I compared the median household income for the census tract according to the 2006-2010 ACS data to that of the tract for the 2013-2017 ACS data, and calculated the change while accounting for inflation, and then compared that resulting number to the number for the city of Pittsburgh as a whole. For a census tract to be identified as potentially gentrifying, the change in median household income for the tract had to be a greater increase than the change in median household income for the city of Pittsburgh.

I marked a census tract as gentrifying, if it was able to be gentrified according to the precursor variable and if it had positives on at least three of the five indicator variables. Four of my five indicators focused on neighborhood changes, while the last one had to be considered at the tract level. To bridge this gap, I used data from the 2010 US Census to assign each

neighborhood its appropriate tract number(s). As such, I was able to look at each neighborhood at the tract level, the sum of its parts with regards to the income. In doing so, some neighborhoods indicated gentrification across all census tracts, while others did not. For example, the neighborhood of Bloomfield in Pittsburgh is made up of five census tracts. Three of the five tracts were indicated as gentrifying, while the remaining two were not. There was also a third category, neighborhoods which showed no gentrification in any of the census tracts that made it up. This led to the creation of a gentrification identifier variable with three possible values—not gentrifying at all, partially gentrifying, and completely gentrifying. Neighborhoods categorized as "not gentrifying at all" indicates those neighborhoods that were not determined to have any gentrifying census tracts. This refers to neighborhoods that had the potential to gentrify according to the Freeman approach described above, but did not gentrify, either remaining stable, or declining in the indicators used. This category also refers to those neighborhoods that were determined to be unable to gentrify, due to having a median income greater than that of the city as whole. "Partially gentrifying" neighborhoods refer to neighborhoods that were able to gentrify, where some of the census tracts were considered gentrifying, while others were not. And finally, "completely gentrifying" neighborhoods refer to those neighborhoods that were able to gentrify, in which all of the census tracts that made up the neighborhood were identified as gentrifying.

In using this approach, I had to exclude some neighborhoods. The structure of the census tracts of Pittsburgh are such that some census tracts include either partially or in their entirety multiple neighborhoods. As such, looking at the median household income for these multiple neighborhood tracts was a problem, as one neighborhood could have a pulling effect, either up or

down, on the other(s). To this end, for neighborhoods sharing a census tract designation, if the neighborhoods sharing the tract could have their gentrification statuses determined without resorting to the use of median income, they were kept in the study. I excluded those that needed the median household income for a determination to be made in an attempt to remove the pulling effect. Additionally, I excluded two additional neighborhoods, Oakwood and East Carnegie, which share a census tract, 5638. While these neighborhoods were classified without looking at income, one was coded as gentrifying while the other was not. As respondents are geocoded by their census tract, I had no way to distinguish between which neighborhood a respondent might live in, and so opted to remove the tract.

Respondent Classifications

Once the neighborhoods were classified as either not gentrifying, partially gentrifying, or completely gentrifying, the next step was to classify the respondents into their respective neighborhoods. As the census tract was given for each respondent, this data was used to identify respondents for each of the neighborhoods still included in the study (those that weren't dependent on income for classification while sharing a census tract with one or more other neighborhoods). Those respondents who were not identified to be in one of the neighborhoods of study were dropped from the dataset. The final sample size resulted in residents from 63 to 65[2] different neighborhoods; see Table 1 for a full breakdown on which neighborhoods, and how many respondents from each neighborhood.

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2 I cannot provide a definite number of neighborhoods because in three cases there are two different neighborhoods that share a census tract. Given that respondents were matched to their neighborhoods by their census tract, it is not possible to isolate which specific neighborhood of the two a respondent lives in.

[Table 1 about here]

Identification, Coding, and Interpretation of Data

Dependent Variables

Next, I selected questions from the UCSUR (n.d.) quality of life survey to operationalize sense of place and group cohesion. The questions asked on the survey all measure the perceptions of respondents towards various aspects and potential problems within their communities. These perceptions in turn reflect actual conditions which can impact residents' sense of place and group cohesion.

I justify using this approach, looking at respondent perceptions, by deferring to existing research. Taylor (1996) suggests that neighborhood stability deepens neighborhood attachment. In the literature review, I tied neighborhood attachment to sense of place and group cohesion. Thus, to find variables that would indicate changes in sense of place and group cohesion, I had to find variables that indicate neighborhood stability. Taylor, Shumaker, and Gottfredson (1985b) and Perkins, Meek, and Taylor (1992) show that public perceptions of problems are connected to the existence of actual problems. Skogan (1990) makes it a point to note that the actual reactions to these perceptions can have a further impact on a community, beyond that of the impact of the initial actions which caused the reactions. Thus, in looking at the perceptions of respondents to various forms of neighborhood elements and potential disorder, I was able to get at actual conditions which could impact sense of place and group cohesion.

In focusing on public perceptions, my ability to measure sense of place was limited. I was unable to directly capture the impact of respondents' locations on respondent attitudes, familiarity, and identity formation. However, the literature cited by Fullilive (1996) and Stedman (2002) argue that sense of place is made up of multiple components. Stedman (2002) specifically mentioned perception of a place as an element of sense of place. As such, respondents' perception of place is used as a means to capture one component of sense of place.

I selected three questions to act as indicators of respondents' perception of place, and a single question to act as an indicator of respondents' group cohesion. I then reordered the responses for each question, to ensure that the more positive responses, those that indicate an increased perception of place/group cohesion, had a larger value. Values for the three perception of place questions ranged from 1-5, while the values for the question on group cohesion ranged from 1-4.

The three questions for perception of place reflect perceptions of neighborhood disorder. Taylor, Gottfredson, and Brower (1985a) found that the perceptions of various forms of disorder in a community have been linked to decreased attachment in the community. The first question that I selected as a measure of perception of place asked respondents "How would you rate your community or neighborhood as a place to live?" This question reflects perceived overall disorder, by asking respondents to quantify the quality of their neighborhood, The second question selected asked "How would you rate the overall physical or structural condition of the house or apartment in which you live?" and the third question asked "What about the condition of the other houses or buildings in your neighborhood? Would you say that, in general, the physical condition of surrounding houses and buildings is..." Instead of looking at the overall disorder of

the neighborhood, these questions instead focus in on the perceived physical disorder, Additionally, the two questions about housing also reflect perceptions of physical structures. The physical structure of a location has been conditionally connected to the perceptions and sentiments of individuals, based on their income class (Taylor et al. 1985b). Respondent choices to these three questions were: “Excellent”, “Very Good”, “Good”, “Fair”, and “Poor”. The scale was reordered so that a response of “poor” was valued as a “1”, and “Excellent” was valued as a “5”. I created an additive index for perception of place by summing across all three indicators (Cronbach’s alpha:.7090)[3].

The following question is used to measure group cohesion: “Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement: ‘The people in my neighborhood are willing to help their neighbors.’” The unwillingness of individuals to help their neighbors is indicative of a larger diminished attachment to the group as a whole and thus reflects a lack of group cohesion (Taylor et al. 1985a). I reverse coded the response choices such that a response of “strongly disagree” has a value of “1”, while “strongly agree” has a value of 4.

Independent Variables

Length of residence was measured by the question “How many years have you lived where you currently live?” The response choices were: “Less than one year,” “1-3 years,” “3-5 years,” “5-10 years,” “10-20 years,” and “More than 20 years.” These responses were coded as values based on their midpoint, in order to generate separation between the values for later

3 A Cronbach’s alpha score between .70 and .80 is a respectable coefficient based on Devellis’ (1991:85) guidelines.

regression analysis. For the response “More than 20 years”, as there was no upper boundary given, this response was coded with a value of 20.

I include multiple control variables in the models to account for differences between respondents in age, gender, race, ethnicity, education, income, marital status, and the presence of children. For age, respondents were asked, “What is your age now? (IN YEARS)”, which is used as is. For gender, respondents were asked, “What is your gender?” and were given the choices of male (0) or female (1). For race, respondents were asked, “What is your race? CHECK ALL THAT APPLY” and were given the choices: “Caucasian/White”, “Asian/Pacific Islander”, “Native American”, “Black or African-American.” Respondents who chose not to mark any categories were dropped; the other responses were recoded into a set of dummy variables with those who selected multiple categories coded as mixed race. For ethnicity, respondents were asked, “Are you of Hispanic or Latino descent?” and given the choice of yes (1) or no (0). From this point on, respondents who indicated yes on this variable will be referred to as Latinx. For education, respondents were asked, “What is the highest level of education you have completed?” with the following response choices: Eighth grade or less; Some high school; High school graduate or GED; Some college, no degree; Associate's degree, occupational; Associate's degree, academic; Bachelor's degree; Master's degree; Professional degree; Doctoral degree. I combined the two associate’s degree categories into a single response. I also combined all post-graduate degrees into a single response (i.e., Master’s degree, Professional degree, and Doctoral degree). For income, respondents were asked, “Which of the following best describes your household's total yearly income?” The possible responses were: Under $25,000; $25,000 to just under $50,000; $50,000 to just under $75,000; $75,000 to just under $100,000; $100,000 to

just under $150,000; $150,000 or More. This variable was left as is. For marital status, respondents were asked, “What is your current marital status?” The possible choices were: Married/living as married; Divorced or separated: Widowed; Single/never married, This variable was recoded, combining all categories besides that of married/living as married into a single category, not married. For the presence of children, respondents were asked, “Do you have any children aged 3-18?” and were given the choice of yes (1) or no (0).

Method

I estimate Ordinary Least Square regressions to test each hypothesis. To test hypothesis 2, I also include an interaction term between gentrification and length of residence. I estimated Variance Inflation Factors (VIF)for each model; in each case, VIF values were under the recommended level. For the models, the highest VIF value was for the interaction term between gentrification and length of residence (3.55). Gentrification had a VIF value of 3.21, and the VIF value for length of residence was 2.05. The VIF values for all variables not involved in the interaction remained under 2.

Results

Descriptive Statistics

Table 2 shows the majority of respondents are white (78%) and female (71%). These percentages are higher than that for the residents of the city of Pittsburgh in which 67% of residents are white and 52% are female (U.S. Census Bureau, N.d.a). Pacific/Asian Islanders make up 4% of the sample and 5.7% of Pittsburgh residents (U.S. Census Bureau, N.d.a). Mixed race respondents are the closest to their representation of Pittsburgh residents; they account for 3% of the total respondents in the survey, and 3.2% of residents in Pittsburgh (U.S. Census Bureau, N.d.a). Blacks/African Americans are underrepresented in the survey; 15% of respondents are Black/African American, while 23% of Pittsburgh residents are Black/African American (U.S. Census Bureau, N.d.a). A small minority of respondents are Latinx (2%), which is comparable to the percent of Pittsburgh residents who are Latinx (3.4%) (U.S. Census Bureau, N.d.a).Slightly less than half of respondents are married (43%), and just under a fifth have children between the ages of 3 and 18 (17%). This is more than the percentage of residents of Pittsburgh that are married (30.5%) (U.S. Census Bureau, N.d.b). The education of respondents ranges from some high school education but no degree, up to those with post-graduate degrees, with the mean falling between those who have an associate's degree and those with a bachelor's degree. This is similar to the education of residents of Pittsburgh, which ranges from those with less than a 9th grade education to those with post-graduate degrees with a mean falling between those who have some college education but no degree, and those with an associate's degree (U.S. Census Bureau, N.d.c). Income ranges from those making less than $25,000 a year to those making $150,000 or more a year, with the mean falling between those making $50,000-$74,999

and $75,000-$99,999. The mean age of respondents falls between the age groups 45-54 years old and 55-59 years old. This is slightly older than the mean age of respondents of Pittsburgh, who fall between the age groups 35-44 years old and 45-54 years old (U.S. Census Bureau, N.d.a). The top three age group categories for respondents are, in order: 65-74 years old, 45-54 years old, and 25-34 years old. Only one of these groups overlaps with the top three age group categories for the city of Pittsburgh: 25-34 years old, 20-24 years old, and 35-44 years old (U.S. Census Bureau, N.d.a). The majority of respondents (56.5%) are 55 or older. By contrast, in the city of Pittsburgh, the majority of residents (58.8%) are 44 or younger (U.S. Census Bureau, N.d.a), Length of residence ranges from under a year, to a maximum value of 20 years with a mean of 11.46 years. For gentrification, the mean for respondents (0.57) falls between those whose neighborhoods were experiencing no gentrification, and those whose neighborhoods were partially gentrifying. For group cohesion, the mean score is 3.23, with scores ranging from a minimum value of 1 to a maximum value of 4. The mean score on the perception of place composite measure is 10.76, with a range of 3 to 15.

Overall, the sample used in the study oversampled female respondents, which led to undersampling men. The sample also oversampled white respondents, which led to undersampling Blacks/African Americans, Asians/Pacific Islanders, and those who are mixed race. The difference is largest among Blacks/African Americans and smallest among those who are mixed race. The mean education and age is similar between respondents and Pittsburgh residents, though the majority of respondents tended to be older, as opposed to the majority of Pittsburgh residents, who are younger.

[Table 2 about here]

Correlations

Table 3 shows that perception of place has a weak negative correlation with gentrification. This is in line with the first proposed hypothesis, that as gentrification increases, so does indirect displacement, via a decrease in sense of place and group cohesion. This is also consistent with past research that has studied gentrification‘s relationship to sense of place (Farahani 2016; Hummon 1992; John, Austin, and Baba 2010; Kasarda and Janowitz 1974; Theodori and Luloff 2000; Woldoff et al. 2016). There is also a weak negative correlation between perception of place and those who are female, Latinx, Asian/Pacific Islander, Black/African American, mixed race, and those who have children between the ages of three and eighteen years old. For all of these categories except female, the group is in the minority in the city of Pittsburgh. This may explain the negative correlation with perception of place. Perception of place has a weak positive correlation with respondents’ length of residence, age, education, and status as married. The longer one resides in an area, the more time one has to build connections to the area and as one gets older, one also has more time to form connections to the area around them. Additionally, marriage increases the number of ties that one has, allowing for a more developed sense of place. Perception of place has a moderate positive correlation with respondents’ income and with being white. Individual’s with higher incomes have more choice regarding where to live and they can select a neighborhood where they feel stronger connections. As for the correlation between perception of place and being white, the majority of the population in Pittsburgh is white; white respondents are more likely to be around others who appear as themselves, maximizing similarities and minimizing differences, contributing to a higher perception of place.

Group cohesion has a weak negative correlation with gentrification. This is also in keeping with the first hypothesis and is consistent with existing research (Colic-Peisker and Robertson 2015; Uitermark et al. 2007). Group cohesion has a weak negative correlation with being female, Latinx, Asian/Pacific Islander, Black/African American, and mixed race. As before, these categories, except for female, are all minorities in Pittsburgh, so this may lead to less chances to form connections to others with whom the individuals can relate. Group cohesion has a weak positive correlation with respondents' length of residence, age, being white, having higher income, more education, being married, and having children aged three to eighteen. As with sense of place, the longer one resides in an area, and the older one is, the more time they have had to form social connections with those around them. Being more educated, married, and having children all provide more social spheres that one may form connections in, allowing for increased group cohesion.

[Table 3 about here]

Test of the Hypotheses

Tables 4 and 5 present the OLS regression results predicting perception of place and group cohesion respectively. Table 4, Model 1 presents the base model with all controls and length of residence. Age, income, and education are all positively and statistically associated with a respondent's perception of place. Additionally, those who are Latinx are more likely than whites to report a higher perception of place, a difference of a full point ($p<.05$). Those who identify as Black/African American or mixed race have significantly lower levels of perception of place compared to whites. Overall, these factors explain about 22% of the variance in perception of place (adjusted R-squared = .2172).

Model 2 in Table 4 adds gentrification to the base model, which slightly diminishes the coefficients for each of the control variables. Additionally, the level of significance for age, education, and being mixed race all drop by a level. Latinx and white respondents no longer significantly differ in their perception of place in this model. Gentrification is significantly and negatively associated with perception of place net of the controls ($p<.001$). This is consistent with hypothesis 1. Additionally, the model better explains the variance in perception of place, increasing to 25% (adjusted R-squared = .2494); thus, gentrification explains approximately 3 percent of the variance in perception of place.

Model 3 adds an interaction term for length of residence and gentrification. The interaction between length of residence and gentrification is statistically significant ($p<.01$), but the impact is a positive one, rather than negative. The impact is small, just under 4% of a point. This fails to support hypothesis 2. This model also sees a small bump in the amount of variance explained, increasing to about 26% (adjusted R-squared = .2586).

[Table 4 about here]

Turning to Table 5, Model 1 represents the base model with all control variables and length of residence. Length of residence and income are both positively and significantly associated with group cohesion. African Americans are more likely to report lower levels of group cohesion compared to whites, about a fifth of a point lower ($p<.05$). Overall, these factors explain about 6% of the variance in group cohesion (adjusted R-squared = .0591).

Model 2 adds gentrification to the base model, which diminishes the difference between Blacks/African Americans and Whites and attenuates the association between income and group cohesion. Gentrification is statistically and negatively associated with group cohesion ($p<.05$).

This supports hypothesis 1. Additionally, the ability of the model to explain the variance in group cohesion slightly increased to almost 7% (adjusted R-squared = .0662), which means that gentrification accounts for 1% of the variance in group cohesion.

Model 3 adds an interaction term for length of residence and gentrification. This interaction term is not statistically significant, which fails to support hypothesis 2. This model also sees a small decrease in the amount of variance explained, a difference of about one-twentieth of a percentage point (adjusted R-squared = .0657).

[Table 5 about here]

Overall, gentrification is significantly and negatively associated with both perception of place and group cohesion. Lower levels of sense of place and group cohesion is indicative of an increase in indirect displacement. This supports hypothesis 1—that gentrification should be associated with an increase in indirect displacement. The interaction between length of residence and gentrification has a significant positive association with perception of place but no significant association for group cohesion. Thus, there is no support for hypothesis 2—that length of residence will amplify the positive relationship between gentrification and indirect displacement.

Discussion and Conclusion

The results support H1—that gentrification should be associated with an increase in indirect displacement. In looking at sense of place, as measure by perception of place, gentrification is negatively associated with one's perception of place by either a half or a whole point on a 15-point scale, depending on whether the gentrification is partial or complete. For group cohesion, the association is either a tenth or a fifth of a point, on a 4-point scale. The association is larger on the perception of place dimension of indirect displacement, but both are statistically significant.

Overall, these findings are in line with existing research. Gentrification leads to changing political and cultural environments of communities (Chernoff 1980; Hyra 2014; Martin 2007; Brown-Saracino 2009). Gentrification changes the dynamics of the gentrifying area (Gotham 2007; Gotham and Greenburg 2014; Halle and Tiso 2014), and the very character of the area (Zukin 2009). Gentrification reduces the voice of long-term residents regarding the changes that occur in their communities (Fraser 2004). Even when the gentrifiers act to preserve elements of the neighborhood, they are selective, and focus on what they consider to be authentic, leaving some long-term residents excluded (Brown-Saracino 2007). All of these changes work together to create indirect displacement, through a loss of attachment and identity within the changing neighborhoods and communities. These findings move the research forward, by using individual-level data on Pittsburgh, a city that has received less scholarly attention in terms of gentrification, despite being tied for the seventh-most gentrifying city in the U.S. (Wiltse-Ahmad 2019).

The findings further show that the impact of gentrification is felt among residents of a neighborhood, regardless of a resident's sex, race, or Latinx ethnicity. While African-Americans have a statistically significant lower perception of place and group cohesion compared to whites, this is consistent across all models and is net of gentrification.

The results did not support Hypothesis 2—length of residence does not amplify the positive relationship between gentrification and indirect displacement. The interaction between gentrification and length of residence was not statistically significant when predicting group cohesion. As for perception of place, the results show the opposite effect. The interaction between length of residence and gentrification functioned as a buffer of sorts, reducing the negative association between gentrification and perception of place. This effect did not support the hypothesis and was the opposite of what was predicted. Despite this fact, this interaction could be of interest in future research, Studies which focus on variables that help to minimize the negative impact of gentrification could include this interaction effect.

The findings suggest that age has a statistically significant, if minor, positive effect on perception of place, across all models. When one considers that length of residence did not have a statistically significant association with perception of place yet is highly correlated with age, it potentially suggests that stronger connections to an area are not a product of how long one has resided in an area, but rather how old one is. This is not due to multicollinearity since, as mentioned in the methods section, all VIF values for variables are under the recommended value.

Possible Limitations

Indirect displacement was operationalized through looking at two different measures, sense of place, as measure by perception of place, and group cohesion. The findings would suggest that gentrification has a larger impact on perception of place than on group cohesion, due to three reasons. First, gentrification had a larger overall impact on the measure of perception of place than on group cohesion, when considering the impact of gentrification on the size of the scale as a whole. Second, gentrification explains a larger portion of the variance in the measure of perception of place (approx. 3-4%, depending on model) than it does for group cohesion (approx. 1%). And finally, gentrification remained a statistically significant variable for perception of place on both models where it was tested, as opposed to group cohesion, where the interaction between gentrification and length of residence attenuates the impact of gentrification alone.

However, while the findings would suggest a larger impact on perception of place, this may be due to a potential limitation in the data studied. Group cohesion was measured by looking at respondent's willingness to help their neighbors in need. This question did not differentiate at all between neighbors a resident has had for a while, and new neighbors resulting from gentrification. There is the potential that residents interact with new neighbors less than longer-term neighbors, if they interact at all. Thus, the responses given may have been made in consideration of neighbors that the respondents already have strong social connections with, focusing exclusively on those neighbors that exist with the respondents' social spheres.

This could also potentially impact a respondent's answers about perception of place as well. One is more likely to see structural changes in a community that one resides in and travels

through than to see changes in locations one does not frequent. However, there is still the potential that the changes resulting from gentrification may be occurring outside of the area(s) that a respondent is likely to pass through/frequent. This could be especially true of neighborhoods undergoing only partial gentrification, where the majority of the neighborhood remains untouched.

As a result of these limitations, the impact of gentrification on indirect displacement could potentially be higher. It is also possible though, that the impact of gentrification on group cohesion is just less overall than the impact on perception of place. This would suggest that the indirect displacement experienced by residents of gentrifying communities is mostly a loss of sense of place, and as a result future research interested in indirect displacement might be better directed specifically at the impact on sense of place. This argument is further supported by the fact that 25-26% of the variance of perception of place was explained by the models, as compared to only 6-7% of the variance in group cohesion.

Another possible limitation to the study was the fact that the sample differed from the official statistics for Pittsburgh. The sample population oversampled whites and undersampled African Americans, oversampled females and undersampled males, sampled a larger percentage of married respondents than the percentage in Pittsburgh, and the respondents were generally older, as compared to Pittsburgh's younger population. However, the goal of this study was to make associations between variables, and not to provide demographic population level descriptive statistics, so representativeness is less important.

Possible Directions for Future Research

There are a few different directions for future research to take, to expand upon the research done here. First, future research would do well to better explore the group cohesion element of indirect displacement. As mentioned, it is possible that residents of a gentrifying neighborhood contain their interactions mostly or completely to those other residents existing in their social spheres. Future research could examine if this is the case, and if newer residents are able to assimilate into existing social spheres, or form their own, and if there is friction between the groups that was not able to be captured here. The work of Martin (2007) and Fraser (2004) would seem to suggest that new groups are formed, and friction does become present.

Another possible direction for future research would be to connect residents' indirect displacement measures with their perceptions of the changes going on around them. While the research here looked at overall scores for neighborhoods, it is possible that they could vary from person to person, based on how much they are noticing the changes in the physical community around them and/or the changing social structures. It is possible that the scores may be either higher or lower depending on what the respondent perceives, and how much they value the changes being made.

A final possible direction for future research would be to incorporate perceptions of neighborhood safety into studies of indirect displacement. There is reason to believe that one's sense of place and potentially also one's group cohesion could be significantly impacted by one's perception of how safe their neighborhood is. I considered including neighborhood safety in this study but the data was too limited. In order to do so, one would need some form of longitudinal data to establish a baseline for comparisons. This area is of particular importance for future

research. Maslow's hierarchy of needs places safety as a basic need. Sense of place and group cohesion, by contrast, are better tied to psychological and self-fulfillment needs. As such, an increase in perceived safety resulting from gentrification may erase the negative impacts of gentrification, evidenced in this research.

Conclusion

Even considering the potential limitations raised, and the need for future research, there are some points that we can take away from these findings. As mentioned, the findings support the argument that gentrification has a statistically significant impact on indirect displacement net of controls. This association is negative for both perception of place and group cohesion, though the impact is larger for sense of place. This may be due to the ability of respondents to minimize the impact to group cohesion, by sticking to their own social spheres.

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Tables

Table 1: Breakdown of Respondents By Neighborhood	
Neighborhood Name	**Number of Respondents**
Total Number of Neighborhoods Represented: 63-65*	***551***
Neighborhoods Identified As Unable to Gentrify:	***220***
Brighton Heights	8
Brookline	19
Central Northside	9
New Homestead	1
Overbrook	4
Point Breeze	27
Regent Square	5
Shadyside	45
Squirrel Hill North	29
Squirrel Hill South	46
Stanton Heights	17
Strip District	1
Swisshelm Park	9
Neighborhoods Identified as Able to Gentrify:	***331***
Neighborhoods Identified as Not Gentrifying:	*148*
Allentown	4
Banksville	2
Bedford Dwelling	1
California-Kirkbride	1
Carrick	9
Crafton Heights	4
Crawford-Roberts	5
Duquesne Heights	4
East Hills	2
Elliot/West End	2
Highland Park	23
Homewood North	3
Homewood South	4
Homewood West	4
Knoxville	4

Larimer	3
Lincoln-Lemington-Belmar	5
Middle Hill	4
Morningside	10
North Oakland	23
Northview Heights	1
Polish Hill	2
South Oakland	7
Southside Flats	14
Spring Hill-City View	4
Summer Hill	3
Neighborhoods Identified as Partially Gentrifying	*53*
Beechview	13
Bloomfield	17
Mount Washington	13
Sheraden	5
Terrace Village	5
Neighborhoods Identified as Fully Gentrifying	*130*
Arlington/Arlington Heights	2
Central Lawrenceville	12
Central Oakland	9
East Allegheny/North Shore	1
East Liberty	18
Fineview	2
Friendship	7
Garfield	7
Greenfield	16
Lincoln Place	4
Lower Lawrenceville	5
Manchester	1
Marshall-Shadeland	6
Perry North	8
Perry South	6
Point Breeze North	11
South Side Slopes	7
Troy Hill	5
Upper Lawrenceville	3

* - A definite number cannot be provided because in three cases there are two different neighborhoods that share a census tract. Given that respondents were matched to their neighborhoods by their census tract, it is not possible to isolate which specific neighborhood of the two a respondent lives in. Where this

happens, these neighborhoods are listed together, divided by a “/”. The upper range is 65, not 66, because for East Allegheny/North Shore, there was only a single respondent. As such, only one of those two neighborhoods is represented.

Table 2, Descriptive Statistics					
Variables	Obs.	Mean	Std. Dev.	Min	Max
Sense of Place Composite Score	551	10.76	2.35	3	15
Group Cohesion	551	3.23	0.71	1	4
Three Cat. Gentrification	551	0.57	0.85	0	2
Length of Residence	551	11.46	7.78	0.5	20
Age	551	5.93	2.27	1	10
Female	551	0.71		0	1
Hispanic	551	0.02		0	1
White	551	0.78		0	1
Asian/Pac. Islander	551	0.04		0	1
Black/African American	551	0.15		0	1
Mixed Race	551	0.03		0	1
Income	551	3.06	1.59	1	6
Education	551	5.85	1.25	2	7
Married	551	0.43		0	1
Kids	551	0.17		0	1

Table 3, Correlation Table

Variables	Sense Place	Group Coh.	Gent.	Length Res	Age	Female	Hispanic	White	Asian/ PacIs	Black/ AA	Mixed	Income	Educ.	Married	Kids
SensePlace	1.000														
GroupCoh.	0.326	1.000													
Gent.	-0.250	-0.125	1.000												
LengthRes	0.103	0.186	-0.036	1.000											
Age	0.190	0.162	-0.121	0.555	1.000										
Female	-0.126	-0.050	0.065	0.015	-0.067	1.000									
Hispanic	-0.024	-0.082	-0.080	-0.090	-0.152	-0.026	1.000								
White	0.308	0.150	-0.022	0.153	0.162	-0.032	-0.112	1.000							
Asian/PacIs	-0.077	-0.023	-0.010	-0.206	-0.279	-0.043	-0.028	-0.375	1.000						
Black/AA	-0.234	-0.133	0.035	-0.037	0.008	0.039	-0.024	-0.794	-0.084	1.000					
Mixed	-0.170	-0.057	-0.008	-0.064	-0.096	0.042	0.350	-0.336	-0.036	-0.075	1.000				
Income	0.358	0.158	-0.145	0.226	0.146	-0.154	-0.046	0.185	-0.043	-0.166	-0.053	1.000			
Education	0.242	0.096	-0.055	-0.067	0.003	0.020	-0.025	0.214	-0.007	-0.222	-0.046	0.255	1.000		
Married	0.187	0.069	-0.066	0.230	0.083	-0.192	-0.020	0.126	-0.040	-0.121	-0.007	0.538	0.129	1.000	
Kids	-0.059	0.028	-0.056	0.060	-0.176	-0.029	-0.030	-0.089	-0.014	0.108	0.004	0.102	-0.059	0.165	1.000

Table 4, Sense of Place Regressions			
Dependent Variable: Sense of Place			
Regressors	(1)	(2)	(3)
Gentrification, Three Cat.		-0.518***	-0.932***
Gentrification, Three Cat. x Length of Residence			0.036**
Length of Residence	-0.016	-0.011	-0.031
Age	0.019**	0.014*	0.013*
Female	-0.335	-0.309	-0.337
Hispanic	1.026*	0.663	0.580
Asian/Pacific Islander	-0.686	-0.812	-0.934
Black/African American	-1.149***	-1.127***	-1.135***
Mixed Race	-2.337***	-2.314**	-2.395**
Income	0.410***	0.373***	0.371***
Education	0.228**	0.220**	0.233**
Married	-0.042	-0.020	-0.001
Kids	-0.195	-0.303	-0.366
Intercept	7.853***	8.511***	8.805***
Number of Observations	551	551	551
Adjusted R-Squared	.2172	.2494	.2586
*The individual coefficient is statistically significant at *p<.05, **p<.01, or ***p<.001.*			

Table 5, Group Cohesion Regressions			
Dependent Variable: Group Cohesion			
Regressors	(1)	(2)	(3)
Gentrification, Three Cat.		-0.081*	-0.124
Gentrification, Three Cat. x Length of Residence			0.004
Length of Residence	0.012*	0.012*	0.010
Age	0.003	0.003	0.002
Female	-0.059	-0.055	-0.058
Hispanic	-0.235	-0.292	-0.300
Asian/Pacific Islander	0.061	0.041	0.029
Black/African American	-0.220*	-0.217*	-0.218*
Mixed Race	-0.093	-0.090	-0.098
Income	0.045*	0.039	0.039
Education	0.036	0.034	0.036
Married	-0.083	-0.080	-0.078
Kids	0.091	0.074	0.067
Intercept	2.668***	2.770***	2.801***
Number of Observations	551	551	551
Adjusted R-Squared	.0591	.0662	.0657
*The individual coefficient is statistically significant at *p<.05, **p<.01, or ***p<.001.*			