The Effects of Immigrant Classmates on the Non-Achievement Educational Outcomes of Native Peers



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Abstract

This research investigates how interactions with immigrant peers during school-age can affect the non-achievement educational outcomes of natives in the United States (US). More specifically, it explores the effect of immigrant peers on the self-belief, imagination, educational expectations and satisfaction, and gender attitudes of natives.

With theoretical grounding in Social Cognition Theory, the thesis make use of the National Longitudinal Study of Adolescent to Adult Health Survey (Add Health), which provides a nationally-representative sample of over 20,000 high school students with data regarding the demographic, social, and cognitive characteristics of participants over a span of more than 20 years. We use this dataset to exploit differences in the number of immigrants across cohorts within schools, and subsequently consider the implications of the demographic composition of a native student's cohort on their non-traditional, non-achievement educational outcomes, both during school-age and adulthood.

As an integrated thesis, this dissertation is comprised of two general introductory chapters, outlining the doctoral thesis (Chapter 1) and the historical-geographical context in which the data was collected (Chapter 2). It also includes four core chapters (Chapters 3 – 6) intended to be a stand-alone academic papers, as well as an overarching conclusion (Chapter 7). Each of the core chapters explores the effect of interaction with immigrants on a different educational outcome or cognitive skill in natives, as follows:

Chapter 3 explores the effects of interaction with immigrant students on the self-belief of their native peers, and finds that higher interaction with immigrants can lead natives to develop higher self-efficacy and a more internal locus of control, both during school-age and adulthood.

Chapter 4 considers the effect of interaction with immigrant students on native imagination. The chapter finds a positive relationship between higher numbers of immigrants in school cohorts, and the adult-age imagination of natives.

Chapter 5 focuses on natives' educational expectations during high school years, as well achievement of expectations and satisfaction with educational accomplishments during adulthood. Increased exposure to immigrant peers during school-age is found to have positive effects on the educational expectations of native high school students, however these increased expectations do not appear to materialize into university completion by the time natives reach adulthood.

Chapter 6, in turn, explores the extent to which interaction with immigrant peers could influence the gender attitudes of natives. The findings suggest that while immigrant parents generally hold more traditional gender attitudes than native parents, interaction with immigrant peers (as well as their parents) does not appear to have significant influence the gender attitudes of natives during adulthood.

This thesis contributes to our understanding of how non-achievement educational outcomes and cognitive traits can be developed and modified throughout childhood and adolescence. The dissertation identifies different channels of influence through which a diverse group of peers

can impact the academic trajectories of natives, and also highlights the potential benefits of multicultural classrooms, in both the short-term and long-term.

Key Words: Diverse Classrooms; Peer Effects; Self-Belief; Imagination; Expectations; Gender Attitudes

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Terminology and Definitions

This section provides an overview of the terminology that will be used in this thesis. While the terminology employed can certainly be subject to debate, the practical need to identify and refer to population sub-groups or particular dynamics renders the establishment and use of these terms necessary. Chapter-specific terms, meaning those related to the unique focus of a single core chapter, are defined within the chapters themselves.

Achievement/attainment metrics: Refers to subject grades, grade-point averages (GPAs), standardized test scores, matriculation rates, and similar parameters, which are observable, quantifiable, and comparable measures of academic performance.

College: The term 'college' in Add Health data refers to undergraduate university education. Distribution tables and description of variables keep the original Add Health wording, however in our analysis we use the term 'university.' These wordings are synonymous.

Cohorts and Classmates: In this thesis, we use the term 'cohort' to refer to a group of students who are in the same grade (in the US, 'grades' are equivalent to UK year groups), at the same school. At the middle school and high school levels (Grades 6 – 12 in the US, and Years 7 – 13 in the UK), high school students in the US take a variety of different subjects/classes which are most often taught by a number of different teachers. The timetable for each student may vary, and so, while students progress through their educational experience jointly as a cohort, they may, in fact, have different classmates within each particular classroom/lesson. Because we do not have information regarding the specific students in each lesson, we focus on cohort composition, and assume that students within the same cohort will have interacted with each

other across a number of lessons throughout the school year. As a result, when we speak of 'the effects of immigrant *classmates*,' we are actually referring to the effects of immigrant cohort-mates, and we use these terms interchangeably. Similarly, when we speak of 'immigrant students in the *classroom*,' we are, in fact, referring to immigrant students in the *cohort*. Nonetheless, we recognize that some schools may sort students into classes based on ability or language proficiency (a practice known as Ability Tracking), and that consequently, native students in these schools may interact less with immigrant peers who are not yet fluent in English, despite being in the same cohort. We discuss the implications of this in our conclusion.

Ethnicity / Ancestry: The term ethnicity will be employed as defined by the US Census Bureau in 1990. In the 1990 Census, ethnicity refers to cultural identification and can include national origin. Hispanic, or Latino, is defined by the US Census Bureau as an ethnicity rather than a race. See our use/definition of 'race' below for a more detailed discussion on the similarities and differences between ethnicity and race, as we make use of them in this thesis.

High School: The term 'high school' in Add Health data refers to grades 9 to 12 (UK Years 10, 11 and Sixth Form). We use the term 'high school' throughout this thesis.

High-skilled: This category will encompass any individual with at least one parent who completed a university education.

Immigrants: This category will encompass all individuals who were either (1) born outside of the US, or (2) born within the US to at least one foreign-born parent. Puerto Rico, as well as all overseas territories belonging to the US are, for the purposes of this thesis, considered a part of the US.

Children of Immigrants (CoIs): This term refers, specifically, to those individuals with at least one foreign-born parent, regardless of whether or not the individual was born in the US. We include CoIs in our definition of 'immigrant children.'

Limited English Proficiency Children: The term Limited English Proficiency (LEP) will be employed as defined by the No Child Left Behind Act (NCLB). In the NCLB Act, LEP children are identified as (1) being 3 to 21 years of age, (2) enrolled or preparing to enroll in elementary or secondary school, (3) either not born in the US or speaking a language other than English, and (4) owing to difficulty in speaking, reading, writing, or understanding English, not meeting the state's proficient level of achievement to successfully achieve in English-only classrooms. While, on paper, this is a nationally-applicable definition, we recognize that the operational definition of LEP varies considerably across schools, districts, and states.

School-Age Educational Outcomes: This term will encompass any educational outputs measured during Wave 1 of the Add Health study. This term will also encompass any educational outcomes measured, during Wave 1, for participants who were over the age of 18, but still in a participating school and interviewed as Add Health respondents.

Adulthood Educational Outcomes: This term will encompass any educational outputs measured after Wave 1 of the Add Health study. The temporal range covered by adulthood educational outputs is large, including variables captured six years after the initial study (Wave 3), and 14 years after the initial study (Wave 4).

Minority: The term minority will be employed as defined by the US Census Bureau, meaning a sub-group of the population comprised of several different race categories— Black, American

Indian, Asian, Pacific Islander, Other, and 'Two or More' races. In addition to the afore-mentioned race categories, Hispanics are considered a minority, despite the fact that Hispanic or Latino origin is defined by the US Census Bureau as an ethnicity rather than a race.

Motivational and Cognitive / Non-Achievement Metrics: Refer to non-achievement, non-attainment factors, which are more difficult to observe and measure, but could nonetheless be relevant in determining educational outputs. For the purpose of this thesis, motivational and cognitive metrics include self-belief, self-efficacy, locus of control, effort, imagination, educational aspirations, educational expectations, attitudes towards gender, and attitudes towards education more broadly.

Natives: The category of native will encompass all US-born individuals with two US-born parents (including Puerto Rico and other overseas territories). We are aware of the problematic nature of the word 'native', particularly as it relates to landownership, power-dynamics, and the complicated context of the US. However, as the term 'native' is commonly used in the literature pertaining to the effect of immigration on wages and education, it will be adopted for use in this thesis.

Public school: In the US, the term public school refers to schools which are maintained at public expense (government-funded) and are available free-of-charge for the children in a given community or district.

Race: While we recognize that terms such as 'race' have important historical connotations, in the US the term is still commonly used, including in academia. Our use of the term 'race' is based on the definition of the concept by the US Census Bureau in 1990, where race was based

on self-identification. According to the Bureau, the categories reflect a social definition of race recognized in the US, and are not an attempt to define race biologically, anthropologically, or genetically. In 1990, the Bureau required that data be collected for the five following races: (1) White, (2) Black or African American, (3) American Indian or Alaska Native, (4) Asian or Pacific Islander, and (5) Other race. In the US Census, race is considered a category separate from ethnicity. This is mostly because, within the context of the US, race refers to physical characteristics of an individual, whereas ethnicity refers to a combination of characteristics such as language, customs, and region of origin. According to the Census Bureau, people who identify their origin as Hispanic, Latino, or Spanish may be of any race, hence, the distinction between Hispanic and non-Hispanic is recorded under the 'Ethnicity / Ancestry' Census category, as opposed to race. While the terms race and ethnicity are complicated ones, we consider a combination of race and ethnic categories that are commonly used in research in the US. Consequently, when we reference 'race' in in our analysis, we use the White group (non-Hispanic) as the control group, and Hispanic, Asian (non-Hispanic), Black (non-Hispanic) and Other (non-Hispanic) as the alternative racial/ethnic categories. We recognize that definitions of race, ethnicity, and cultural groupings more generally are constantly changing, and that our use and understanding of these concepts must adapt. Nonetheless, the practical need to refer to specific population sub-groups in this thesis requires the definition and consistent use of a term such as 'race'. We also realize that there are substantial limitations in the comparability of race data between 1990 and 2000 because, for the first time in a decennial census, respondents in the 2000 census could report more than one race.

The Effects of Immigrant Classmates on the Non-Achievement Educational Outcomes of Native Peers

1. Introduction

1.1. Background and Motivation

To what extent do our high school classmates play a role in shaping the adults we become?

With the sociodemographic composition of schools in the US changing significantly over the past decades (Hernandez et al. 2008, Ward and Batalova 2023), and specifically given a very notable increase in the share of foreign-born students, growing attention has been given to the potential effects that increasingly diverse classrooms could have on the academic outcomes of native students (Bifulco et al. 2011, Brunello and Rocco 2013, Cebolla-Boado 2007, Fekjaer and Birkelund 2007, Geay et al. 2013, Gould et al. 2009, Hanushek et al. 2009, Hardoy and Schone 2013, Hermansen and Birkelund 2015, Jensen and Rasmussen 2011, Ohinata and van Ours 2013, Szulkin and Jonsson 2007).

A surge in immigration since the late decades of the 20th century has resulted in the foreign-born population rising from 4.7% in 1970, to 13.1% in 2013 (Pew Research Center 2015), and the number of immigrant children under 17 from 13.1 million in 2000 to 17 million in 2010 (an increase of 30 percent). Between 2010 and 2019, this number grew by another five percent, reaching just under 18 million (Ward and Batalova 2023).

Throughout this surge in the number of immigrants living and studying in the US, many of them have settled in metropolitan areas, and in doing so, have clustered into residential areas

characterized by relative social deprivation and spatial segregation. Simultaneously, they have often been over-represented within the economically-disadvantaged demographic (Charles 2003, De Trinidad Young et al. 2018, Grieco and Ray 2004, Hook et al. 2004, Musterd 2005, Proctor et al. 2016). This has caused concern that high concentrations of disadvantaged immigrant students could have a negative effect on the educational opportunities of natives residing in these communities, particularly through the disproportionate consumption of school resources and class time.

However, recent research has also highlighted the characteristically strong work ethic and high educational ambitions of immigrant students (Lee, J. and Zhou 2015, Ljunggren and Orupabo 2020, Louie 2012, Portes and Rumbaut 2001, Shah et al. 2010), emphasizing the need to consider the possibility that immigrant students could very well have positive impacts on their native peers. This is particularly true in light of recent empirical findings which suggest that the children of immigrants have exceptionally optimistic plans about university attendance (Feliciano and Lanuza 2016, Kao and Tienda 1995) and a higher likelihood of attending university (Hofferth and Moon 2016, Kirui and Kao 2018, Reisel et al. 2019), compared to native peers of similar socioeconomic backgrounds.

This changing sociodemographic composition of the social spaces in which children spend their most formative years, and in which they develop intellectually, has re-sparked debate on the extent to which educational policies and practices promote the integration of the immigrant population, as schools are often considered a key space and mechanism for integration (Alba et al. 2011).

Consequently, a significant amount of literature has sought to identify and quantify the specific effects that classroom interactions with immigrant peers can have on the educational outcomes of natives. Most literature to date on this topic falls into one of two categories: (1) Market-Based Theories, and (2) Peer Effects Theories.

1.1.1. Market-Based Theories

The more traditional scholarly work on the effects of immigration on the educational outcomes of natives has employed market-based theorization (and economics-based methods) to evaluate the effects of immigration levels on native academic achievement. Broadly speaking, two kinds of market-based theories have guided researchers in their attempts to develop models which accurately represent the relationship: crowding-out theories and human capital accumulation theories. Results, however, have been mixed, with persisting ambiguity regarding the contexts in which each theoretical approach is applicable.

Crowding-out theories had their foundation in the 1990s, with key scholars arguing that immigrants will crowd-out natives from educational resources and labor opportunities within a closed system. Under these assumptions, an increase in immigrant students would lead to a decrease in native educational quality through disproportionate consumption of resources (financial, but also class time), as well as through competition for places in higher education institutions (Betts and Lofstrom 1998, Betts 1998, Fix and Zimmermann 1993, Hoxby, C. 1998).

Mixed results have come from crowding-out theories, which have often drawn from economic models originally developed to examine the effects of immigration on wages. Socioeconomic

status, race, and the educational contexts (characteristics of a school or community) have been found to affect results (Chin et al. 2013, Diette and Uwaifo Oyelere 2017, Hunt 2017, Ohinata and Ours 2016, Ransom and Winters 2021). While most scholars examining these crowding-out dynamics have been unable to find negative effects of immigration on the general population, some have found negative externalities of immigration when focusing on specific sub-populations, including economically-disadvantaged natives or minorities (Betts and Lofstrom 1998, Betts 1998, Fix and Zimmermann 1993, Hoxby, C. 1998, Ransom and Winters 2021). Additional mechanisms have since been incorporated into crowding-out theories; native-flight dynamics, for example, have suggested that in response to an increase in immigration, native parents with the possibilities to do so will enroll their children in private institutions or relocate to other areas where the demographic composition of schools is not as affected by the surge in immigration (Betts and Fairlie 2003).

Human Capital Accumulation (HCA) theories have often complemented, but also often competed with, crowding-out theories. HCA theories have focused on the effects of immigration on wages, types of occupations, and educational performance of natives. Scholars have found that with a surge in immigration, natives look to differentiate themselves from the incoming immigrants through additional years of education or by changing occupations (Brunello et al. 2020, Chiswick 1989, McHenry 2015, Peri and Sparber 2009). Chiswick (1989), for example, has found that the long-run mobility that natives have between occupation types allows them to relocate to high-paid occupations with less immigrant concentration. Consequently, even when one considers short-term decreases in native wages caused by immigration, the long-run accumulation of other kinds of human capital has beneficial effects, which surpass wage reduction effects. A number of scholars (Anelli et al. 2017, Brunello et al. 2020, Eberhard 2012, Jackson, O. 2015, McHenry 2015, Orrenius and Zavodny 2015, Peri and

Sparber 2009, Tumen 2019) over the past decades have carried out research which supports the existence of these dynamics.

1.1.2. Peer Effects Theories

The market-based theories explained above often portray immigrants -and their children- as pieces within a system, influenced almost exclusively by labor market forces or the decisions of natives, ultimately reacting to the environment. Peer effects theories, however, provide greater agency to immigrants, by considering the possibility that the mere social interactions between immigrant and native students can affect the behavior of natives. Immigrants are not passive pieces of a system, but active factors capable of exerting influence themselves and impacting their peers and environments (Burke and Sass 2013, Cooley 2009, Cooley 2014, Griffith and Main 2019, Hoxby, C. and Weingarth 2005, Sacerdote 2011, Vigdor and Nechyba 2007).

Various mechanisms through which peers can affect one another have been identified in the literature, these include: competitive preferences (O'Keeffe et al. 1984), self-perception in comparison to others (Deci and Ryan 1985), imitation of behavior (Bandura and Walters 1963, Mobius and Rosenblat 2014), an increase in knowledge about a task (Banerjee 1992, Guryan et al. 2009), 'Keeping up with the Joneses' effects (Bursztyn et al. 2014, Falk and Knell 2004), guilt and shame (Kandel and Lazear 1992), a desire for conformity (Bellemare et al. 2010), or the pure joy of working with others (Bandiera et al. 2010).

The large number of mechanisms which have been identified has consequently led to a large number of models being developed in attempts to describe and predict how the interactions

between peers of different abilities and characteristics can impact educational performance. Results have been varied, and often contradicting, with some models suggesting that one disruptive student may harm the performance of all other classmates (often known as the 'Bad Apple' model); that one excellent student may provide an example and improve the performance of all (referred to as the 'Shining Light' model); that low-achieving students may learn from their better-achieving peers (without necessarily harming the performance of strong students); that while an increase in low-ability students may result in decreases in the achievement of those at the bottom of the ability distribution, an increase in high-ability students may result in improvements for all; or that that students generally perform best when surrounded by others with similar ability, among others (Betts and Shkolnik 2000, Burke and Sass 2013, Chachashvili-Bolotin et al. 2016, Cooley 2009, Cooley 2014, Griffith and Main 2019, Han and Li 2009, Hoxby, C. and Weingarth 2005, Imberman et al. 2012, Lazear 2001, Mendolia et al. 2018, Sorensen et al. 2017, Vigdor and Nechyba 2007)[1].

The literature above demonstrates that, while results on peer effects in the classroom are mixed and appear to vary on an almost case-by-case, context-by-context basis, there is an overarching consensus amongst researchers in the field that peers can, and do, influence each other's academic performance.

1.1.3. Motivation and Research Question

As the review above demonstrates, many researchers have engaged with the relationship between immigration and the academic outcomes of natives. Across this research, the theories

[1] For a detailed summary and categorization, see Hoxby and Weingarth (2005).

and mechanisms used to explore the relationship have been incredibly varied, as have been the results themselves.

Considering the possibility that both peer-effects theories and market-based theories could exist and operate simultaneously leads to the conclusion that the effects of immigrants on the educational outcomes of natives could be positive, negative or non-existent, depending on the specific context of the interactions, as well as the strength of each dynamic/mechanism. A surge in immigration could, at once, be causing a disproportionate consumption of school resources (as per crowding-out theories), while also motivating native youths to pursue occupations which differentiate them from the incoming foreigners (according to HCA theories), while also yielding changes in attitudes and behaviors which native children learn from interactions with their immigrant peers (in line with peer-effects theories).

It is also possible, as is suggested by the literature above, that increased exposure to immigration could affect population sub-groups differently. The heterogeneity observed in results to date suggests that interactions with immigrant peers can benefit the educational outcomes of some native students, while worsening those of others (depending on race, and other factors), resulting in no effects or mixed effects.

This thesis aims to further explore the relationship between immigration and the educational outcomes of natives, but in doing so address the aforementioned gaps and necessities by bringing together market-based and peer-effects theories, while considering in its analysis the personal characteristics of the individual. We focus, specifically, on a series of non-achievement educational outcomes (self-belief, imagination, educational expectations and

satisfaction, and gender attitudes). We expand on the importance of non-achievement outcomes in Section 1.2.2. below.

The two resulting main research questions, which guide this thesis throughout, are the following:

Does the presence of immigrant students in US classrooms affect the non-achievement educational outcomes of their native peers?

Are these effects still present, or perhaps manifest only, during adulthood?

The two research questions above yield additional sub-questions, which offer a more in-depth exploration of the topic:

Do the racial and sociodemographic characteristics of immigrant students in a cohort play a role in determining what impact they have on native peers?

Do immigrant peers have different effects on the various racial groups of natives?

Does emotional closeness between immigrants and natives (friendship, as opposed to merely being classmates) moderate the effects of immigrant students on their native peers?

1.1.4. Overarching Theoretical Framework

Social Cognition Theory (SCT) provides a well-recognized theoretical backdrop for this exploration which is flexible enough to simultaneously consider both the possible system-level dynamics and influences (as suggested by crowding out and HCA theories), as well as the individual-level effects of interactions with peers and relevant others (as suggested by peer effects theories), on the educational outcomes of natives. Therefore, we use it as an overarching theoretical framework for the thesis.

SCT, which offers a psychological angle on human functioning by highlighting the essential role of the environment on learning, was first formally established by Bandura in the late 20th century (Schunk and Usher 2019, Schunk and DiBenedetto 2020). SCT highlights the reciprocal nature of interactions between an individual's environmental, behavioral, and personal influences (a dynamic which has also been labelled as the 'triadic reciprocality' theoretical framework), and aims to explain how people maintain or alter their behaviors through control and reinforcement (Bandura 1986, Bandura 1997, Schunk and DiBenedetto 2020).

SCT suggests, in short, that just as an individual's thoughts (or 'personal processes') can affect their actions and environments, their actions can also alter their thoughts and environments, and environments can, just as well, influence individuals' thoughts and actions. In this way, each one of the three kinds of influences can affect the other two, while simultaneously being affected by them (Bandura 1986, Schunk and DiBenedetto 2020).

In SCT, the term 'personal processes' is used to refer to an individual's cognitions, beliefs, perceptions, and emotions (Schunk and Usher 2019, Schunk and DiBenedetto 2020). In an

educational context, this may include goals, self-efficacy beliefs, outcome expectations, social comparison perceptions, values, attitudes, and attributions.

SCT defines goals as mental representations of what an individual is wanting or attempting to attain, and the theory suggests that goals can direct educational outcomes (Bandura 1986, Bandura 1997, Garriott et al. 2014, Lent et al. 2017). If one considers the model of reciprocal interactions described above, SCT would see goals as personal processes which will then affect an individual's behaviors, including the effort and persistence which they expend on their learning.

The extent to which an individual moves closer to achieving their goals can, in turn, affect self-efficacy, another personal process considered important in SCT (Locke 2018, Schunk 2012). Self-efficacy refers to an individual's perceived ability to learn and perform at designated levels (Bandura 1977, Bandura 1997). Resulting from both evaluative and goal-oriented self-reflection, self-efficacy is considered a key personal process in SCT. Individuals with high self-efficacy often seek out increasingly challenging cognitive and behavioral activities, including setting more ambitious goals, using more complex learning strategies, periodically monitoring their goal progress, and even developing more productive physical and social environments for learning (Schunk and DiBenedetto 2016).

In SCT, outcome expectations are beliefs about the anticipated consequences or results of an action, considering past experiences or observation of others who have carried out similar actions (Bandura 1986, Schunk and DiBenedetto 2020). SCT posits that individuals will act in ways which they believe will help them achieve their desired outcomes; if an individual believes their actions will eventually produce success, and result in a highly desirable outcome

expectation, they might be motivated to persist through adversity (Garriott et al. 2014, Lent and Brown 2006, Lent et al. 2017).

Social comparisons, meaning an individual's comparisons of their own potential in relation to their peers or models, have been found to affect educational outcomes (Areepattamannil et al. 2017, Chiu 2012, Eccles and Wigfield 2002, Fang et al. 2018, King and Ganotice 2014, Mijs and Nieuwenhuis 2022, Schunk and Usher 2019, Schunk and DiBenedetto 2020, Wigfield and Tonks 2002). SCT suggests that, as learners observe peers succeeding in a specific task or activity, their confidence in their own ability to succeed may be affected. This may, in turn, affect their behaviors, like the amount of effort invested or the persistence with which a goal is pursued. It may also influence self-efficacy, and consequently, result in an individual modifying their goals (Lent and Brown 2006, Moss-Pech et al. 2021).

In SCT, the term 'values' refers to the importance or usefulness given by an individual to a specific task or outcome. SCT suggests that people's actions are a reflection of their values (Bandura 1986, Schunk and DiBenedetto 2020), and that students are most motivated to perform well academically when their goals correspond with outcomes which they value and find important. An entire strand of literature known as the expectancy-value theoretical tradition has focused on exploring the nature of value-attribution and its relationship with behavior, including the choice of and persistence in educational pursuits (Eccles, J. 2005, Eccles and Wigfield 2020, Wigfield et al. 2016).

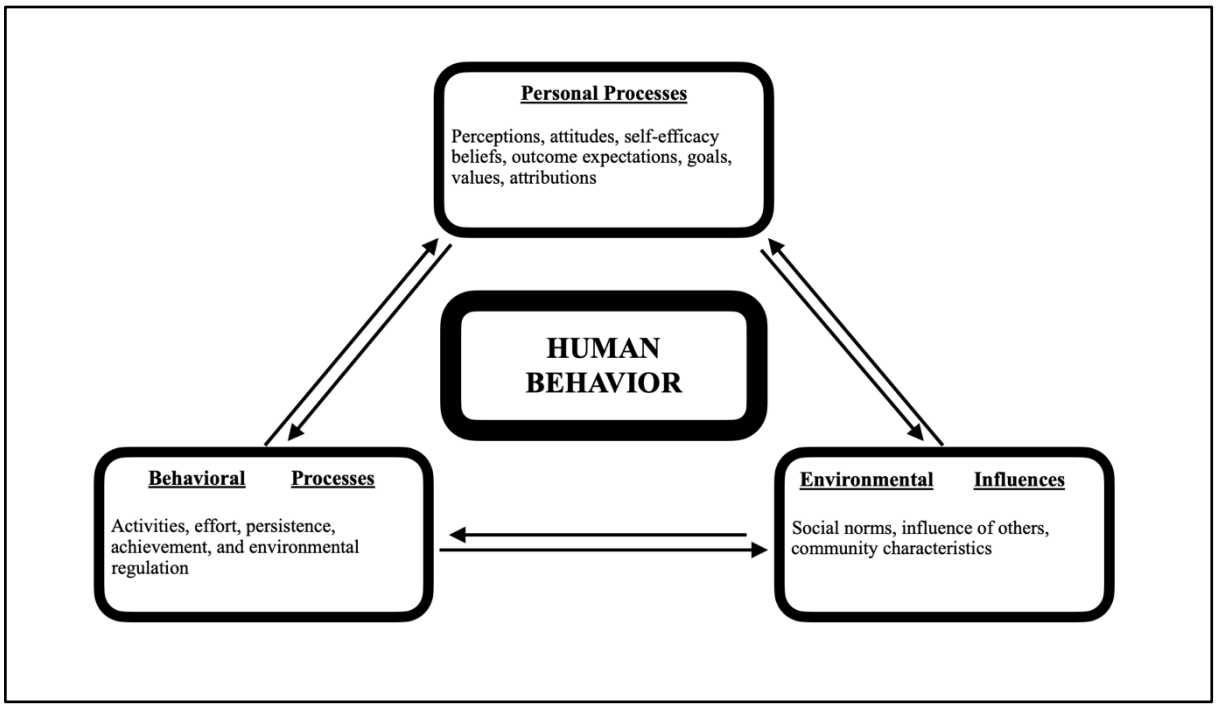
SCT also describes the role and importance of attributions, or the perceived causes of outcomes (Graham 2020, Weiner 2010). In contrast with other SCT processes which take place before or during actions, attributions are made after an event or outcome has taken place, and relate to

why it has occurred (Graham 2020). SCT argues that individuals who see themselves as mostly responsible for their positive outcomes are more likely to have high-self efficacy and show persistence in their goals and efforts (Schunk and Usher 2019). Similarly, when learners accept responsibility for negative outcomes, and see the causes for those outcomes as having been under their control, they are more likely to attempt to rectify and produce improved outcomes in the future, to maintain their self-efficacy (Schunk and DiBenedetto 2020).

Behavioral processes, in SCT, refer to activities, effort, persistence, achievement, and environmental regulation (Schunk and DiBenedetto 2020). Individuals who engage in challenging activities, invest effort, persist on difficult tasks, and regularly modify their environments to promote success, are in turn more likely to have improved self-efficacy and motivation, as well as being more likely to persist in the pursuit of their goals (Schunk and DiBenedetto 2016, Schunk and Usher 2019, Usher and Schunk 2018, Zimmerman 2000, Zimmerman et al. 2015).

Finally, environmental influences are identified in SCT as also being able to affect individual's educational outcomes (Schunk 2012, Schunk and DiBenedetto 2020), with individuals often choosing to pursue similar educational trajectories to, and/or imitate the behaviors of, individuals who they perceive as happy or successful. From observation of models, individuals form expectations about the foreseen outcomes of actions; consequently, peers may be significant models in situations where students are unsure about their own capabilities and chances of success. When similar peers successfully perform a task, an individual's sense of self-efficacy may increase, due to social comparisons (Schunk 2012, Schunk and DiBenedetto 2020).

Figure 1.1. Graphical Representation of Social Cognitive Theory



1.2. Thesis Contributions

1.2.1. The Add Health Dataset – Summary and Benefits

All chapters in this thesis make use of the National Longitudinal Study of Adolescent to Adult Health (Add Health) (Harris 2018) for analysis. Add Health is a longitudinal, nationally-representative study of over 20,000 adolescents. The survey has collected data regarding the demographic, social, cognitive, and physical characteristics of participants (and their parents) over a span of 20 years, as well as linking participants to wide variety of contextual data from participants' schools and neighborhoods.

More specifically, the Add Health survey provides five waves of data[2,3]:

Wave 1 (W1): Collected in 1994 – 1995 when participants were in grades 7 to 12.

Wave 2 (W2): Collected in 1996 when participants were in grades 8 to 12.

Wave 3 (W3): Collected in 2001 – 2002, when most participants were 18 to 26 years of age.

Wave 4 (W4): Collected in 2008 – 2009, when most participants were 24 to 32 years of age.

Wave 5 (W5): Collected in 2016 – 2018 when most participants were 33 to 43 years of age.

Past research engaging with the relationship between immigration and the educational outcomes of natives has most often produced census-based analyses (Betts and Lofstrom 1998, Betts 1998, Hunt 2017, Jackson, O. 2015, Smith 2012). These analyses have benefitted from large sample sizes, as well as periodic data, which has allowed for comparisons of changes through time while maintaining representative figures of sub-populations such as race, gender, or age groups.

However, as McHenry (2015) points out, these census-based analyses have been unable to account for a number of methodological gaps. Public-use datasets have often been limited to the state or city-level, due to data security concerns over the identifiable nature of geographic data. In the US, immigration and educational contexts may vary dramatically within states,

[2] Waves 2 and 5 are not used in this doctoral thesis, but could be useful to further research.
[3] A detailed description of the Add Health Dataset, including number of respondents for each wave, can be found in Appendix 1.

particularly at the school district level. Census data, which is often only available in broader geographical scopes, often fails to capture these differences.

Additionally, these analyses often fall short in their ability to link individuals with the immigration flow most relevant to them and their educational outcomes. For instance, many analyses match individuals with their state of birth, or a specific location during a particular phase in their life. However, young people, particularly in an increasingly globalized and interconnected world order, are often mobile (particularly at the national level in the US), and the immigration profile assigned to them according to their state of birth or place of residence may not accurately represent the immigration context which was most relevant in shaping their educational decisions.

Finally, the fact that census data provides only very general indicators of educational achievement (such as enrollment rates or highest level of education achieved) is another significant drawback of census-based analyses, with aspects such as attitudes regarding education or cognitive abilities remaining largely unexplored.

By using the Add Health Survey we are able to directly link individuals with their corresponding school and grade, thus allowing for a more accurate and specific link to the demographic composition of their cohort, and thus, their interaction with immigrant peers.

An additional benefit of using the Add Health dataset over census data is the possibility to make use of school, parental and sibling data in our analyses. Separating the influence of environmental, selection, and social factors is a common methodological challenge when looking to explore the effects of social environments on individual outcomes (Brandén et al.

2019, Dietz 2002, Hanushek et al. 2003, Hanushek et al. 2009, Manski 2000). As this thesis looks to uncover the potential effects of social interactions with immigrant classmates, it is essential to isolate these effects from other environmental and selection effects which could simultaneously be influencing the educational outputs of natives.

Both selection and endogeneity problems could arise when school-specific factors (such as school quality, availability of resources, teacher experience) bias results of analyses, namely in situations where they correlate with the concentration of immigrant students in a specific school, while simultaneously affecting results (Brandén et al. 2016, Brandén et al. 2019, Clotfelter et al. 2005, Hanushek et al. 2004).

With better-quality institutions frequently offering better resources, more experienced teachers, smaller class sizes, and better support for struggling students, children in these institutions may have better possibilities of academic success, regardless of their abilities or effort. Because families very often settle into areas which reflect their socioeconomic status, children from more affluent families are very often enrolled in higher quality institutions, as well as surrounded by other children from highly affluent family backgrounds. Immigrant children, in turn, are usually under-represented in highly-affluent communities and schools. This could, in turn, result in reflection problems leading to over-estimation of environmental effects (Flores Morales et al. 2022, Hermansen and Birkelund 2015, Lee, D. and Lee 2020, Legewie and DiPrete 2012).

This thesis addresses the selection problems detailed above by controlling for school and family characteristics. In addition to controlling for standard factors such as family education, race, and income, the robustness of the Add Health data allows for the matching of each individual

with a school. The thesis exploits differences in cohort (i.e., school grade) composition (within schools) to address unobserved school heterogeneity. With this approach, which is only used by a handful of scholars (Fletcher et al. 2021, Kim, J. 2020, Rodríguez-Planas et al. 2022, Sotoudeh et al. 2017), we are able to account for broader school differences (resources, teacher quality, etc.). By focusing on the variation between immigrant concentrations across cohorts, we assume cohort composition is largely random, as well as difficult to observe/respond to by parents.

The analysis also accounts for the fact that other family-related factors may be more difficult to observe than income or educational background. Attributes such as parental discipline for academic matters (and parental academic attitudes more generally), perceptions on gender roles, the level of education achieved by previous generations, access to out-of-school support such as tutoring, and the role models or other models of high academic achievement children have access to are, among others, factors which may prove difficult to measure and/or control within estimations. Once again, the robustness of the Add Health data allows us to address this challenge. We do this by linking each participant to a family identifier variable and, in certain estimations, being able to control for unobserved family characteristics through sibling comparisons. Additionally, an extensive Parent Questionnaire, carried out during W1 of the survey, allows for a more in-depth exploration of parental background and attitudes.

In addition to the practical benefits of the dataset which we describe above, the Add Health data allows us to make three important conceptual contributions to literature examining the nexus between immigration and the educational outcomes of natives: (1) consideration of non-achievement metrics as educational outputs; (2) long-term analysis of educational outputs,

linking school-age exposure to adulthood outcomes; and (3) consideration of immigrants in their own right, as opposed to using proxy measures such as native language or race.

1.2.2. Non-Achievement Metrics

While the impact of immigrant children on the educational outcomes of their native peers has been explored extensively by scholars in the past (Betts and Lofstrom 1998, Betts 1998, Brunello et al. 2020, Hunt 2017, Llull 2018, McHenry 2015, Silveira et al. 2019) and has yielded important insights, most of this research has centered on achievement and attainment metrics as indicators of academic outcomes. Over recent years, however, there has been growing recognition of the importance of non-achievement/attainment metrics as means of measuring educational outcomes, with many scholars shifting focus to motivational, social, and cognitive metrics (Belfi et al. 2012, Hofman et al. 1999, Malecki and Elliott 2002, OECD 2013, Palardy 2020, Reschly and Christenson 2012, Sung 2014, van Houtte 2005).

As was explained in a 2012 OECD report on international education, 'achievement is in fact only one of the factors that can help countries maximize the economic value of investments in education' and 'students need to be engaged, motivated, willing to learn new things', emphasizing the importance of participation and effort to succeed (OECD 2013). While the study of educational outcomes outside of academic achievement or attainment is relatively new to educational literature, already existing studies have shown that factors such as curiosity, motivation, effort, emotional investment (aspirations and desire to succeed academically), and engagement within the classroom, can be relevant components of educational performance (Fletcher et al. 2021, OECD 2013, Peguero et al. 2016, Reschly and Christenson 2012, Skilling et al. 2021).

This thesis moves beyond achievement/attainment metrics by considering four non-achievement outcomes: (1) self-belief, (2) imagination, (3) educational expectations and satisfaction, and (4) gender attitudes. Research has found empirical evidence of strong correlation between each of these outcomes and traditional measures of educational performance such as graduation/enrollment rates or degree completion (see Alhadabi and Karpinski 2020, Arens et al. 2017, Bouffard-Bouchard et al. 1991, Bouffard-Bouchard 1990, Carmichael and Taylor 2005, Lane et al. 2004, Lent et al. 2002, Linnenbrink and Pintrich 2003, Marsh and Craven 2005, Pajares and Miller 1994, Pajares 1996, Pajares 2003, Pekrun et al. 2017, Pintrich and De Groot 1990, Relich et al. 1986, Schnell et al. 2015, Schunk 2003, Usher et al. 2019, Zimmerman et al. 1992 for self-belief; Duffy 2006, Fleer 2011, van Oers 2005 for imagination; Jowkar et al. 2014, Suárez-Orozco et al. 2009, Erikson, R. and Jonsson 1996, Jackson, M. 2012, Portes et al. 2010 for expectations/aspirations; and Alesina et al. 2013, Pearse and Connell 2016 for gender attitudes).

In considering non-achievement outcomes, the thesis recognizes that at the district, city, state, country or even international levels, there may be differences in access to and affordability of further education, as well as inherent differences in the quality of education available to young people throughout all stages of their educational journey. Consequently, and as has been pointed out by the OECD (2013), being aware of the determinants and effects of non-achievement outcomes such as the ones explored in this thesis can allow policymakers, as well as teachers, parents, and students themselves to maximize their investments in education.

1.2.3. Analysis of Long-Term Outcomes

To date, most of the existing scholarship on the effects of immigration on the educational outcomes of natives has focused on immediate or short-term effects, with only a fraction of the research on the topic exploring long-term effects on native youths (Betts and Shkolnik 2000, Brunello et al. 2020, Gould et al. 2009, McHenry 2015, Neymotin 2009). Due to this strong focus on short-term effects, most of the research on the impact of immigrant students on native peers has only considered dependent variables such as test scores, high school completion, or university enrollment. As a result, the effects of interactions with immigrant peers on natives once they are young adults (and, quite importantly, independent from their parents and responsible for their own educational pursuits) have been largely overlooked.

The importance of considering the long-term effects of immigrant peers on natives is justified by both adolescent cognitive development literature, as well as peer effects literature, simultaneously. Extensive research in both of these fields suggests that traits such as self-belief, imagination, aspirations/expectations, and gender attitudes, while largely determined by the individual, are also fluid and sensitive to the influence of others (Lent et al. 2002). The effects of parents have been documented extensively in literature with scholars often suggesting that parental support has significant effects on a child's cognitive abilities and choice of educational pursuits (Ginevra et al. 2015, Howell 2005, Ross 2016). However, literature has also suggested that as children progress through adolescence and into adulthood, individuals may become increasingly independent from parents, and may be far more likely to question the beliefs and perspectives of their immediate family families; instead, during this phase, the effect of peer attitudes and behaviors has been found to increase relative to family (Erikson, E. 1968, Flanagan 2013).

These findings highlight the need to explore whether interactions with immigrant peers affect native individuals not only during high school, but also as they progress through adulthood and their educational trajectories. Long-term educational effects of immigrants on natives remain largely understudied, however, and gaps remain even amongst the research which does consider these effects.

Neymotin (2009), for example, considers the effects of immigration on SAT-scores and university-application behaviors of natives in California and Texas. The breakdown of analysis into two panels (1994 and 2001) provides a longitudinal perspective of the effects of immigration, however this longitudinal perspective is applied to state-level measures of immigration (as opposed to district, school, or individual levels of exposure), which results in an evaluation of how exposure to immigrants changed over time, but not how exposure to immigrant peers affected each individual through their educational trajectory. Comparably, Gould, Lavy and Passerman (2009) adopt a similar approach, exploring effects of immigrant concentration during elementary school on the outcomes of natives during high school.

While these two papers provide valuable insights regarding the relationship between exposure to immigrant peers and the educational outcomes of natives, the focus on SAT-scores, university application decisions, and high school matriculation as dependent variables nonetheless limits the research to educational outputs which may not be entirely the decision of the native students themselves, but also heavily determined by their parents.

A broader temporal scope is adopted by McHenry (2015), who uses the National Educational Longitudinal Study to show the impact of variation in low-skilled immigration on the educational decisions of natives between 1988 and 2000. While McHenry provides valuable

insights on possible effects and dynamics, this thesis builds on his work in at least two meaningful ways. First, the thesis considers the effects of *all* immigrant peers, regardless of their (or their parents') skill level. Expanding the analysis beyond only low-skilled immigration could provide important findings, particularly as peer effects literature indicates that traits such as perseverance, effort, tolerance and creativity can be passed down from parents to their children (Berckmoes et al. 2017, Cunha and Heckman 2008, Mendez 2015, Shrira et al. 2019, Tadmor et al. 2017, Zumbuehl et al. 2021) and the possibility that high-skilled immigrants may have inherently different profiles than their low-skilled counterparts in these attributes should not be discarded. Considering immigration beyond the low-skilled subset is also important as high-skilled immigrants could have different integration/adaptation abilities, or be more proficient in English (thus enabling communication, and consequently relationship-building, with natives) than those immigrant children from low-skilled backgrounds.

Additionally, this thesis builds on McHenry's work by expanding the temporal scope of analysis, and providing a more contemporary perspective. In addition to providing a 10-year update on McHenry's work, the additional decade encompassed by this thesis allows us to consider a period during which immigration policy in the US changed dramatically, as have public perceptions and attitudes towards immigrants. The 2008 financial crisis, several large (and sudden) waves of immigration from Central America, and 9/11, likely impacted natives in their perspectives of immigration and, consequently, the results of their interactions with immigrant peers.

1.2.4. Immigrants in Their Own Right

This thesis will also contribute to existing literature by considering 'immigrant-ness' as a variable in its own right, separate from race, ethnicity, and language ability. Our specific definition of 'immigrant' can be found in the Terminology and Definitions section of this thesis, as well as within each individual paper, but is broadly defined as: all individuals who were either (1) born abroad, or (2) born within the US to at least one foreign-born parent. By focusing on the country of birth of an individual and their parents (which is provided for all participants in the Add Health data), we are able to consider 'immigrant-ness', separate from ethnicity, race, or language ability.

A significant amount of the analyses exploring the relationship between immigration and the educational outcomes of natives use race, ethnicity, or language ability as proxies for immigrant status (Angrist and Lang 2004, Chin et al. 2013, Cooley 2009, Cooley 2014, Diette and Uwaifo Oyelere 2017, Dills 2018, Fryer and Torelli 2010, Geay et al. 2013, Griffith and Main 2019, Hanushek et al. 2009, Hanushek and Rivkin 2008, Hoxby, C. and Weingarth 2005, Hoxby 2000, Hsieh and Lin 2017, Lorenz et al. 2020). However, in the increasingly globalized context of the 21st century, and in which this research takes place, ethnicity, race, and language ability may sometimes -yet not always- coincide with being an immigrant in the US. With second-generation (and third generation, fourth generation, etc.) populations growing exponentially (Cohn 2013, Myers et al. 2013), and considering contexts of traditionally high-immigration states like Texas or California where individuals may identify as Hispanic / Latino even in situations when their family has been settled in the US for 3+ generations, equating ethnicity and/or race with being an immigrant may not be the most accurate way to capture the impacts of immigrant students on their native peers.

Similarly, a number of studies use language ability (or Limited English Proficiency) as a proxy for being an immigrant (Chin et al. 2013, Cho 2013, Diette and Oyelere 2014, Friesen and Krauth 2011, Geay et al. 2013, Nathenson et al. 2016, Pivovarova and Powers 2019). This too results in methodological shortcomings, because, while most LEP students may, in fact, be either first-generation immigrants or children of immigrants (second-generation immigrants), it is also possible that a large number of immigrant children are proficient in English, and consequently overseen when using language ability as a proxy for immigration. Focusing on LEP students as a means of measuring immigration could result in the exclusion from analysis of those immigrant students who are able to build closer relationships with native children due to their better command of the English language, and focusing instead on those with limited communication with their native peers, and who, consequently, are not able to fully socialize and integrate.

The decision to identify immigrants based on both their country of birth and that of their parents allows us to identify those individuals who were most likely raised, through their formative years, with consistent exposure to a different system of beliefs and attitudes than those of mainstream US culture. It our analyses, it allows us to consider a sample of immigrants which is diverse in terms of race, ethnicity and language proficiency, but which may nonetheless differ significantly from natives in their educational performance, beliefs and attitudes.

This consideration of immigrant-ness in its own right is far less common in literature than the use of race, ethnicity, or language ability (perhaps due to the additional complications presented by having to link each individual to their parents, and have additional information regarding their parents' countries of birth), however a handful of scholars, like Ohinata and van Ours

(2016) and Brandén et al. (2019), support the joint use of individual and parental country of birth as a metric for an individual's 'immigrant-ness'.

Nonetheless, the main analyses across core chapters still consider many of the variables often used as proxies for immigration including race and ethnicity. This thesis does so by not only considering the effects of interaction with immigrant peers on native educational outputs, but also how the individual characteristics of immigrant students might affect different sub-groups of native students. Particular attention will be given to characteristics such as race (Brandén et al. 2019, Diette and Uwaifo Oyelere 2017, Fryer and Torelli 2010, Griffith and Main 2019) and parental education, which often correlates with language abilities (Abbasian et al. 2020, De Cat 2021, Fruehwirth and Gagete-Miranda 2019, Iwaniec 2020), as literature suggests these individual characteristics are relevant to the educational outputs of children and young adults. Additional analyses with alternative definitions of 'immigrant' are discussed in the Conclusion section.

1.3. Thesis Structure

The thesis is structured to follow an integrated format, which is one of the options offered by the University of Oxford. Each of the core chapters (Chapters 3 – 6) is intended to be a stand-alone academic paper. The benefit of this format is that each core chapter can be independently submitted for publication in an academic journal,[4] while simultaneously being able to link interrelated concepts under an overarching theoretical framework, as well as discussing

[4] As of January 2024, two of the four content chapters in this thesis have been submitted for publication in peer-reviewed journals. There are minor differences between the journal versions and thesis versions of the chapters, as changes were made to the versions submitted for publication in order to comply with word count limits, and to address reviewer comments.

potential reasons for overlaps and differences in results. The decision to present this investigation as an integrated thesis, rather than in monograph format, also stems from the fact that the cognitive skills and educational outcomes outlined above have been shown to be interrelated, and sometimes endogenous, with the direction of impact/causality often being mutual (Kim, D. and Jung 2023, OECD 2013, Reschly and Christenson 2012).

Given the chosen format, there is repetition across chapters, particularly, regarding data description. Nonetheless, each of these chapters is accompanied by its own distinct literature discussion, which elaborates on particular mechanisms, contexts, or factors which are specific to the outcome in question.

Chapter 1 and Chapter 2 in this thesis introduce both the doctoral thesis (Chapter 1) and the historical-geographical context in which the data for this thesis was collected (Chapter 2). Each of the core chapters then explores the effect of interaction with immigrants on a different educational outcome or cognitive skill in natives, as follows:

Chapter 3 – Constructing Confidence: Immigrants in the Classroom and the Self-Belief of Natives

Chapter 4 – Exploring Difference: Immigrants in the Classroom and the Imagination of Natives

Chapter 5 – Establishing Expectations: Immigrants in the Classroom and the Educational Expectations of Natives

Chapter 6 – The Socialization of Gender in Education: Immigrants in the Classroom and the Gender Attitudes of Natives

1.3.1. Core Chapter Summaries

Chapter 3 explores the relationship between the concentration of immigrants in high school cohorts and the self-belief of natives, both during high school years and adulthood. The chapter uses self-belief as an umbrella term for two key concepts in education research: self-efficacy and locus of control (LOC). Through the lens of Social Cognitive Theory (SCT), we present the existing research which highlights how these two concepts have been found to affect student interest (or lack thereof) in specific tasks, persistence, goal-setting, and achievement. We identify two possible mechanisms through which interaction with immigrant peers might influence the self-belief of natives: (1) interaction with immigrant peers increases native self-belief by improving native confidence regarding their own academic abilities, mastery of the educational system, and chances of success; and (2) immigrant peers place higher-than-native value on education, and hence are less disruptive in the classroom. This results in a greater sense of calm and control within the learning environment, increasing native students' sense of self-belief. After consideration of these mechanisms, we develop the hypothesis that: A higher number of immigrant students in a cohort will lead to higher levels of native self-belief. The chapter uses variation in within-school, cross-cohort concentrations of immigrants as the independent variable in regression, and Self-Efficacy, LOC, and Self-Belief as dependent variables. Results then show that a one-immigrant student increase in a cohort resulted in a 0.8-point increase (in a 0 to 7 adult-age Self-Belief scale) for natives.

Chapter 4 examines the effect of school-age interactions with immigrant peers on the imagination of natives during adulthood. The chapter centers on the 'social cognition process,' which suggests that creativity and imagination can be developed through the expansion and interaction of ideas which may not traditionally overlap. We identify research which suggests that exposure to different perspectives and experiences afford opportunities to develop higher cognitive complexity as well as the ability to recognize and integrate alternative viewpoints from other cultures. Supported by this literature, the chapter uses regression to explore the hypothesis that when controlling for school characteristics, interaction with immigrant peers in the classroom will increase the imagination of natives. As variables the chapter uses cross-cohort, within-school immigrant concentration during W1, as well as a W4 Imagination Variable. We find a small, but statistically significant effect of interaction with immigrant peers on native imagination during adulthood, with an increase of 20 immigrant students in the cohort yielding an increase in the likelihood of reporting a high level of imagination by 0.03 (i.e., three percentage-points).

Chapter 5 explores whether interaction with immigrants in a classroom setting during W1 affects the educational expectations (and educational satisfaction) of natives during high school years and adulthood. Chapter 5 examines the development processes of educational aspirations and expectations through Social Cognitive Career Theory (SCCT), a widely-accepted and implemented theoretical framework of career and academic choice. The chapter uses regression to explore the hypothesis that when controlling for school characteristics, exposure to immigrant classmates has a positive effect on the academic expectations of natives. We consider possible mechanisms such as (1) the role of immigrants as social models of high educational aspirations for native students and, (2) the role of immigrants as a reference point for natives to compare their own abilities and chances of academic success. As variables, the

chapter uses cross-cohort, within-school immigrant concentration during W1 (once again, to measure the extent to which any given native interacted with immigrant peers), as well as two dependent variables: W1 Educational Expectations and W4 University Completion. The main results suggest that the effect of immigrant peers on native expectations of attending higher education (university or beyond) during high school is positive and statistically significant. However, the number of immigrant peers in high school was found to have no effect on university completion during W4, by the time natives reach the 24 – 32 age bracket.

Chapter 6 explores the degree of correlation between parent and child gender attitudes, and if this correlation differs between native and immigrant parent-child pairs. The chapter subsequently explores the extent to which the gender attitudes of immigrant students and their parents can then influence the gender attitudes of natives. The chapter considers the hypothesis that an increase in the number of immigrant peers in a cohort will result in natives adopting more traditional gender attitudes themselves. Chapter 6 draws from Identity Economics (IE) and Social Learning Theory (SLT) to explore the development of gender attitudes, and considers Agreement with Traditional Gender Roles as main dependent variable. The chapter's main results suggest that immigrant parents have, generally speaking, more conservative gender attitudes than native parents. At the same time, the correlation between parent and child gender attitudes is stronger between native parent-child pairs than immigrant parent-child pairs. Nonetheless, we find that the generally more-conservative gender attitudes of immigrant parents do not transmit to native students.

Chapter 7 concludes by re-visiting our research questions and aims. The chapter also offers a summary of the contributions and limitations of the doctoral thesis, as well as its policy implications.

1.3.2. Relationship Between Chapters and Their Integration as a Complete Text

While the summaries above may show that each core chapter incorporates outcome-specific literature, uses different variables, and ultimately finds different results, considering these outcomes as separate parts of a larger piece has important benefits.

The integration of the chapters into a complete text allows us to compare three distinct kinds of findings: (1) outcomes for which immigrants do not have any statistically significant effects on natives, (2) outcomes for which immigrants produce effects only during high school years, and (3) outcomes for which immigrants produce effects both during high school years and adulthood. The conclusion of this thesis explores the chosen outcomes jointly, including possible explanations for why some outcomes were more sensitive to immigrants than others, why some effects persisted through time, and potential overlap in mechanisms for impact.

Methodologically, the four core chapters in this thesis share significant similarities. Across all chapters, the analysis makes use of National Longitudinal Study of Adolescent to Adult Health (Add Health). In all four core chapters, we make use of W1 of the Add Health survey to explore variables related to natives' family, and school composition, as well as information on friendships during high school. Chapters 3, 4 and 5 then use W4 data to explore and develop outcome variables such as adulthood self-belief, adulthood imagination, adulthood educational expectations, and adulthood educational satisfaction. Chapter 6, in contrast with the three preceding chapters, uses data from W3 for the exploration of adulthood outcomes. This decision was grounded on greater relevance of questions available for the exploration of gender attitudes in W3 (compared to W4), in addition to the fact that, during Wave 3 (when participants

were aged 18 – 26) most participants were in the process of making decisions regarding further education or entry into the labor market, and negotiating these paths with romantic relationships, and gender expectations or roles.

2. History and Context

With SCT emphasizing the importance of the environment for the development of an individual's learning, we now provide a brief summary of the context in which our analysis takes place. The sections below summarize relevant changes in educational policy and practice in the years immediately preceding data collection for W1 of Add Health, providing an overview of the educational scene in which the native respondents we study were interacting with their immigrant peers.

The late 1980s and early 1990s were a period of significant educational reform in the US. After the 1983 landmark publication of *A Nation at Risk: The Imperative for Educational Reform* by the US National Commission on Excellence in Education (The National Commission on Excellence in Education 1983), there was a growing interest in educational policy, particularly as it related to the improvement of public-school funding and student performance. The report argued that the academic performance of children schooling in the US was quickly falling behind children schooling in other countries; this triggered a wave of federal, state, and local efforts to reform public education. Many of the reforms would impact what was perceived as 'academic success,' the extent to which native students interacted with immigrant peers in academic settings, and the resources available to support immigrant children in their integration.

Four key areas of reform resulted in significant changes: (1) the growing popularity of achievement metrics in education (such as competency testing, grade-point averages, and the meeting of performance standards), (2) the increased focus on instructional time, (3) changes in school finance strategies and legislation, and (4) reform regarding school choice.

2.1. The Growing Popularity of Achievement Metrics

Educational reform in the 1980s and 1990s contributed to achievement-centered perspectives of educational quality, as competency testing as a means of measuring academic success grew in popularity. By 1990, 47 states were using some form of state-wide testing to assess students (Medrich et al. 1992), and minimum grade-point averages (GPAs) gained traction as well, with over a dozen states requiring that students maintain a certain GPA in order to participate in extracurricular activities.

The commitment of the federal government to improving achievement was visible through the development of the National Education Goals of 2000. A 1989 education summit with all state governors set national goals for education to be accomplished by 2000. In 1995, two additional goals were added, and the US Congress formalized the National Education Goals.

The goals laid the foundations for improving student achievement, and identified national academic objectives, including targets such as achieving a high school graduation rate of 90 percent, and ranking first, globally, in achievement in science and mathematics.

By 1990, the country was witnessing minor improvements in reading and mathematics at the national level. A more significant change, however, was the improvement in reading proficiency amongst minorities who, despite remaining below the proficiency levels of non-minority students, managed to make significant gains. Despite the minor progress, the National Center for Education Statistics highlighted the lack of consistency in patterns of improvement, particularly at the higher skills level. Relatively low performance of US students compared to

children educated in other countries, as well as research pointing to relatively weak writing abilities amongst US-educated students, gave education policy specialists in the US continuing reason for concern.

Consequently, into the 1990s education policy continued the trend from the preceding decade, with states further shifting their focus from educational inputs (such as per-student expenditures) to achievement-based educational outputs such as student proficiency, and the meeting of educational standards (Hurst et al. 2003). In addition to the increase in requirements for graduation throughout most states, efforts also centered around the aligning assessments to standards and developing accountability systems to facilitate monitoring and evaluation (Council of Chief State School Officers 2000a, Linn 2001).

At the federal level, the government supported the setting and alignment of standards through initiatives such as the inclusion of standards for the provision of supplemental services for low-achieving students in the 1994 reauthorization of the Elementary and Secondary Education Act (ESEA). This prioritization of academic standards extended, as well, to the field of vocational education. Legislation such as the Card D. Perkins Vocational and Technical Education Act of 1998, as well as the School-to-Work Opportunities Act of 1994, sought to integrate academic and vocational education, and improve the ways schools were training people for work.

The commitment of federal, state, and local authorities to student performance and school standards was also reflected in policies regarding school (and district) accountability and the ability of institutions to meet the minimum standards being set for students. By 1999, most (41) states collected information regarding assessment scores, and by September of 2000, 46 states issued at least one annual report providing statistics at the district level (Council of Chief State

School Officers 2000b). In addition to reporting efforts, some states further encouraged school-level or district-level accountability by providing incentives for school improvement (Education Commission of the States 2000).

2.2. Increased Focus on Instructional Time

Policy changes also focused on instructional time and intensity, particularly after the *A Nation at Risk* report highlighted that students in the US spent less time in school than students in other industrialized nations. The growing attention paid to class time, and the increasing tendency to consider it a factor of academic success, could have accentuated concerns over the extent to which immigrant students disproportionately consumed teacher time and attention.

By 1990, 43 of the 50 states had set requirements for the minimum length of a school day (Medrich et al. 1992), with some states, like California and Michigan, offering incentives to districts which established longer workdays (Coley and Goertz 1990). Also looking to increase instructional time and intensity, many states modified their attendance policies. In the years leading up to 1990, five states lowered the age at which students were expected to begin formal education, and an additional seven raised the age at which it was permissible to leave formal education. Additionally, some states set minimum attendance requisites for graduation, and some established mandates for class sizes (looking to increase student-teacher interactions by decreasing student-teacher ratios) (Medrich et al. 1992).

Despite concerns regarding instructional time and intensity, teacher-student ratios were improving in the early 1990s. The number of individuals involved in primary or secondary school instruction rose steadily in the second half of the 1980s, meaning that with the number

of public-school teachers rising at a faster rate than the number of students, there was a continuing decrease in the pupil-teacher ratio. Nonetheless, the concern over instructional time persisted; a clear example of the importance of the issue to policy makers can be seen in the passing of Public Law 102-62, also known as the Education Council Act of 1991, which established the National Education Commission on Time Learning, to advise on minimum attendance and the length of school days.

2.3. Reform in School Finance

Much like today, in the 1990s there were significant differences between districts in the amount and variety of courses offered, the extracurricular activities available to students, and the specialized programs for students requiring additional help. This was, in part, because public school financing strategies varied from state to state. A wide array of programs and funding formulas had been put in place in order to allocate funds to each district, with many formulas seeking to narrow the resource gap between wealthier and poorer school districts (Hurst et al. 2003). However, state funds were often distributed to districts either through general aid, or through categorical aid (Gold et al. 1995, Sielke and Holmes 2002).

General aid formulas, which accounted for the majority of state funds, were often calculated on a per-pupil basis, taking into account a district's educational needs (often related to enrollment figures, student populations, etc.), and the district's ability to pay for services (most often measured through property tax). Consequently, schools frequently reflected the financial capabilities of the communities in which they were located. Often times, however, states combined funding formulas, in order to create tiered funding systems which guaranteed basic needs were met throughout all districts.

Categorical aid was often given in addition to general aid. State categorical aid was meant to support specific student populations by targeting funds to particular programs. These programs, which often aimed to improve special education, transportation, or compensatory education, often benefited disadvantaged children from low-income or minority groups. In 1993-1994, 28 states provided funds for compensatory education, 30 for bilingual education programs, and 40 financed initiatives for gifted children (Gold et al. 1995).

Reform in school financing strategies and legislation had significant implications for the immigrant community, and the extent to which immigrant children interacted with their native peers in an academic setting. The growing efforts to improve the funding structures responsible for financing poorer school districts, as well as the increasing popularity of channeling funds specifically to schools or programs for minority and low-achieving populations, represented significant shifts in policy which would affect how the school-aged immigrant population integrated and, consequently, how they impacted their native peers.

In the 1990s, financial reform sought to ensure the provision of quality education across all districts, regardless of their wealth and resources. A number of these reforms took place in response to legislative actions (such as court orders), as various state court decisions found that several state financial systems had not been able to accomplish their constitutional mandate of delivering an acceptable level of education services to all. Consequently, states adapted their financial structure to facilitate the financing of adequate educational services (Ladd and Hansen 1999).

Taxpayer preferences also impacted sources of financing. While many school districts had historically relied on local property taxes to raise revenues for public education (with local governments raising, on average, 75 percent of their total tax revenue from property tax (Ladd and Hansen 1999)), throughout the 1990s and into the early 2000s, many taxpayers expressed their frustration with high property taxes (Ladd and Hansen 1999). At times, these frustrations translated into formal action to pressure policymakers into reducing property taxes (Crampton and Whitney 1996, Odden 1994). As a result, during the 1990s a number of states were persuaded into containing property taxes, and consequently, policymakers were forced to find alternative sources of educational funding.

In addition to modifying their funding structures, and the consequent effect of greater equality between poor and wealthy districts, school finance reform also strived towards equality by promoting investment into programs which benefited minorities and low- achieving students. Generally, during the 1990s, a significant number of states reformed their educational finance strategies to incorporate categorical grants into their general aid funding (Hurst et al. 2003). By 1999, according to Sielke and Holmes (2002), every state had dedicated funding for transportation, 23 had assigned categorical funding to compensatory education, and 24 had allotted categorical funds to bilingual education.

The afore-mentioned move to improve achievement and meet standards generally resulted in an increased amount of state aid received by poorer districts (Fulton 1997). Through the enhanced channeling of resources available to programs targeting at-risk children, early childhood, professional development, or technological improvements, many states expanded their adjustments. Additionally, increased scrutiny over how special education funds were raised and spent, as well as heightened interest in special education, led to significant legislative

changes, such as the Individuals with Disabilities Education Act (IDEA) of 1990. The Act stated that school districts had the responsibility of determining whether a child had a disability, and then developing an individualized education program (IEP) to describe the support services the child would receive. By offering federal grants to all participating states, IDEA counted on the participation of all 50 states and the District of Columbia.

In addition to federal support for special education programs such as IDEA, every state counted on different policies and procedures in order to secure and channel funds for special educational needs. During the 1990s states showed significant interest in reforming their financing strategies for special education programs. From 1989 - 1994, in fact, 16 states implemented special education reforms, and during the 1994/1995 school year, more than half considered major financial reforms.

2.4. Reform in School Choice

School choice reform represented a noteworthy educational shift throughout the 1990s. Historically, parents had limited choices in the specific schools which their children attended. Because school assignment at the public level was most often linked to the location of a child's residence, prior to the 1990s, many parents wishing to send their children to a school other than the one in their neighborhood resorted to private schooling, or opted for moving to communities which they perceived provided better public education. Nonetheless, families often did not have the resources to move, or enroll their children in private schooling, and hence, the options for school selection were very limited.

Through the 1990s however, increased support for school choice reform at the state level provided parents with a greater variety of choices in where their children were educated. A growing number of options for public schooling (mostly through the establishment of magnet schools), the increased support for charter schools, and a growing acceptance of financial support options for students wishing to enroll in private education were all significant reforms which gained momentum throughout the decade.

In the 1990s, magnet schools (schools providing education focused on specific subject areas or institutional philosophies) were open to students who lived in the surrounding areas, and offered some variation in the type of education a child could receive if parents were hesitant to enroll their child in the traditional local public school. Magnet schools provided a focused curriculum, centered around specific areas of interest, such as performing arts, world languages, and leadership, as well as STEM, while still operating within the public-school structure.

Hand in hand with the growing popularity of magnet schools, in the late 1980s many states began extending public school choice to more families, and a number of policy shifts took place in order to allow students to enroll in a wider variety of public schools, without having to pay tuition (also known as open enrollment policies). According to the Education Commission of the States (2001), by early 2001, 32 states allowed for some flexibility in public school choice. The National Household Education Survey, in turn, showed that between 1993 and 1999, the percentage of K-12 students attending an assigned public school decreased from 80 percent to 77 percent (US Department of Education 2001).

In addition to more flexible enrollment policies, in the 1990s many states introduced legislation which allowed for the creation of public schools which could operate with a significant amount of independence from local and state governments. Charter schools, as these schools became known, provided parents with even further flexibility from traditional public education, as they could function with autonomy in matters such as class sizes, curriculum, and extracurricular activities, so long as they adhered to basic standards in terms of health, safety, and achievement. According to Nelson et al. (2000), the number of charter schools operating in the country doubled between 1997 and 1999, with close to 1500 charter schools catering to children by the last year of the 1990s.

Finally, the emergence of movements looking to increase school choice by making private education more accessible (mainly, through the subsidizing of costs from public funds) led to an increase in school choice in the 1990s (Moffit et al. 2001). Many states allowed the use of public funds for the subsidization of private schooling primarily in the form of transportation services, textbooks, and support services; however, these allowances were most often accompanied by limitations on the amount of funds which could be used.

The aforementioned educational reforms likely impacted the ways in which immigrant and native students interacted within schools, in addition to influencing the public's perception on the possible effects of immigration on native education.

It is possible that the shift towards achievement-centered perspectives of educational quality and the accompanying growing popularity of standardized testing could have led school administrators, teachers, parents, and even students themselves to underestimate or oversee

potential non-achievement benefits related to diversity in classrooms (such as increased curiosity, open-mindedness, tolerance, intellectual risk-taking, etc.).

Similarly, increasing concern with instructional time and intensity could have led parents to believe that a higher concentration of immigrant students in a classroom would result in the disproportionate use of resources by immigrant students, as well as increased competition for teacher attention and a decrease in the instructional time that native students could receive.

Simultaneously, however, it is possible that school finance reform, and the incorporation into state funding formulas of categorical grants targeting at-risk, low-income, LEP, or special educational needs children, could have played a role in leveling the playing field between native and immigrant students, and incentivized schools to help immigrant children integrate and succeed academically.

Nonetheless, reforms in school choice and the greater variety of options for public schooling (via magnet schools, charter schools, and alternative funding for private education) could have, in many instances, allowed parents who were unhappy with the demographic composition of their child's current school to transfer their child to an institution which they believed would be preferable.

2.5. Demographic Changes in American Public Schools

In addition to the afore-mentioned effects resulting from educational reform, the 1990s and early 2000s also witnessed significant changes in the demographic composition of American schools. Shifts in the makeup of the general population trickled down to the school-aged

population, and at times even magnified among young people. The demographic transformations taking place, together with the significant movements for school reform, resulted in a unique environment for school-aged children and young people. Both native and immigrant students experienced changes in terms of who they interacted with in the classroom, and in what contexts those interactions took place.

Throughout the 1990s and early 2000s, the US saw an increase in the number of children of immigrants (CoIs). First-generation adult immigrants represented one in nine of all US residents in 2000, while their children represented one in five of all persons under the age of 18. Amongst children who were considered low-income, the proportion of CoIs was even higher, reaching one in four (Capps et al. 2005).

The share of children with Limited English Proficiency (LEP) also increased significantly among the school-aged population in the 1990s and early 2000s. While many CoIs were, in fact, proficient in English, the fact that in 2000 LEP students represented 7.4 percent of children in primary grades and 5.5 percent of those in secondary school, suggests although children did often become more proficient as they progressed through the American school system, many did not become proficient by the time they reached the higher grades (Capps et al. 2005).

The share of CoIs with LEP parents is also a relevant metric, as many LEP parents were often unable to be involved in their children's educational environment. In 2000, close to a third (27%) of CoIs were part of a household where everyone over the age of 14 was LEP (also known as a linguistically-isolated household) (The Annie E. Casey Foundation 2022). The overlap between LEP children and children living in linguistically-isolated families highlights

an additional challenge: the task of achieving English proficiency when parents cannot be fully involved in their child's education due to their own LEP.

2.5.1. Profile of Children of Immigrants and LEP Children

In 2000, more than half of foreign-born elementary students were from Latin America or the Caribbean and a third of them were Mexican-born. Approximately 25 percent of all foreign-born school-aged students were born in Asia, and only 17 percent came from Canada, Europe, or Oceania (with four percent being born in Africa) (Capps et al. 2005). The large share of the total immigrant population originating from Mexico and other Latin American (and Caribbean) countries meant that a significant fraction of LEP children had Spanish as a first language.

While the profile of foreign-born immigrant children is no doubt relevant, it is worth noting that in 2000, close to 75 percent of CoIs were, in fact, born within the US, and consequently were US citizens (Capps 2001, Fix and Capps 2005, Shields and Behrman 2004). Despite the fact that many CoIs not only had legal status in the country, but were also entitled to enjoy the same rights and privileges than children of US-born parents, a fraction of US-born CoIs were children of undocumented parents and, due to concerns over deportation and other immigration-related consequences, may not have benefitted fully from interactions with public institutions. These fears were accentuated amongst children who were foreign-born and undocumented themselves. The majority of LEP students were also born in the US, most of them to immigrant parents (Fix and Capps 2005, Spees et al. 2016).

Immigrant children were more likely to be living in poverty and without health insurance than native children (Fix and Capps 2005, Shields and Behrman 2004). In conjunction with higher

rates of poverty, CoIs were also more likely to have parents with limited educational backgrounds (Capps et al. 2005, Shields and Behrman 2004). The profile of LEP children was generally in line with the profile of immigrant children (Spees et al. 2016); in 2000, LEP children almost doubled the low-income rate of English-proficient children (Capps et al. 2005). The important overlap between LEP children and low-income children presented significant challenges for schools trying to meet performance standards, particularly when considering the correlation between poor language proficiency and economic hardship established in previous literature (Capps, Ku et al. 2002). In terms of parental education, LEP children showed even higher shares of parents without high school degrees than immigrant children (Spees et al. 2016).

2.5.2. Concentration of Children of Immigrants and LEP Children

Radical differences in the immigration contexts of many states made the geographic distribution of immigrant and LEP children a relevant factor in terms of the demographic composition of schools. While interactions between native and immigrant students could be quite common in states with high rates of immigration, many communities in the country had a predominantly native population, and native interactions with immigrant peers were likely much more rare.

As was the case with the general immigrant population in the 1990s and early 2000s, CoIs concentrated in six states: California, Texas, New York, Florida, Illinois, and New Jersey. The number of immigrants across these six states was equivalent to over 60 percent of the country's immigrant population, and slightly more of all elementary school children in 2000 (Capps et al. 2005, de Cohen and Clewell 2007, Massey 2008, Spees et al. 2016).

Despite the high concentration of immigrant children in these states, other states in the country were experiencing sharper increases in their shares of CoIs. In fact, between 1990 and 2000, the share of CoIs in primary grades grew fastest in Nevada, North Carolina, Georgia, and Nebraska (Capps, Fix et al. 2002, Spees et al. 2016). The growth in CoIs was far slower in the top-immigration states.

The trends in LEP concentration and dispersion showed significant parallels with the trends seen for CoIs (Spees et al. 2016). As was the case with the CoIs population, the states with the fastest growing rates of LEP children were not the same as the states with the largest LEP populations. Additionally, the LEP student population grew more rapidly in secondary than primary schools. A growth of 64 percent among secondary schools from 1990 to 2000, compared to 46 percent at the elementary level, evidenced how many secondary schools were not equipped to provide the language acquisition resources needed by many LEP children (Ruiz-de-Velasco and Fix 2000).

3. Constructing Confidence: Immigrants in the Classroom and the Self-Belief of Natives

Abstract

Using data for the United States, we explore how interactions with immigrant students during high school affect the self-belief of natives, both during high school years as well as during adulthood. The analysis uses The National Longitudinal Study of Adolescent to Adult Health survey, which includes a nationally-representative sample of students in grades 7 to 12 during the 1994-95 school year. These students were interviewed in four additional waves, covering a period of 24 years. In the analysis, we focus on the impact of differences in the number of immigrants across cohorts, within schools. This allows us to focus on the implications of the demographic composition of a student's cohort, while controlling for broader school differences and the possibility of self-selection into schools. Our results suggest that exposure to immigrant classmates has positive effects on the self-belief of natives during both school-age and adulthood. More specifically, results exploring the impact during school-age show that an increase of one immigrant student in a cohort would result in a 0.7-point increase in self-belief (in a 7-point Self-Belief scale) for a native student. We find this effect to persist into adulthood in a statistically significant manner.

3.1. Introduction

The sociodemographic composition of schools in the United States (US) has been re-defined over the last few decades (Hernandez et al. 2008), largely due to a surge in immigration in the late decades of the 20th century, as evidenced by the foreign-born population rising from 4.7% in 1970, to 13.1% in 2013 (Pew Research Center 2015). Looking specifically at children, between 2000 and 2010, the number of immigrant children under 17 grew 30 percent, from 13.1 million to 17 million. Between 2010 and 2019, the number grew by another five percent, reaching 17.8 million (Ward and Batalova 2023). This demographic change in the social spaces in which children develop throughout their most formative years has re-ignited debate on the extent to which educational policies and practices encourage the socioeconomic assimilation of the foreign-born population, with the educational system often being seen as a critical mechanism to integrate immigrants and their children (Alba et al. 2011).

Similarly, growing attention has been given to the potential effects that increasingly diverse classrooms could have on the academic outcomes of native children (Bifulco et al. 2011, Brunello and Rocco 2013, Cebolla-Boado 2007, Fekjaer and Birkelund 2007, Geay et al. 2013, Gould et al. 2009, Hanushek et al. 2009, Hardoy and Schone 2013, Hermansen and Birkelund 2015, Jensen and Rasmussen 2011, Ohinata and van Ours 2013, Szulkin and Jonsson 2007). With many immigrants and their families settling in metropolitan areas, and clustering in residential areas marked by relative social deprivation and spatial segregation (Charles 2003, Musterd 2005), there is concern that high concentrations of disadvantaged immigrant students could have a negative effect on the educational opportunities of natives residing in these communities.

However, recent literature has also highlighted the characteristically strong work ethic and high educational ambitions of immigrant students (Lee, J. and Zhou 2015, Ljunggren and Orupabo 2020, Louie 2012, Portes and Rumbaut 2001, Shah et al. 2010), emphasizing the need to consider the possibility that immigrant students could also have positive impacts on their native peers. This is particularly true in light of recent empirical findings which suggest that the children of immigrants have exceptionally optimistic plans about university attendance (Feliciano and Lanuza 2016, Kao and Tienda 1995) and a higher likelihood of attending university (Hofferth and Moon 2016, Kirui and Kao 2018, Reisel et al. 2019) compared to native peers of similar socioeconomic backgrounds.

Consequently, researchers have focused increasingly on the importance of student attitudes, thoughts, and beliefs throughout the learning process, as opposed to merely academic achievement (Pajares 2006, Schunk 2003). This paper contributes to that literature, and uses Social Cognitive Theory (SCT) to explore the effects of school-age academic environments on adult-age academic outcomes.

SCT sees human behavior as a transactional process in which there are interactions between an individual's behaviors, their internal processes (such as their thoughts, values, beliefs, etc.), and their environment (Bandura 1986, Bandura 1997). We explore the possibility that, through environmental differences (mainly, different levels of exposure to immigrant classmates during high school), the internal processes of native students (specifically, self-belief) may be affected.

Given the large amount of literature emphasizing the importance of self-belief for educational pursuits in general, it is important to understand how interactions that occurred during

schooling years, including interactions with immigrant students, could affect self-belief during adulthood.

Consequently, in this paper, we explore the following specific research questions:

> *Does the presence of immigrant students in US classrooms affect the self-belief of their native peers? Are these effects still present, or perhaps manifest only, during adulthood?*

In addition, we explore the mechanisms through which this influence occurs and the roles of demographic factors such as race.

In order to explore how interactions with immigrant classmates affect the self-belief of natives during both high school years and adulthood, we make use of the National Longitudinal Study of Adolescent to Adult Health survey (Add Health)(Harris 2018). This longitudinal study includes a nationally-representative sample of students in grades 7 to 12, in the US, during the 1994 – 1995 school year. The students were interviewed in four additional waves, covering a period of 24 years. The first wave of the survey collects detailed information on family and school composition as well as information on friendships during high school. The fourth wave of data collection gathered information on self-belief at a time when respondents were 24 to 32 years of age.

While self-belief is most often studied during adolescence (13 – 18 years of age) or emerging adulthood (18 – 25) (Erb and Drysdale 2017, Klassen 2002, Klassen and Usher 2010, Panadero et al. 2017, van Dinther et al. 2011) the availability of data for the 24-32 age bracket of

adulthood yields the opportunity to explore how attitudes and perceptions are modified once individuals have entered and experienced professional life in the labor market or chosen to pursue further education (Moss-Pech et al. 2021).

In the analysis, we focus on the impact of differences in the concentration of migrants across cohorts within schools. This allows us to focus on the implications of the demographic composition of a student's cohort, while controlling for broader school differences and the possibility of self-selection into schools. As a robustness test, we also make use of household fixed effects, to eliminate household-level correlates and to leverage the within-household, between-sibling differences in exposure to immigrant peers.

Our results suggest that immigrant students not only have an effect on the self-belief of their native peers during high school years, but also that the effects of school-age exposure to immigrant peers carry on through adulthood and have a positive and statistically significant relationship with adult-age self-belief.

3.2. Literature Review and Conceptual Background

We explore self-belief through two key concepts: Self Efficacy and Locus of Control. In this section, we unpack the definition and theoretical underpinnings of both concepts. Additionally, we provide examples of relevant empirical applications of these concepts in education research, and suggest possible channels through which interaction with immigrant peers could affect self-belief of natives during school-age and adulthood.

3.2.1. Self-Efficacy

Self-efficacy is defined by Bandura (1997) as beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. Self-efficacy may affect behavior in numerous ways, including the choices made by a particular individual and the effort they commit to a particular task, as well as their perseverance in the face or hardship. Generally speaking, the stronger an individual's notion of self-efficacy is, the stronger their effort and perseverance will be (Alhadabi and Karpinski 2020, Bandura 1977, Bandura 1986, Honicke and Broadbent 2016, Olivier et al. 2019, Schunk and Mullen 2012). In addition to influencing behavior, self-efficacy may also influence internal thoughts and feelings. Weak self-efficacy can lead to overestimating the difficulty of tasks, as well as feelings of failure and helplessness. Alternatively, strong self-efficacy often results in feelings of positive challenge in the face of difficult tasks (Fredricks et al. 2004, Olivier et al. 2019, Schunk and Mullen 2012).

In educational research, many academics have explored the effects of self-efficacy on motivation and learning. More specifically, in this research, self-efficacy has been found to affect student interest (or lack thereof) in specific tasks, persistence, goal-setting, and achievement (Alhadabi and Karpinski 2020, Arens et al. 2017, Bouffard-Bouchard et al. 1991, Bouffard-Bouchard 1990, Carmichael and Taylor 2005, Lane et al. 2004, Lent et al. 2002, Linnenbrink and Pintrich 2003, Marsh and Craven 2005, Pajares and Miller 1994, Pajares 1996, Pajares 2003, Pekrun et al. 2017, Pintrich and De Groot 1990, Relich et al. 1986, Schnell et al. 2015, Schunk 2003, Usher et al. 2019, Zimmerman et al. 1992).

While results have varied depending on levels of education (primary, secondary, tertiary), topic area (STEM, reading, etc.), and ability level (Alhadabi and Karpinski 2020, Arens et al. 2017,

Arens et al. 2022, Burger et al. 2020, Marsh and Craven 2005, Pekrun et al. 2017, Robbins et al. 2004, Thorsen 2018), overall academic consensus is that self-efficacy can play a significant role in improving academic motivation and performance.

3.2.2. Development of Self-Efficacy

SCT suggests that four main factors affect the development of self-efficacy: enactive mastery experiences, observational (vicarious) experiences, social persuasions, and physiological and psychological states (Bandura 1997).

Enactive mastery experiences can be defined as instances of success in dealing with situations, and are considered to be the most influential factor of self-efficacy, as they provide evidence of an individual's ability to succeed at a task. Mastery experiences are particularly significant when they result from overcoming significant obstacles through persistence and effort (Alhadabi and Karpinski 2020, Arens et al. 2017, Bandura 1997, Marsh and Craven 2005, Olivier et al. 2019, Palmer 2006, Panadero et al. 2017, Schunk and Pajares 2009, Talsma et al. 2018).

Observational experiences contribute to the development of self-efficacy by providing social models, where students gather information about their own abilities by observing others, often peers (Bandura 1997, Marsh et al. 2020, Nagengast and Marsh 2012, Salchegger 2016, Schunk 1987). Students may also develop self-efficacy by receiving information that validates their ability to carry out a task (Falco and Summers 2021, Joët et al. 2011, Schunk 1989b, Wentzel et al. 2010, Won et al. 2017). Social persuasions, meaning situations in which others communicate confidence, are most effective when the person communicating confidence is

perceived as knowledgeable and reliable (Bong and Skaalvik 2003, Falco and Summers 2021, Joët et al. 2011, Wentzel et al. 2010, Won et al. 2017).

The fourth source of self-efficacy -physiological and psychological states- suggests that feelings such as anxiety, stress, tension, and excitement can signal failure or success. Individuals with positive moods may find their self-efficacy strengthened, while individuals with negative emotional states may be more prone to weakened efficacy (Arens et al. 2022, Butz and Usher 2015, Fredricks et al. 2004, Olivier et al. 2019, Panadero et al. 2017, Schunk and Mullen 2012).

3.2.3. Locus of Control

The concept of Locus of Control (LOC), in turn, is developed within Rotter's (1954, 1966) Social Learning Theory (SLT)[5], and refers to an individual's beliefs about the main underlying causes of events in his or her life. More specifically, LOC refers to whether the outcomes of an individual's actions are contingent on what they do, or on events outside their personal control. LOC captures, in essence, whether individuals 'attribute the cause or control of events either to themselves or to the external environment' (Galvin et al. 2018, Spector 1982, Wang, Q. et al. 2010).

While the concept of LOC is often used interchangeably with self-efficacy, an important difference is that self-efficacy involves an individual's beliefs regarding their ability to carry

[5] Social Learning Theory, similarly to SCT, posits that individuals learn by observing the events that occur around them in a manner that ultimately influences behavior (Rotter, 1954).

out an action, whereas the LOC involves beliefs on the extent to which actions will produce specific outcomes.

The belief that one has strong control over their own life is referred to as an internal LOC. People who are internally-oriented believe that personal outcomes are a result of skill and hard work. Those who are externally-oriented believe that personal outcomes are a result of luck, destiny, fate, or the behaviors of others (Allen et al. 2005, Galvin et al. 2018, Ng et al. 2006, Rotter and Mulry 1965, Rotter 1966, Wang, Q. et al. 2010).

Research demonstrates that, compared to believing that one has little influence over their own life, a stronger internal LOC is linked to a number of positive outcomes, including: smaller likelihood of criminal behavior, increased tolerance and resilience, superior self-control, better mental well-being, physical health, more positive work experiences, and greater career success (Ahlin 2014, Antunes and Ahlin 2014, Cheng, C. et al. 2013, Efta-Breitbach and Freeman 2004, Farver et al. 2000, Galvin et al. 2018, Gierowski and Rajtar 2003, Hersch and Scheibe 1967, Kanfer et al. 2017, Meier et al. 2008, Ng et al. 2006, Sargent-Cox and Anstey 2015, Wang, Q. et al. 2010, Wu et al. 2015).

3.2.4. Development of LOC

Research suggests that an individual's LOC may develop during early childhood, when children begin to uncover 'the causal relationship between one's own behavior and its consequences,' (Rotter 1966) particularly as children start to make appraisals of the extent to which they have control over their experiences (Bodovski 2014, Morton 1997, Rotter 1966).

Scholars have explored, in greater detail, how childhood experiences may shape an individual's LOC. Rotter (1966) and Bodovski (2014) both suggest that children who feel they are a 'small cog in a big machine and at the mercy of forces too strong or too vague to control' (Rotter 1966, p.3) are more prone to develop an external LOC. Culpin, Stapinski, Miles, Araya, & Joinson (2015) empirically support this perspective, finding that children who experience socioeconomic hardship are less likely to have a strong internal LOC. Similarly, parenting and societal factors have also been found to play a role in the development of LOC during childhood (Carton and Nowicki 1996, McClun and Merrell 1998, Morton 1997, Twenge et al. 2004).

For decades, LOC has mostly been perceived by academics as a dispositional attribute, which develops in childhood but subsequently remains static throughout an individual's adulthood. In this traditional view, individuals are considered to have an LOC that falls at a specific point along a continuum with external and internal loci as opposite poles (Galvin et al. 2018, Johnson et al. 2015, Johnson et al. 2016). However, a handful of scholars have proposed that LOC can change in response to situations, environments, or domains (April et al. 2012, Galvin et al. 2018, Johnson et al. 2015, Johnson et al. 2016, Ryon and Gleason 2014, Twenge et al. 2004, Wong and Sproule 1984). More specifically, that environments which support personal agency should work to enhance an individual's LOC, even in adulthood (Rotter 1954, Rotter 1960).

Yet, we still have limited empirical examples of the extent to which perceptions of the LOC may be influenced by an individual's environment, and particularly, the extent to which these perceptions can change over time (Galvin et al. 2018, Johnson et al. 2015, Johnson et al. 2016, Ryon and Gleason 2014, Wu et al. 2015). Only a handful of empirical studies have adopted a developmental perspective of LOC into adulthood, and these studies have produced mixed findings. Cobb-Clark and Schurer (2013) found no link between developing a strong internal

LOC and major life events (such as a promotion at work, or marriage) within a three-year time period. However, Anderson (1977), Andrisani and Nestel (1976), and, more recently, Wu et al. (2015), have found a positive relationship between work performance and LOC. Wu et al. (2015) suggest that, due to the scarcity of research on LOC as a developmental concept, as well as the diversity of results, it is necessary to consider contexts in which environmental influence is sustained and profound.

3.2.5. Influence of Peers on Self-Belief: Mechanisms and Hypothesis

Given that both SCT and SLT suggest that self-efficacy and an internal LOC could be affected by an individual's environment, it is worth considering the possibility that a student's peers during high school might have a significant effect on these attributes (Ahlin and Lobo Antunes 2015, Catterson and Hunter 2010, Fredstrom et al. 2011, van Reemst et al. 2016). More specifically, we identify two possible mechanisms through which immigrant students could be influencing the self-belief of their native peers: (1) by increasing native confidence regarding their own chances of success via observational (vicarious) experiences, and (2) through emotional arousal resulting from less disruptive classroom behavior and greater sense of calm and control within the learning environment.

Mechanism 3.1: Immigrant peers increase native confidence regarding their own academic abilities, mastery of the educational system, and chances of success

Bandura (1997) and Schunk (1987) both suggest that mastery and observational experiences contribute to the development of self-efficacy, with students gathering information about their own abilities by observing their peers. Schunk (1989a) posits

that students may develop self-efficacy by receiving information that validates their ability to carry out a task. Under these premises, native students could see their confidence increased when making an appraisal of their advantages in terms of language skills and knowledge of the US educational system, relative to their immigrant peers. If, through interactions with immigrant classmates, native students were to make a positive evaluation of their chances of success (Davis 1966, Merton 1957) this would, in turn, increase native self-efficacy beliefs. This mechanism would also be supported by recent literature finding that immigrant students often have lower self-efficacy than otherwise comparable natives (Aguayo et al. 2011, Bondy et al. 2017, Titzmann and Jugert 2017).

Mechanism 3.2: Immigrant peers are less disruptive than natives in the classroom. This results in a greater sense of calm and control within the learning environment, increasing native students' sense of self-belief.

Shifrer (2019) and others (Hardré et al. 2007, Kitsantas et al. 2011, Kristoffersen et al. 2015, Lavy and Schlosser 2007, McMahon et al. 2009, Murray and Malmgren 2005) suggest that classrooms with disruptive students and poor behavior can negatively impact the self-efficacy of students and externalize their LOC. Disruptiveness in a classroom not only results in students observationally experiencing their teachers' seeming inability to control behavior, but also in students' inability to learn in disruptive environments. This can often trigger emotional reactions such as anxiety, stress, and tension (Shifrer 2019). Both of these outcomes could result in driving student LOCs towards the external end of the spectrum.

Simultaneously, literature highlights how immigrants in the US place higher-than-native value on education, and a number of scholars have documented how this appraisal of the value of education is often transmitted from immigrant parents to their children (Lee, J. and Zhou 2015, Ljunggren and Orupabo 2020, Louie 2012, Portes and Rumbaut 2001, Shah et al. 2010). Additionally, there is a large amount of research documenting how immigrant students in the US (particularly those originally from eastern cultures, or with parents from eastern cultures) may be accustomed to more strict, demanding, and rigid academic environments (Al Kadri et al. 2011, Altinyelken 2010, Bridger 2007, Chan 1999, Frambach et al. 2014, Gwee 2008, Khoo 2003, Leung et al. 2008, Nguyen, P. et al. 2009, Wang, Y. et al. 2012). Taking into account the above (as well as the fact that language barriers and difficulty making friendships may result in immigrant students often being more quiet and less participative), it is not only possible, but likely, that immigrant students would be less disruptive in a classroom than their native peers. This would yield a calmer and more controlled learning environment, subsequently leading to the development of more internal LOCs in all students (both immigrant and native), in turn improving their sense of self-belief.

Based on these possible mechanisms, we hypothesize that:

Hypothesis 3.1: ***A higher number of immigrant students in a cohort will lead to higher levels of native self-belief.***

The hypothesis above predicts positive influences of immigrant students on their native peers, but this prediction is grounded on mechanisms which make key assumptions about the academic performance and attitudes of immigrants. Mainly, Mechanism 3.1 assumes native

students perceive themselves as having greater chances of success than their immigrant counterparts, and Mechanism 3.2 assumes immigrant students are less disruptive in the classroom than their native peers. These assumptions are explored in the analysis section of the paper, where we discuss potential channels and mechanisms to explain our results.

3.3. Data

3.3.1. Description of the Data Used

The National Longitudinal Study of Adolescent to Adult Health survey (Add Health) is a longitudinal study conducted in the US (Harris 2018). The first wave was conducted in the academic year 1994-95 and it includes a nationally-representative sample of students in grades 7 to 12. There were four additional waves of the survey in 1996, 2001–02, 2008, and 2016-18. In this study, we focus on the first wave of the survey when students were in high school, and the fourth wave of the survey (2008) when respondents were 24 to 32 years of age. From the first wave we collect information regarding individual, family, and school cohort characteristics, as well as self-belief during high school years, and from the fourth wave we collect the information on self-belief during adulthood.

We define immigrant students as those who were born abroad, or those born in the US to at least one foreign-born parent (i.e., first and second generation immigrants). We consider all students who do not fall under this definition of 'immigrant' (i.e., all students who were born in the US to two US-born parents) as 'natives'. We limit our analysis to native students, resulting in a sample of 12,439 respondents that we can observe in both waves, and who

responded to all questions relevant for this analysis. These respondents attended 128 different schools, spread across the country.

As shown in Table 3.1, in the general sample there were 18 immigrant students per grade out of an average total of 68 students, suggesting that on average close to 26% of students were categorized as immigrant as per our definition. Also, most students were aged 14 to 18 during the first interview and the majority of respondents were White. A slight majority of students came from families in which the mother had high school education or less. Finally, close to 10% of families received assistance from welfare programs. See Appendix 2 for a detailed description of all the variables included in the estimation.

Table 3.1. General Characteristics of the Sample

Variable		**Means and Distributions**
Immigrants in Cohort		18
Total Students in Cohort		68
Sex – Male		0.465
Race	White (non-Hispanic)	0.656
	Hispanic	0.073
	Black (non-Hispanic)	0.250
	Asian (non-Hispanic)	0.012
	Other (non-Hispanic)	0.010
Age		
	12	0.003
	13	0.085
	14	0.139
	15	0.171
	16	0.189
	17	0.187
	18	0.168
	19	0.053
	20	0.004
	21	0.0005
	Mean	16
High Achiever		0.065
Mother's Educational Attainment		

	High school or less	0.540
	Some college	0.199
	College or more	0.261
On Benefits		0.100

3.3.2. Dependent Variables

In this paper, we consider the W1 and W4 self-belief of participants, to examine both the school-age as well as the adulthood effects of interaction with immigrant peers on natives. From the first wave of data, we extract information of individual demographics and school-age self-belief of native students. From W4 of the survey, we extract variables relevant to the self-belief of native participants during adulthood.

For both W1 and W4, the primary outcome variable of interest is self-belief. With literature suggesting that self-efficacy and locus of control are both separate but important factors contributing to educational self-belief, confidence, and motivation (Alias et al. 2016, Anderson, A. et al. 2005, Fritson 2008, Joo et al. 2013, Landine and Stewart 1998, Thompson et al. 2020), we consider the two variables independently, and focus on the specific impact of interaction with immigrant peers on each of the variables respectively. However, we not only recognize that the two concepts are inherently linked, but also that it is likely necessary that both be simultaneously present in order to fuel educational motivation and success (individuals need both the belief in their ability to carry out an academic task, i.e., self-efficacy, as well as belief in the fact that their effort or success in a task will produce their desired results, i.e., an internal LOC). Consequently, we also consider them jointly in a constructed Self-Belief variable.

In summary, we consider six separate dependent variables:

(1) W1 Self-Efficacy

(2) W1 LOC

(3) W1 Self-Belief

(4) W4 Self-Efficacy

(5) W4 LOC

(6) W4 Self-Belief

Our W1 Self-Efficacy variable considered responses from the following Add Health W1 Survey question:

> *How often was each of the following true during the last week? You felt that you were just as good as other people.*

Response options ranged from 0 (never or rarely), to 3 (most of the time or all of the time).

Our W1 LOC variable, in turn, considered the following question:

> *On a scale of 1 to 5, where 1 is strongly agree and 5 is strongly disagree, please tell me whether you agree or disagree with each of the following statements: When you get what you want, it's usually because you worked hard for it.*

We recoded the responses, inverting values in order to have 1 signal strong disagreement, and 5 signal strong agreement. We also subtracted 1 from all responses, to maintain consistency

with the scales used in other variables, where 0 (as opposed to 1) represented the lower-most value in a scale.

Our W1 Self-Belief variable was constructed from the two variables described above. We combined the total possible points for both questions, with highest self-belief signaled by 7 total points (high frequency for the Self-Efficacy question, and strong agreement with the LOC question), and the lowest by 0.

Our W4 Self-Efficacy variable considered responses from the following Add Health W4 Survey question:

> *On a scale of 0 to 4, where 0 equals never and 4 equals all the time, in the last 30 days, how often have you felt confident in your ability to handle your personal problems?*

Our W4 LOC variable considered the following question:

> *On a scale of 0 to 3, where 0 equals never and 3 equals all the time, overall, how often do you have the freedom to make important decisions about what you do at work and how you do it?*

We use workplace empowerment to proxy W4 LOC due to a significant amount of literature highlighting the link between LOC and decision-making power in the workplace (Ahearne et al. 2005, Avey et al. 2009, Biemann et al. 2015, Cheong et al. 2016, Hao et al. 2018, Huang 2017, Kim and Beehr 2017, Li et al. 2015, Zhang and Zhou 2014), with authors such as Wu

(2015) and Kim and Beehr (2017) finding that autonomy and decision-making power in the workplace can be an indication of an internal LOC.

Our W4 Self-Belief variable was constructed from the two W4 variables described above. We combined the total possible points for both questions, with highest self-belief signaled by seven total points (high frequency for both W4 questions).

While, to the best of our knowledge, no other study has thus far utilized these specific Add Healthy survey questions as a measure of self-belief, existing literature has made use of similar survey elements when assessing self-belief.

Rotter's (1966) Locus of Control scale is the most widely used and cited measure for LOC (Wang, L. and Lv 2017), with numerous authors employing adaptations or short forms of the scale to more contemporary research (Shifrer 2019, Wolfle and List 2004). The tool, as well as its adaptations, requires participants to express (in a Likert scale format) their agreement with statements regarding the extent to which they feel in control of their life, and the degree to which hard work is important for success. Example statements from previous literature include, 'Good luck is more important than hard work for success', 'Sometimes I feel that I don't have enough control over the direction my life is taking,' 'When I make plans, I am almost certain I can make them work,' and 'Becoming a success is a matter of hard work, luck has little or nothing to do with it' (Anmol and Rath 2022, Lowes and Lin 2015, Rotter 1966, Shifrer 2019, Wolfle and List 2004).

Similarly, research in self-efficacy routinely makes use of Tsai et al.'s (2014) Strength Self-Efficacy Scale, Sherer's General Self-Efficacy Scale (SGSES) or the General Perceived Self-

Efficacy Scale (GPSES) to assess the extent to which individuals feel able to produce outcomes. Much like Rotter's LOC scale, these tools require that respondents choose between various degrees of agreement/disagreement with statements regarding their confidence in their own ability to carry out actions or achieve results. Statements from these tools which closely resemble our own choice of Add Health questions include: 'How confident are you in your ability to use your strengths to overcome any obstacle?', 'I can always manage to solve difficult problems if I try hard enough,' 'I am confident that I could deal efficiently with unexpected events,' 'I feel insecure about my ability to do things,' and 'I do not seem capable of dealing with most problems that come up in life' (Tsai et al. 2014).

Table 3.2. Distribution and Means of Dependent Variables

Variable		**Distribution**
W1 Self-Efficacy	0	0.108
	1	0.211
	2	0.327
	3	0.355
	Mean	1.929
W1 LOC	0	0.011
	1	0.066
	2	0.184
	3	0.494
	4	0.246
	Mean	2.898
W1 Self-Belief	0	0.002
	1	0.011
	2	0.039
	3	0.112
	4	0.221
	5	0.279
	6	0.233
	7	0.104
	Mean	4.827
W4 Self-Efficacy		
	0	0.025

	1	0.028
	2	0.177
	3	0.383
	4	0.388
	Mean	3.081
W4 LOC		
	0	0.093
	1	0.250
	2	0.339
	3	0.318
	Mean	1.883
W4 Self-Belief	0	0.005
	1	0.011
	2	0.043
	3	0.104
	4	0.196
	5	0.254
	6	0.239
	7	0.148
	Mean	4.933

3.4. Methods

3.4.1. Empirical Strategy

The primary empirical specification of this study is as follows:

$$\boldsymbol{y_{igs} = \alpha_i + \delta M_{gs} + \theta C_{gs} + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 3.1)}$$

In our specification, y_{igs} is each of the dependent variables explained above (W1 Self-Efficacy/W1 LOC/W1 Self-Belief/W4 Self-Efficacy/W4 LOC/W4 Self-Belief), for individual i in grade g in school s. α_i represents a school dummy, to control for any differences across schools. M_{gs} is the number of immigrant students in grade g in school s, which we adjust by

dividing by 100. C_{gs} is included in the empirical specification as a control for cohort size, and R_i is an indicator of the racial group of the student with the White group as the reference category. X_i are a series of individual characteristics of the students and their families; these are discussed further in the Controls sub-section below.

Through this empirical strategy, our analysis focuses on within-school variation in the number of immigrants per grade (M_{gs}). Our main interest from Equation 3.1 is on δ which provides information on the impact of one additional immigrant student in a cohort (controlling for cohort size), on an individual's self-belief once we control for school and demographic differences. According to our hypothesis we expect δ to be positive.

3.4.2. Controls

When looking at the effect of social environments on individual outcomes, disentangling environmental, selection, and social interaction effects is a common methodological challenge (Brandén et al. 2019, Dietz 2002, Hanushek et al. 2003, Hanushek et al. 2009, Manski 2000). As our focus for this study is the social interaction effect of having immigrant classmates, it is essential to isolate it from other environmental and selection effects that could also impact the self-belief of natives.

Personal Controls:

At the individual level, we include control variables for gender, age, and race, as these may all impact a person's physiological and psychological states, which are identified by SCT as important determinants of self-efficacy and LOC. These characteristics may also define who

an individual sees as a social model, or who they consider a reference group more generally, and consequently determine which observational experiences contribute to building their self-efficacy and LOC. The opportunities that are perceived as available to an individual, as well as the degree to which observational experiences confirm that opportunities *are* available, may also be determined by inherent characteristics such as race or gender, and this may, in turn, impact an individual's LOC.

We also attempt to control for intelligence and biologically-determined cognitive ability, as this might impact the frequency with which individuals have enactive mastery experiences. We do this through a school achievement variable (a binary variable indicating the student is a high-achiever in school).

Parental Controls:

We include a binary variable representing whether a student's parent participated in a welfare assistance program, as an indicator of socioeconomic status. The importance of controlling for socioeconomic status is highlighted in LOC literature, where scholars have found that children who feel they are a 'small cog in a big machine' (Rotter 1966, p.3) or who experience socioeconomic hardship are less likely to have a strong internal LOC.

We control for parental education, as this might impact not only the observational experiences a child is exposed to, but also the reference groups to which they compare themselves, as well as the social persuasions (words of affirmation or validation) that a child receives as they develop their self-belief (Falco and Summers 2021, Joët et al. 2011, Schunk 1989b, Wentzel et al. 2010, Won et al. 2017).

School Control:

It is important to consider that school-specific factors such as general school quality, availability of resources, or teacher experience could significantly bias our results if they were to be correlated with the concentration of immigrant students in a given school while simultaneously affecting results (Brandén et al. 2016, Brandén et al. 2019, Clotfelter et al. 2005, Hanushek et al. 2004).

With families often settling into areas which reflect their socioeconomic status, children from highly-affluent families are often enrolled in better-quality institutions, and surrounded by other highly-affluent peers. In these institutions, students often benefit from better resources and more experienced teachers, as well as smaller class sizes, and more ample support for students who struggle academically. Immigrant students are generally under-represented in highly-affluent communities and schools, which could, in turn, result in the over-estimation of environmental effects due to both selection and endogeneity problems (Flores Morales et al. 2022, Hermansen and Birkelund 2015, Lee, D. and Lee 2020, Legewie and DiPrete 2012).

Mindful of this, in our estimation, α_s plays the role of controlling for unobserved differences across schools and the possibility of self-selection into particular schools (Arieli et al. 2016).

Our main specification makes use of School Fixed Effects (SFE) only, and considers all 12,439 students in our dataset. To address the problem of unobserved school heterogeneity, we exploit differences in cohort composition within schools. By using SFE, we are able to control for broader school differences (such as resources, teacher quality, average class size) as well as

accounting for situations in which parents may select a school for their child based on the specific characteristics or composition of the institution (parents may easily observe which schools are 'better' or 'worse-suited' for their child), or in which children from a particular geographical area are assigned to a district/local school. Choosing to focus on variation in immigrant concentration across cohorts within the same schools allows us to account for factors driving students/parents to attend a specific school, and assumes that the characteristics of specific cohorts are not only more random, but also less easily-observed by parents.

3.4.3. Alternative Specifications

It is likely that most students within a school would reside in the same -or similar- communities; under this assumption, including a school dummy variable as we do in the SFE approach described above would also control for most community/environmental differences between individuals. Nonetheless, we do consider alternative specifications which include additional controls for the characteristics of the community in which each individual resides (measured at the Census Tract level) such as: poverty level (proportion of persons with income in 1989 below poverty level), average educational attainment (proportion aged 25 years and over with university degree or more), unemployment rate, proportion of the population which was foreign-born, and proportion of the population which was White.

We also consider the possibility that teacher influence could be a significant factor in developing the self-efficacy and LOCs of students, due to the social persuasions which teachers may offer, as well as the degree to which they prompt mastery and observational experiences within a classroom. The Add Health dataset did not include cohort or classroom-level teacher data, and consequently, we were not able to control for teacher characteristics more specifically

than at the school-level. Nevertheless, we attempted to capture the extent to which each individual student had a positive relationship with their teachers by carrying out an alternative specification which controlled for responses to the question 'How often have you had problems getting along with your teachers?' There were no significant changes resulting from the addition of the aforementioned controls to our main specifications; as such, we did not include them in this dissertation.

Additionally, we carry out a number of specifications in which we treat our dependent variables as continuous (and hence employ OLS to analyze the relationship between our dependent and independent variables), as ordinal (and consequently employ ordinal logistic regression), and where we fit a logit model instead of OLS.

While the significance and magnitude vary across these specifications, the directionality of relationships remains consistent with the results obtained with the SFE specification selected. The results of these specifications can be found in Appendix 3, Appendix 4, Appendix 5, and Appendix 6.

3.5. Results

3.5.1. The Impact of Immigrant Classmates on the Self-Belief of Natives

Our results suggest that immigrant students not only have an effect on the self-belief of their native peers during high school, but also that the effects of school-age exposure to immigrant peers carry on through adulthood and have a positive and statistically significant relationship with adult-age self-belief.

Table 3.3 below shows the relationship between exposure to immigrant peers during W1 and native student self-efficacy, LOC, and self-belief during this same wave.

Columns 1 and 2 show the relationship between Immigrants in a Cohort and W1 Self-Efficacy and W1 LOC, respectively. Column 1 shows how an increase of one immigrant student in a cohort resulted in a 0.3-point increase (in a Likert scale which ranged from 0 to 3) in W1 Self-Efficacy. Similarly, Column 2 shows how an increase of one immigrant student in a cohort resulted in a 0.4-point increase (in a Likert scale which ranged from 0 to 4) in W1 LOC.

In Column 3, we consider self-belief as an ordinal variable, combining scores for W1 Self-Efficacy and W1 LOC, resulting in a W1 Self-Belief variable. This model not only has the largest effect in terms of magnitude, but is also the most statistically significant; an increase of one immigrant student in a cohort would result in a 0.7-point increase (in our 7-point Self-Belief scale) for a native student.

Column 4 shows an additional regression in which W1 Self-Belief is dichotomized, with individuals showing high self-belief (W1 Self-Belief scores of 6 or higher) are coded as 1, and all others as 0. This regression shows how an increase of 20 immigrant students in cohort would result in approximately a 3.4 percentage-point increase in the probability of a native having high W1 Self-Belief.

Table 3.3. Effect of Immigrant Classmates on the W1 Self-Efficacy, W1 LOC, and W1 Self-Belief of Natives

	(1)	(2)	(3)	(4)

Immigrants in Cohort	0.342*	0.402**	0.746***	0.168*
	(0.187)	(0.168)	(0.256)	(0.090)
Total Students in Cohort	-0.003***	-0.003***	-0.005***	-0.001***
	(0.001)	(0.001)	(0.001)	(0.0004)
Constant	2.268***	2.907***	5.174***	0.523***
	(0.261)	(0.236)	(0.358)	(0.125)
R2	0.160	0.126	0.156	0.140
Observations	12,439	12,439	12,439	12,439

Note: These are the coefficients from regressions in which the dependent variables are W1 Self-Efficacy (Column 1), W1 LOC (Column 2), W1 Self-Belief (Column 3), and W1 Self-Belief Binary (Column 4). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

We proceed to explore the effect of exposure to different categories of immigrant peers (Hispanic immigrants, White immigrants, Asian immigrants, Black immigrants, and Other-race immigrants); Columns 2 - 6 in Table 3.4 below represent these relationships. As the table demonstrates, the effects of Hispanic and White immigrants are statistically significant at the 5% level; Column 2 shows a one-student increase in the number of Hispanic immigrants in a cohort would result on a 0.6-point increase in our W1 Self-Belief scale, while a one-student increase in the number of White immigrants would result in a 1.3-point increase. The effects of Asian, Black, and Other-race immigrant peers are positive, although not statistically significant. Potential reasons for this difference in effects between immigrant racial groups is discussed further in Section 3.5.2 below, which addresses possible mechanisms.

Table 3.4. Effect of Immigrant Classmates on the W1 Self-Belief of Natives, by Immigrant Race

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.746***					
	(0.256)					
Hispanic Immigrants		0.642**				
		(0.311)				
White Immigrants			1.302**			
			(0.596)			
Asian Immigrants				0.517		
				(0.326)		
Black Immigrants					1.528	
					(1.568)	
Other-race Immigrants						0.463
						(0.444)
Total Students in Cohort	-0.005***	-0.004***	-0.004***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	5.174***	5.164***	5.170***	5.171***	5.168***	5.162***
	(0.358)	(0.358)	(0.358)	(0.358)	(0.358)	(0.358)
R2	0.156	0.155	0.156	0.155	0.155	0.155
Observations	12,439	12,439	12,439	12,439	12,439	12,439

Note: These are the coefficients from six regressions in which the dependent variable is constructed scale for W1 Self-Belief, which ranges from 0 - 7 points. In each of the regressions shown in Columns 2 - 6, the independent variable is a different racial group of immigrant students. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

We then focus on the effect of school-age exposure to immigrant peers on adult-age self-belief.

Table 3.5 below shows the relationship between exposure to immigrant peers during W1 and native student self-efficacy, LOC, and self-belief during W4.

As can be seen in Column 1, an increase of one immigrant student in a cohort during school-age resulted in a 0.6-point increase (in a Likert scale which ranged from 0 to 4) in W4 Self-Efficacy. Similarly, Column 2 shows how an increase of one immigrant student in a cohort resulted in a 0.3-point increase (in a Likert scale which ranged from 0 to 3) in W4 LOC.

In Column 3, we once again model self-belief as an ordinal variable, combining individual scores for W4 Self-Efficacy and W4 LOC, resulting in our W4 Self-Belief variable. As was the case with W1, this model not only has the largest effect in terms of magnitude, but is also the most statistically significant; an increase of one immigrant student in a cohort would result in a 0.8-point increase (in our 0 to 7 W4 Self-Belief scale) for natives.

Column 4 shows an additional regression in which W4 Self-Belief is dichotomized, and individuals showing high self-belief (W4 Self-Belief scores of 6 or higher) are coded as 1, and all others as 0. This regression shows how an increase of 20 immigrant students in cohort would result in approximately a 3.6 percentage-point increase in the probability of a native having high W4 Self-Belief.

Table 3.5. Effect of Immigrant Classmates on the W4 Self-Efficacy, W4 LOC, and W4 Self-Belief of Natives

	(1)	(2)	(3)	(4)

Immigrants in Cohort	0.564***	0.320*	0.843***	0.182**
	(0.180)	(0.187)	(0.276)	(0.092)
Total Students in Cohort	-0.002***	-0.001	-0.003**	-0.001
	(0.001)	(0.001)	(0.001)	(0.0004)
Constant	2.598***	0.379	2.541***	0.021
	(0.261)	(0.551)	(0.386)	(0.129)
R2	0.132	0.130	0.143	0.135
Observations	12,439	12,439	12,439	12,439

Note: These are the coefficients from regressions in which the dependent variables are W4 Self-Efficacy (Column 1), W4 LOC (Column 2), W4 Self-Belief (Column 3), and W4 Self-Belief Binary (Column 4). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

For W4 we also explore the effect of exposure to different categories of immigrant peers; Columns 2 - 6 in Table 3.6 show these relationships. Hispanic immigrants remain significant, with a one-immigrant student increase in a cohort during school-age resulting in a 0.9-point increase in our adult-age self-belief scale, while a one-student increase in the number of White immigrants would result in a 1.1-point increase (despite with a lower significance, at the 10% level). The effects of Asian and Black immigrant peers are positive, although not statistically significant. As with W1 results, the potential reasons for this difference in effects between immigrant racial groups in W4 is discussed further in Section 3.5.2 below, which addresses possible mechanisms.

Table 3.6. Effect of Immigrant Classmates on the W4 Self-Belief of Natives

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.843***					
	(0.276)					
Hispanic Immigrants		0.872***				
		(0.335)				
White Immigrants			1.099*			
			(0.642)			
Asian Immigrants				0.405		
				(0.352)		
Black Immigrants					0.378	
					(1.690)	
Other-race Immigrants						1.062**
						(0.478)
Total Students in Cohort	-0.003**	-0.001	-0.001	-0.0004	0.0001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	2.541***	2.529***	2.535***	2.535***	2.531***	2.525***
	(0.386)	(0.386)	(0.386)	(0.386)	(0.386)	(0.386)
R2	0.143	0.143	0.143	0.143	0.143	0.143
Observations	12,439	12,439	12,439	12,439	12,439	12,439

Note: These are the coefficients from six regressions in which the dependent variable is constructed scale for W4 Self-Belief, which ranges from 0 - 7 points. In each of the regressions shown in Columns 2 - 6, the independent variable is a different racial group of immigrant students. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

3.5.2. Mechanisms

In Section 3.2.5 we identified two distinct channels through which interaction with immigrant peers during high school could impact the self-belief of native students. We then find that interaction with immigrant peers can have effects on native self-belief during school-age and adulthood. Consequently, in this section we re-visit each initial mechanism, and descriptively analyze both the native and immigrant populations of our sample to discuss the extent to which different channels or mechanisms could be influencing results.

Our first identified mechanism (Mechanism 3.1) stipulated that interaction with immigrant peers – who often face additional academic obstacles related to integration – could increase native confidence regarding their own academic abilities, mastery of the educational system, and chances of success, consequently increasing natives' sense of self-belief. This mechanism was grounded on both SCT – which suggests students gather information about their own abilities by observing others, often peers (Bandura 1997, Schunk 1987) – and supported by Reference Group Theory (RGT) – which posits that when making decisions about their school career and academic abilities, students often judge their own probability of success at higher levels of education not only from their own achievement, but also from their achievement relative to peers (Fang et al. 2018, Kelley and Volkart 1952, Marsh 1984, Marsh 1987, Merton 1957, Plieninger and Dickhäuser 2015).

We explore this mechanism by examining differences in academic achievement (both High Achievement and Low Achievement). These variables are described in greater detail, and their distributions included, in Appendix 2.

Table 3.7. Means and T-test for Native and Immigrant High Achievement and Low Achievement, During W1

	Natives Mean (1)	Immigrants Mean (2)	t-statistic
High Achievement	0.061	0.061	-0.115
Low Achievement	0.014	0.008	3.223***
Note: *p<0.1; **p<0.05; ***p<0.01.			

As can be seen in Table 3.7, we observe that the fraction of native students who were high achievers differed from the fraction of immigrant students who were high achievers by less than 0.05 percentage-points (6.08% of natives, compared to 6.13% of immigrants). With a t-value of -0.11 and a p-value of 0.91, the difference between these two groups in terms of the frequency with which their members perform very well in school was not significant. The difference in frequencies with which students were low achievers was more notable, however, with 1.36% of natives being low achievers, compared to 0.82% of immigrants; a difference of 0.5 percentage-points, which yielded a t-value of 3.22 and p-value of significant at the 1% level.

Considered jointly, these statistics would suggest that immigrant students are simultaneously as likely to be high achievers and less likely to be low achievers than their native counterparts. However, with the differences between our samples being of such small magnitude, it is unclear whether these differences were of a scale large enough to be perceived by native students in their appraisals of their likely success in education.

We consider the possibility that, particularly with such small differences in achievement, self-belief could be influenced by other factors, such as perceived opportunity structures or expected future obstacles. We entertain the possibility that the self-belief of native students

could be improved simply by comparing themselves to immigrant peers with lower self-belief than themselves.

Recent empirical studies have suggested immigrant students may generally have lower self-belief than otherwise-comparable natives (Aguayo et al. 2011, Bondy et al. 2017, Titzmann and Jugert 2017); thus, we explored the extent to which these trends were represented by our specific sample. We find the difference between native and immigrant W1 Self-Belief to be significant. With just over a 0.2-point difference in means (out of a 7-point scale), and a t-value of 8.627 (significant at the 1% level), immigrant students displayed lower W1 Self-Belief than their native peers.

Table 3.8. Means and T-test for Native and Immigrant W1 Self-Belief and Perceived Relative Intelligence

	Natives Mean (1)	Immigrants Mean (2)	t-statistic
Self-Belief	5.826	5.616	8.627***
Perceived Relative Intelligence	3.879	3.786	4.882***
Note: *p<0.1; **p<0.05; ***p<0.01.			

This difference between the W1 Self-Belief of immigrant and native students could be due to a variety of reasons. There is literature which suggests that children from low-SES are frequently characterized by a general sense of external control (Bodovski 2014, Culpin et al. 2015, Fletcher 2015, Gecas and Schwalbe 1983, Rotter 1966), and immigrant families are often over-represented amongst the low SES demographics (Flores Morales et al. 2022, Hermansen and Birkelund 2015, Lee, D. and Lee 2020, Legewie and DiPrete 2012).

In addition, the fact that immigrant children are more likely to face additional obstacles as they integrate into the US and progress through education (i.e., lack of knowledge about the US academic system, language barriers, etc.) could be a contributing factor to lowering the self-belief of immigrants relative to natives. If, as literature would suggest, immigrants have higher-than-native educational aspirations (Engzell 2019, Jackson 2012, Kao and Tienda 1995, Kirui and Kao 2018, Salikutluk 2016), but simultaneously understand that they may realistically face additional obstacles or barriers to pursuing further education, their LOC may become more external and their self-belief hindered (i.e., the realization that high effort and hopes may not equal high results).

Similarly, significant differences between immigrants and natives were seen when participants were asked about perceived intelligence relative to other people the same age. Native responses to the six-point question regarding relative intelligence (where participants selecting 6 believed they were significantly more intelligent than other people their age) produced a mean of 3.88, compared to 3.79 amongst immigrants. With a t-value of 4.88 (significant at the 1% level), we observe that the difference between natives and immigrants in their perceptions of their own intelligence is greater than any observed differences in achievement. That is to say that, regardless of actual performance in school, native students had, in general, higher perceptions of their own intelligence than immigrant students.

This would support the possibility that the small differences in achievement between natives and immigrants may not have been of a magnitude large enough to be perceived by native students in their appraisals of their intelligence. It would also suggest that the relatively higher self-belief of natives was derived form factors outside of actual academic achievement.

While this exploration provides support for Mechanism 3.1, which suggests that native self-belief could be improved through interaction with immigrant peers (who may have lower self-belief due to facing additional academic obstacles related to integration), it also encourages further exploration regarding into the source of the relatively higher self-belief and perceived relative intelligence of natives.

Our second mechanism (Mechanism 3.2) suggested immigrant students would be less disruptive than their native peers in the classroom. We hypothesized that this would, in turn, result in a greater sense of calm and stability within the learning environment, increasing native students' sense of control and self-belief. This mechanism was grounded on literature which has found that disruptions in the classroom can lead to students (both native and immigrant) vicariously experiencing their teachers' seeming inability to control the environment (Emanuelsson and Sahlström 2008, Hutchings et al. 2013, Oliver et al. 2011, Shifrer 2019). At the same time, students may struggle to learn in classrooms with more negative peer behaviors, leading to stress, anxiety and tensions – psychological states which could also negatively impact self-efficacy and LOC (Emanuelsson and Sahlström 2008, Hardré et al. 2007, Hutchings et al. 2013, Kitsantas et al. 2011, Kristoffersen et al. 2015, Lavy and Schlosser 2007, McMahon et al. 2009, Murray and Malmgren 2005, Oliver et al. 2011, Shifrer 2019).

Table 3.9. Means and T-test for Native and Immigrant Disruptiveness, During W1

	Natives Mean (1)	Immigrants Mean (2)	t-statistic
Disruptiveness	0.303	0.212	12.324***
Note: *p<0.1; **p<0.05; ***p<0.01.			

Descriptive analysis of the sample confirmed our hypothesis that immigrant students are, generally speaking, less disruptive than their native counterparts. As can be seen in Table 3.9

above, 30.3% of native respondents had received an out-of-school suspension prior to the W1 survey (our metric for Disruptiveness, which is also described in greater detail in Appendix 2). Amongst immigrant students only 21.2% had ever been suspended. This trend offers validation for literature findings regarding the higher-than-native value of education perceived by immigrant students, as well as empirical research suggesting that immigrant students in the US – particularly those originally from eastern cultures, or with parents from eastern cultures – may be accustomed to more strict, demanding, and rigid academic environments (Al Kadri et al. 2011, Altinyelken 2010, Bridger 2007, Chan 1999, Frambach et al. 2014, Gwee 2008, Khoo 2003, Lee, J. and Zhou 2015, Leung et al. 2008, Ljunggren and Orupabo 2020, Louie 2012, Nguyen, P. et al. 2009, Portes and Rumbaut 2001, Shah et al. 2010).

A difference of nearly 10 percentage-points in means indicates Disruptiveness varies significantly between native and immigrant students, and a t-value of 12.32 highlights this variable as the aspect in which native and immigrant students in our data differ the most. Furthermore, it suggests this is a possible channel by which interaction with immigrants improves native self-belief: greater concentrations of immigrant peers may lead to calmer classrooms and give students a greater sense of control over their own learning and performance.

The Role of Race

The two mechanisms explored above could also help explain the differences seen across immigrant racial categories in Table 3.4 and Table 3.6. With a large amount of literature suggesting that immigrant students from eastern cultures (or with parents from eastern cultures) may be accustomed to more strict, demanding, and rigid academic environments (Al Kadri et

al. 2011, Altinyelken 2010, Bridger 2007, Chan 1999, Frambach et al. 2014, Gwee 2008, Khoo 2003, Leung et al. 2008, Nguyen, P. et al. 2009, Wang, Y. et al. 2012), one would expect Asian immigrant students be less disruptive, and consequently, to have the strongest positive effect on native Self-Belief, according to Mechanism 3.2.

However, as was seen in Table 3.4 and Table 3.6, the relationship between the number of Asian immigrant students in a cohort and native Self-Belief (both during W1 and W4) was found to be positive, but not statistically significant (this was also the case for Black immigrant students). The number of Hispanic and White immigrants in a cohort, in contrast, had a positive and statistically significant correlation with both the W1 Self-Belief and the W4 Self-Belief of natives, while the number of Other-race immigrants in a cohort, in turn, was only significant in the W4 estimation.

These results urge us to consider the possibility that immigrant race could simultaneously be related to perceptions of relative academic achievement (Mechanism 3.1), as well as disruption in the classroom (Mechanism 3.2), and that the mechanisms could not only be operating concurrently, but also exerting opposite influences. Sample comparisons between native students and the different racial categories of immigrant students can be seen in Table 3.10 below. While, uniformly, all categories of immigrant students proved to be less disruptive than their native peers (providing support for the trends outlined in literature that immigrants in the US often place higher-than-native value on education, that a high appraisal of the value of education is often transmitted from immigrant parents to their children, and that immigrant students may be accustomed to more strict, demanding, or rigid academic environments) only immigrant students of Asian race outperformed natives academically to a statistically significant degree. This could, in turn, suggest that, while Asian immigrant students may be

less disruptive than native students (thus providing a sense of calm and order, and improving native Self-Belief and LOC), their notably superior academic performance simultaneously lowers native confidence regarding their own academic abilities and chances of success. It is possible that the positive and statistically significant effects of Hispanic and White immigrants were a result of them being less disruptive, together with performing at more similar academic levels to their native peers.

Table 3.10. Comparison of Native and Immigrant Racial Groups for Achievement and Disruptiveness

	Percentage share	t-statistic	P-value
High Achievement			
Natives:	**0.061**		
Hispanic Immigrants	0.024	-8.542***	< 2.2e-16
White Immigrants	0.085	1.730*	0.084
Asian Immigrants	0.129	5.944***	3.931e-09
Black Immigrants	0.065	0.223	0.823
Other Immigrants	0.047	-0.592	0.555
Low Achievement			
Natives:	**0.014**		
Hispanic Immigrants	0.006	-3.747***	0.0002
White Immigrants	0.007	-1.478	0.1402
Asian Immigrants	0.002	-6.091***	1.421e-09
Black Immigrants	0.005	-1.4931	0.137
Other Immigrants	<0.000	-14.867***	< 2.2e-16
Disruptiveness			
Natives:	**0.303**		
Hispanic Immigrants	0.224	-7.049***	2.479e-12
White Immigrants	0.155	-8.119***	4.616e-15
Asian Immigrants	0.126	-15.013***	< 2.2e-16
Black Immigrants	0.227	-2.433**	0.016
Other Immigrants	0.129	-4.708***	9.546e-06

Further research, however, is needed to further explore dynamics of race and how similarities and differences are perceived by and between native and immigrant students.

3.6. Robustness Checks

While some parental characteristics, such as parental education, can be relatively simple to measure and control for, other factors such as parental discipline for academic matters (and parental academic attitudes more generally), perceptions on gender roles, the level of education achieved by previous generations, access to out-of-school support such as tutoring, and the role models of high academic achievement children have access to, among others, are far more difficult to observe, measure, and control within estimations.

Consequently, in order to accurately capture the effects of social interaction with immigrant peers, it is necessary to account for both observed *and* unobserved characteristics at the family level. We do this by employing a second empirical strategy, which includes Household Fixed Effects (HFE). Through HFE we hope to eliminate family-level correlates and to leverage the within-family, between-sibling differences in exposure to immigrant peers. This effectively differentiates sibling-invariant observed and unobserved confounding variables, such as genetic influences, family environment, socioeconomic status, etc. We make use of 3,003 individuals in sibling-groups as the unit of observation (and excluding only-children without any siblings, and sibling groups in which siblings attend different schools), as we consider differences in cohort composition (i.e., differences in the concentration of immigrant students across grade levels within a school). This allows us to focus on the implications of the number of immigrants in a student's cohort, while controlling for family background characteristics as well as school characteristics.

We proceed to explore whether the relationship between exposure to immigrant peers during school-age and self-belief is present not only in our general sample, but also between siblings.

Hence, we run additional regressions (Table 3.12, Table 3.13), where we limit our sample to consider the 1,447 sibling groups, comprising a total of 3,003 participants, who answered both W1 and W4 of the survey. As can be seen in Table 3.11, the substantial majority (93%) of sibling groups are comprised of two siblings, however 3+ sibling groups represented 7% of the sample.

Table 3.11. Description of Sibling Sample

	Distribution
2 Siblings	0.927
3+ Siblings	0.071

The sibling strategy used in robustness tests varies slightly from the general specification outlined earlier. The equation for the sibling specification is as follows:

$$\boldsymbol{y_{ij} = \lambda_j + \alpha_s + \delta M_{gs} + \theta C_{gs} + \beta X_i + \varepsilon_{ij}} \qquad \textbf{(Equation 3.2)}$$

In this case, y_{ij} represents one of the dependent variables, however the subscripts denote that dependent variables are measured for individual *i* in family unit *j*. λ_j is a family dummy to control for any possible family-specific cofounders common between siblings. M_{gs} is the number of immigrant students in grade *g* in school *s*, which we divide by 100. C_{gs} is a control for cohort size, and X_i are a series of individual characteristics of the students which aren't captured by the family dummy such as gender, age, and achievement level in school.

The small sample size of the sibling dataset is a significant limitation, resulting in weak statistical significance. However, as we can see in Table 3.12 and Table 3.13 below, the

relationship between exposure to immigrant peers and school-age self-belief remains positive (and, in some cases still statistically significant) when comparing between siblings.

Table 3.12 shows how W1 Self-Efficacy, W1 LOC, and W1 Self-Belief are all positively related to the number of Immigrants in a Cohort, with W1 LOC and W1 Self-Belief being statistically significant at the 5% level. An increase of one immigrant classmate in a cohort yields a 0.4-point increase in W1 Self-Efficacy, a 0.5-point increase in W1 LOC, and a 0.9-point increase in our constructed W1 Self-Belief variable when using the sibling sample. Column 4 shows how a 10-immigrant-student increase in a cohort would increase the likelihood of a native having high W1 Self-Belief by approximately two percentage-points, although this was not found to be statistically significant.

Table 3.12. Effect of Immigrant Classmates on the W1 Self-Efficacy, W1 LOC, and W1 Self-Belief of Natives, Sibling Sample

	(1)	(2)	(3)	(4)
Immigrant classmates (All)	0.374	0.482**	0.855**	0.210
	(0.270)	(0.239)	(0.370)	(0.129)
Total Students in Cohort	-0.002	-0.002*	-0.004**	-0.001*
	(0.001)	(0.001)	(0.002)	(0.001)
Constant	2.011***	2.727***	4.736***	0.210**
	(0.195)	(0.172)	(0.267)	(0.093)
R2	0.187	0.161	0.186	0.165
Observations	3,003	3,003	3,003	3,003

Note: These are the coefficients from regressions in which the dependent variables are W1 Self-Efficacy (Column 1), W1 LOC (Column 2), W1 Self-Belief (Column 3) and W1 Self-Belief binary (Column 4). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Similarly, Table 3.13 shows the positive effects of interactions with immigrant peers during school-age on W4 Self-Belief of native siblings, with the effects on W4 LOC being statistically

significant. An increase of one immigrant classmate in a cohort during W1 resulted in a 0.1-point increase in W4 Self-efficacy, a 0.6-point increase in W4 LOC, and a 0.7-point increase in the constructed W4 Self-Belief variable. Column 4 shows how a 10-immigrant-student increase in a cohort would increase the likelihood of a native having high W4 Self-Belief by approximately two percentage-points, however this was not found to be statistically significant.

Table 3.13. Effect of Immigrant Classmates on the W4 Self-Efficacy, W4 LOC, and W4 Self-Belief of Natives, Sibling Sample

	(1)	(2)	(3)	(4)
Immigrant classmates (All)	0.132	0.592**	0.655	0.218
	(0.261)	(0.264)	(0.398)	(0.133)
Total Students in Cohort	-0.001	-0.002*	-0.003*	-0.001*
	(0.001)	(0.001)	(0.002)	(0.001)
Constant	3.116***	1.799***	4.920***	0.321***
	(0.188)	(0.189)	(0.288)	(0.096)
R2	0.161	0.166	0.167	0.156
Observations	3,003	3,003	3,003	3,003

Note: These are the coefficients from regressions in which the dependent variables are W4 Self-Efficacy (Column 1), W4 LOC (Column 2), and W4 Self-Belief (Column 3), W4 Self-Belief binary (Column 4). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

3.7. Conclusion

There is a growing body of literature arguing that the impact of having immigrant children in the classroom goes beyond traditional educational outcomes. We contribute to that body of evidence by exploring the impact of immigrant classmates on native self-belief, both during school-age and adulthood, an aspect that has so far been largely neglected. In particular, we look at the number of immigrant classmates that a native respondent had, and explore the

association with self-belief during that same school year, as well as during their late 20s and early 30s.

Our results suggest that exposure to immigrant classmates has effects on the self-belief of native students during both school-age and adulthood.

Our exploration of mechanisms provided support for Mechanism 3.1. This Mechanism suggested that interaction with immigrant peers, who often face additional academic obstacles related to integration, could increase native confidence regarding their own academic abilities, mastery of the educational system, and chances of success, consequently increasing their sense of self-belief.

Mechanism 3.2 stipulated that immigrant students would be less disruptive in the classroom than their native peers, and that this would, in turn, result in a greater sense of calm within the learning environment. As a result, native students' sense of control and self-belief would increase. Descriptive analysis of our sample confirmed that immigrants are, generally speaking, significantly less disruptive than their native counterparts, highlighting this variable as the aspect in which native and immigrant students in our data differ the most. Through this finding we identify a possible channel by which interaction with immigrants could potentially improve native self-belief: greater concentrations of immigrant peers could be leading to calmer classrooms and giving students a greater sense of control over their own learning and performance.

Our findings contribute to the field in a number of ways. First, our research shows that, although LOC has traditionally been perceived by as a dispositional attribute which develops

in childhood and subsequently remains static through adulthood, LOC could in fact be modified by life events or environments (April et al. 2012, Galvin et al. 2018, Johnson et al. 2015, Johnson et al. 2016, Ryon and Gleason 2014, Twenge et al. 2004, Wong and Sproule 1984), particularly in cases such as this one, where a potential influence is prologued and constant.

These findings, considered jointly with the growing literature which highlights the benefits of self-belief, also suggest that the positive impact of native immigrant students on their native peers could extend beyond self-belief itself. Self-belief has been found to impact academic aspirations, expectations, and achievement (Ansong et al. 2019, Cheng, Y. 2020, Lindner and Retelsdorf 2020, Phan et al. 2020). However, the impact of self-belief has also been found to extend beyond the academic sphere, with high self-belief being linked to improvements in motivation (Makara-Studzińska et al. 2019, Schunk and DiBenedetto 2021), career performance (Asante and Affum-Osei 2019, Nguyen, L. B. N. et al. 2022), and even health (Kesavayuth et al. 2020, Lin et al. 2023).

Our analysis also invites further investigation into a number of research questions. For example, it encourages a more comprehensive exploration of Mechanism 3.2. While theory and past literature, as well as the results of this paper, would appear to support this mechanism (Emanuelsson and Sahlström 2008, Hutchings et al. 2013, Oliver et al. 2011, Shifrer 2019), further exploration into the classroom dynamics, practices, and behaviors, of both teachers and students, would improve our understanding of the dynamics taking place. Despite the fact that the Add Health data provides rich cohort demographic data as well as a wide variety of possible outcomes/results which we can explore quantitatively, perhaps a more qualitative investigation, with a focus *inside* the classroom, could provide additional depth to our findings.

In addition, further studies which consider alternative measures of self-belief, as our measures (particularly our W4 Self-Belief variable) provide but one approach to the concept, could also enrich the findings of this study. Similarly, additional research which considers the extent to which self-belief then materializes into other academic, career, or personal outcomes would strengthen our knowledge in this field.

4. Exploring Difference: Immigrants in the Classroom and the Imagination of Natives

Abstract

Using data for the United States, we explore how interactions with immigrant peers during school-age can affect native imagination during adulthood. The analysis uses The National Longitudinal Study of Adolescent to Adult Health survey, which includes a nationally-representative sample of students in grades 7 to 12 during the 1994-95 school year. These students were interviewed in four additional waves, covering a period of 24 years. In the analysis, we focus on the impact of differences in the number of immigrants across cohorts within schools. This allows us to consider the implications of the demographic composition of a student's cohort, while controlling for broader school differences and the possibility of self-selection into schools. Our results suggest that exposure to immigrant classmates has positive effects on the adulthood imagination of natives. More specifically, results show that increasing the number of immigrants in the grade by 20 students, would increase the likelihood of reporting a high level of imagination during adulthood by 0.03 (i.e., three percentage-points). Further results suggest that the effect is not coming via direct friendship with immigrant students, but through exposure to multicultural experience in the classroom.

4.1. Introduction

There is a large literature exploring the implications of the presence of immigrant children in the classroom on the educational outcomes of native children (Silveira et al. 2019). While this literature has provided important insights, there is a growing recognition that the impact of having immigrant children in the classroom goes beyond traditional educational outcomes. Impacts on aspects such as mental health, risk behavior, creativity, self-confidence, motivation, ambition, and tolerance have recently become a focus of academic research (Fletcher et al. 2021, OECD 2013, Peguero et al. 2016, Reschly and Christenson 2012). This study contributes to the literature on the broader impacts of immigrant students in schools by exploring the impact on native adult imagination, an aspect that has so far been largely neglected.

The presence of immigrant children in the classroom can increase the exposure of native children to new experiences and ideas, a factor that has been directly linked with imagination (Leung et al. 2008). This experience includes direct interaction with traditional outgroup members, but also interactions with elements of other cultures, such as trying different foods, listening to different types of music, or learning about different geographies (Tadmor et al. 2017).

Imagination develops in children from an early age and there is a large academic literature suggesting that it plays a key role in future learning and capacity for problem-solving, abstract thinking and creative thinking during adulthood (Duffy 2006, Fleer 2011, van Oers 2005). For instance, Witt (1998) explains that imagination plays a key role in considering alternatives in any given situation in terms of the theory of the firm. Individuals create alternatives in an imaginative act by linking their experiences, subjective understanding, and contextual

information. This creates a difference between imagination, the mental act of coming up with alternatives, and judgement between alternatives that are already given to an individual, and relates to a large literature linking entrepreneurship and cognition (Grégoire et al. 2011).

The power of imagination has applications beyond the business world, including a key role in areas such as policy creation (Pereira et al. 2019), arts (Dominguez Rubio 2020), and literature. For instance, children's book author J.K. Rowling argues:

> Imagination is not only the uniquely human capacity to envision that which is not, and therefore the fount of all invention and innovation. In its arguably most transformative and revelatory capacity, it is the power that enables us to empathise with humans whose experiences we have never shared. (Rowling 2008)

Given the major potential benefits of greater imagination, it is important to understand how interactions that occurred during school-age, including interactions with immigrant peers, affect imagination during adulthood.

Consequently, in this paper, we explore the following specific research question:

Does the presence of immigrant students in US classrooms affect the imagination of their native peers during adulthood?

In addition, we explore the mechanisms through which this influence occurs and the roles of demographic factors such as race.

In order to explore how interactions with immigrant peers during school-age affect the imagination of natives during adulthood, we use The National Longitudinal Study of Adolescent to Adult Health survey (Add Health) (Harris 2018). This is a longitudinal study in the United States (US) that includes a nationally representative sample of students in grades 7 to 12 during the 1994-95 school year. The students were interviewed in four additional waves, covering a period of 24 years. The survey collected detailed information on family characteristics and school composition, as well as information on friendships of respondents during school-age. Importantly for our study, the fourth wave of data collection gathered information on self-reported imagination, at a time when respondents were 24 to 32 years of age.

In the analysis, we focus on the impact of differences in the number of immigrants across cohorts within schools. This allows us to focus on the implications of the demographic composition of a student's cohort, while controlling for broader school differences and the possibility of self-selection into schools.

Our results suggest that exposure to immigrant classmates has small, yet positive effects on the adulthood imagination of native respondents. More specifically, results show that increasing the number of immigrants in a grade by 20 students, would increase the likelihood of reporting a high level of imagination by 0.03 (i.e., three percentage-points).

Additionally, when exploring the channels by which immigrants could affect native imagination, results showed that the effects of having a close immigrant friend, as well as the share of close friends who are immigrants, were statistically insignificant, suggesting that the effect is not coming via direct friendship but through exposure to diverse experiences and ideas

in the classroom. The evidence also suggests that the effect of immigrant classmates on imagination is greater for White native students than for native students of other races.

4.2. Literature Review and Conceptual Background

In order to provide a conceptual background for our study we have combined two different strands of the literature: (1) the impacts of immigrant classmates on the traditional educational outcomes of natives, and (2) the development of imagination.

4.2.1. Immigrant Effects on Traditional Educational Outcomes

The literature exploring the impact of immigration on educational outcomes is extensive. Some studies suggest that the presence of immigrants has a positive impact on native children, including increasing the likelihood of school completion (Hermansen and Birkelund 2015) and academic effort (Fletcher et al. 2021). Yet, other studies suggest that the impact is not necessarily positive and, in some cases, even negative (Brandén et al. 2019, Brunello and Rocco 2013, Gould et al. 2009, Hardoy et al. 2018, Jensen and Rasmussen 2011).

One reason for the diversity of results is that studies have focused on different aspects. For instance, a series of studies have focused on the role of programs for disadvantaged students. These studies argue that with large increases in immigration, the amount spent per economically disadvantaged student decreases due to the rapid immigration–induced expansion in the number of eligible children (Fix and Zimmermann 1993). This impact is particularly important for minority students (Betts, J. 1998), i.e., those more likely to participate in special programs for disadvantaged children.

Others argue that there are positive spill-over effects of immigrant-targeted educational programs, as well as lowered teacher expectations, which facilitate native attainment (Chin et al. 2013, Hunt 2017). However, higher attainment outputs might not always translate into better education (more knowledgeable native children). It is possible that student competency and knowledge of a subject could decrease because of lowered teacher expectations.

Finally, some studies have focused on the implications of immigration for the future-oriented educational choices of native youth (Brunello and Rocco 2013, Eberhard 2012, Jackson 2015, McHenry 2015, Tumen 2019). Here, authors have suggested that young natives can use information regarding the future expected market price of certain skills in order to guide their educational decisions. Natives can pursue additional years of education or gravitate towards occupations that would complement, rather than compete with immigrants.

Overall, there is a substantial number of mechanisms by which immigrant classmates can affect the educational outcomes of natives and the evidence has provided mixed results. However, there is consensus that experiences during childhood, including the demographic composition of the child's school cohort, do, in fact, have important long-term implications for educational outcomes. In the same way, we could expect that demographic composition to impact other aspects that go beyond traditional educational metrics.

There is a large literature exploring peer effects on social outcomes, with emphasis on aspects such as criminal behavior, alcohol, and drug consumption, as well as smoking. The evidence suggests that peer effects on social outcomes tend to be larger than the effects on academic outcomes (Sacerdote 2011). A smaller literature explores the implications of peer effects on non-achievement academic traits such as curiosity, perseverance and risk-taking (Buechel et

al. 2018, Gardner and Steinberg 2005). Yet, there is less evidence on these types of outcomes in relation to the presence of immigrant peers in the classroom and, in particular, no evidence (with the exception perhaps of Leung et al. (2008) who focus on creativity) of this for the concept of imagination as we do in this paper.

4.2.2. The Development of Imagination

Early literature categorized imagination into two subtypes: reproductive imagination and creative imagination (Betts, H. G. 1916). Reproductive imagination refers to the ability to produce mental images from descriptions of reality, as well as from abstract or ambiguous recollections. Creative imagination focuses on initiative and originality, including exploring unknown concepts, formalizing ideas through focus, and generating associations (Liang et al. 2012).

In this paper, we consider both subcategories as valuable manifestations of imagination, and consequently, adopt the more general definition, suggested by Tamar Kushnir (2022), of imagination as the 'act of generating, from bits of old knowledge, new ideas, and new possibilities'. This definition, to a great extent, aligns with the definition of imagination in the Merriam-Webster Dictionary (2023) ('an act or power of forming a mental image of something not present to the senses or never before wholly perceived in reality'), as well as the definition in the Oxford Dictionary of Philosophy (2023) ('the ability to create and rehearse possible situations, to combine knowledge in unusual ways, or to invent thought experiments.')

Imagination can be seen from early childhood, as toddlers begin to build their knowledge of the world, develop the ability to simulate alternatives to current reality, and engage in pretend play (Atance 2015, Hoff 2013, Kushnir 2022, Redshaw et al. 2019).

The focus of studies exploring the determinants of imagination and creativity has shifted through history. In the first half of the 20th century, research efforts were primarily individual-based with a strong focus on cognitive neuroscience, and with social interactions and cultural psychology often being perceived as playing a secondary role (Dietrich 2004). However, in recent decades research has increasingly focused on the possible influences of an individual's environment.

Since its translation and re-publication in 1995, Vygotsky's theory of imagination and creativity (Vygotsky 2004) has become a widely recognized socio-cognitive framework in educational literature (Lindqvist 2003). An appealing theory in the field, it offers a variety of factors, mechanisms, and processes through which an individual's imagination and creativity could be shaped and triggered.

According to Vygotsky, four key associations exist between imagination and reality: (1) imagination influenced by personal experience; (2) imagination influenced by the experience of others; (3) imagination influenced by emotion; and (4) crystalizing imagination (the materialization of imaginative ideas into real life).

In addition to these associations, Vygotsky's theory of imagination and creativity also outlines four basic processes needed for imaginative thought to take place. First, an individual accumulates material which they will subsequently construct into imaginative thoughts or

fantasies. After gathering material, processes of dissociation, change, and association take place. An individual's ability to gather, break apart, modify, and re-associate impressions (Vygotsky's term for images, thoughts, and experiences), will be key in determining that individual's imaginative potential.

In Vygotsky's theory of imagination and creativity, every impression is considered a 'whole' which is, in turn, comprised of individual parts. During dissociation processes, the whole is separated into these parts, with some parts being retained and others forgotten. The isolation of individual components, and the retainment of some of these parts, is considered essential to abstract thinking and concept formation. The process of dissociation is followed by a process of change, during which exaggeration, minimization, or other modification of individual elements of an impression result in the impression being transformed. Emotions and internal feelings may often influence how an individual transforms parts of an impression. The final process of imagination is association, which involves the re-combination of previously dissociated and transformed elements. The recombination of images, and their merging into a unified, complex picture is the final step in the process of creative imagination.

According to Vygotsky, the extent to which the above-mentioned processes are able to take place can depend on a variety of psychological factors. While Vygotsky's theory acknowledges the role that certain biological traits (such as combinatorial abilities, cognitive functioning, and even stages of brain development) can play in imaginative thought, it also highlights other non-cognitive factors, such as the environment.

According to this theory, when an individual's environment does not present challenges and their inherent reactions are in complete equilibrium with the surrounding world, there is little

incentive to trigger imaginative thought. The need to adapt is what gives rise to needs and interests, which, in turn, require creative thought and imagination in order to be satisfied. Thus, as Vygotsky states, 'the desire to create is inversely proportional to the simplicity of the environment' (Vygotsky 2004, p. 30).

The role of age and brain development is also emphasized in Vygotsky's theory, which argues adolescence is a key stage with potential for powerful enhancement in imagination. The theory suggests that, as physical maturity is approached by adolescents, imagination too matures. This transitional period between childhood and adulthood offers the first instances of 'mature fantasy,' with an individual having gathered enough variety in experiences, developed more permanent interests, and having developed the ability to analyze relations between people in different contexts. In addition, the instability brought on by the very sudden physical and psychological changes during adolescence (which Vygotsky describes as a 'crisis') provides the necessary challenges to trigger imagination.

Literature in the field of socialization of attitudes has also highlighted the importance of adolescent years for the development of long-term priorities, beliefs, and even cognitive abilities/behaviors. As Inglehart suggests in his seminal socialization hypothesis, 'people tend to retain a given set of value priorities throughout adult life, once it has been established in the formative years' (Inglehart 2015, p.23). The formative years (or impressionable years) hypothesis has since explored the relationship between age and attitude formation quite extensively, with overall consensus that individuals are most flexible and open to competing ideas and attitudes during adolescence, and that experiences that occur during this time (as well as the social context in which an individual is immersed) can have a profound, long-lasting impact on the person (Campbell 2016, Dinas 2013).

The last two decades since Vygotsky's landmark publication have seen not only the emergence of sociocultural psychology as a mainstream concept in the social sciences, but also its growth in importance and recognition. This has led to a more balanced approach to the study of imagination, an approach which considers both individual-level factors as well as social and environmental determinants. Scholars (Fuentes 2017, Glaveanu et al. 2020, John-Steiner 1992, John-Steiner 2006, Richardson and Mishra 2018) have increasingly explored collaborative creativity and the role of peers and groups in the imaginative process. More and more often, research has focused to a great degree on real-life, long-term influences, with concepts such as the Vygotsky's 'zone of proximal development' (i.e., the idea that development is driven by collaborations with more capable others) (Eun 2019, Vygotsky 1978), and Bruner's notion of 'scaffolding' (Bruner 2020, Ertmer and Glazewski 2015, Reiser 2004, Wood et al. 1976), not only being referenced in literature, but increasingly being used in teacher training and practice.

The result from this shift in conceptualization of imagination, and the gradual acceptance of the potential importance of environmental and social factors in its development, has resulted in the emergence of the Social Cognition Approach (SCA), also referred to as the Creative Cognition Approach. SCA provides a more recent theoretical framework for researchers to consider the interaction between individual-level determinants of imagination and creativity as well as the social and environmental influences taking place (Dunne 2017).

Under the SCA, and echoing Vygotsky's original theory, divergent thinking and the generative process are thought to be driven by dynamics of conceptual expansion – a cognitive process in which the boundaries of a concept are extended through its combination with another seemingly irrelevant concept (Leung and Chiu 2010), as well as cognitive flexibility – meaning

the ability to create novel associations between concepts by breaking old cognitive patterns (Ritter et al. 2012). In order to prompt creativity and imagination, an individual can develop an increased variety and amount of knowledge through both experience and learning. More specifically, this can be done through exposure to new forms of social organization, different knowledge sets, alternate value systems, and even contrasting approaches to problem solving (Chao et al. 2015, Dunne 2017).

Both Vygotsky's theory of imagination and creativity, as well as the more recent SCA, concur in their claim that, in addition to individual-level neurological and cognitive abilities, a child's parents, teachers, and peers, as well as their school and non-school environments can have important impacts on the child's imaginative abilities.

Recent research has, to some extent, attempted to explore these links between imagination and social interactions. Some scholars have suggested that, in adults, imagination could be linked to our efforts and ability to understand our social lives and identities (Gaither 2015, Kushnir 2022, Saad et al. 2013). In children, recent efforts have focused on exploring the link between actions/experiences, causal knowledge, and social meaning-making, with literature showing that an experience of physical agency can influence an infant's interpretation on physical possibilities (Behne et al. 2005, Brandone and Wellman 2009, Gergely and Csibra 2003, Sommerville and Woodward 2005).

4.2.3. The Impacts of Immigrants on the Imagination of their Native Classmates

Exposure to different ideas and experiences

It is possible to think about several ways in which interactions with immigrant classmates could impact the imagination of native children. We focus on one aspect: exposure to new ideas and experiences. Based on the premise that both the environment and social interactions can significantly affect an individual's imagination, we consider literature specific to the relationship between exposure to different experiences and imagination, to determine the extent to which interaction with immigrant peers could impact natives. However, we also discuss some other mechanisms by which the presence of immigrants can affect the imagination of native children, including adjustments from teachers.

Drawing from SCA, Leung et al (2008) summarize channels through which exposure to different experiences can contribute to the expansion of an individual's creative imagination: (a) by providing direct access to novel ideas and concepts from other cultures; (b) by creating the ability to see multiple underlying functions behind the same form; (c) by destabilizing routinized knowledge structures, thereby increasing the accessibility of otherwise inaccessible knowledge and creating a psychological readiness to recruit ideas from unfamiliar sources; and (d) by promoting readiness to synthesize seemingly incompatible ideas.

Focusing more specifically on the generative process, exposure to different experiences and ideas may contribute to the development of imagination if they facilitate exposure to different perspectives. The new ideas and behaviors may act as inputs for creative expansion processes, as they allow for innovative combinations of previously non-overlapping concepts (Leung et al. 2008, Leung and Chiu 2010, Weisberg 1999).

The generative process of imagination may also benefit from different experiences through the development of the ability to see that the same surface behaviors can have different functions

and implications. Those with exposure to different experiences can be more likely to see the same behavior (for example, food left over on a plate, a smile, a particular way of dressing) as having dynamic functions and multiple possible meanings (Chiu and Hong 2005, Galinsky et al. 2006, Leung et al. 2008). In a similar manner, exposure to different experiences could also help an individual consider multiple perspectives in response to the same problem (Leung et al. 2008, Tadmor et al. 2009). In other words, in these situations, encounters may provide experiences through which traditional thinking styles or patterns are destabilized and a more flexible mindset is introduced (Chao et al. 2015).

Research suggests that the exploratory process could also be positively affected by exposure to different experiences and ideas. More specifically, interaction with different experiences could result in confrontation with values and perceptions different to those with which an individual has been raised. Having acquired and successfully applied formerly incongruent ideas from others with different backgrounds, individuals with these rich diverse experiences may also show an increase in psychological readiness to recruit and seek out ideas from diverse sources and use them as inputs in the creative process. This may allow for continued exposure to a wide range of new ideas, norms, and practices (Leung et al. 2008).

Simultaneously, immigrant students may bring values and beliefs very different from, or even in conflict with, those in an individual's own upbringing. Because incongruent concepts provoke exploration into their interrelations, the process of resolving incongruent ideas may lead to greater cognitive complexity in those with more exposure to different experiences than in those who have had less exposure to diversity (Tadmor and Tetlock 2006). As is suggested by Hoever et al. (2012) and others (Seelig 2012, Tadmor et al. 2012), 'integrative complexity' (the willingness to acknowledge the legitimacy of competing perspectives on the same issue

and to establish conceptual links between them) is an important determinant of creativity and imagination, as it allows individuals to frame problems flexibly and consider several solutions without bias.

Other Mechanisms

The literature above provides ample support for the premise that multicultural classroom environments and interaction with immigrant peers could have positive impacts on the imagination of native students. However, there could be other mechanisms by which immigrant peers affect the imagination of natives (mechanisms outside of the diversity-multicultural experience-imagination link).

For instance, previous literature highlights the importance of teacher effects in student academic outcomes, and a significant amount of work has explored, specifically, the effects of teacher characteristics on creativity and imagination (Fallon and Goetz 1975, Hong et al. 2009, Hosseini and Watt 2010, Karwowski et al. 2015, Kraft 2019, Paek and Sumners 2019). Thus, it is also possible that high concentrations of immigrant students could first have an impact on teachers (e.g., priorities, approaches to material and strategies in the classroom), and subsequently impact native students *via* their teachers.

Hypotheses

Considering the discussion above, we develop a series of hypotheses for our study:

Hypothesis 4.1: ***An increase in the number of immigrant peers in the classroom will increase the imagination of natives.***

This hypothesis is based on the premise that the presence of immigrants can increase exposure to different experiences and ideas in the classroom and that there is ample evidence linking this exposure with imagination.

Hypothesis 4.2: ***An increase in the number of immigrant peers in the classroom will lead to smaller increase in the imagination of non-White native students compared to White native students.***

This hypothesis is based on the premise that the impact of exposure to different experiences and ideas should be greater for White native students – who do not necessarily have the same exposure to non-majority ideas and experiences at home. Note that we expect greater exposure to different experience and ideas in the classroom to affect all students, including those with a non-White background, but expect the effect to be stronger for those with less exposure to non-mainstream experiences at home.

Hypothesis 4.3: ***An increase in the number of immigrant peers in the classroom will lead to greater increase in the imagination of those natives with close immigrant friends during school-age.***

This hypothesis merely states that greater connection to immigrant students will result in greater exposure to different experiences, ideas and, subsequently, imagination. Those who are close friends might be invited to their homes more often and interact more in general.

4.3. Data

4.3.1. Description of the Data Used

The National Longitudinal Study of Adolescent to Adult Health (Add Health) survey is a longitudinal study conducted in the US (Harris 2018). The first wave was conducted in the academic year 1994-95 and it included a nationally-representative sample of students in grades 7 to 12. There were four additional waves of the survey in 1996, 2001–02, 2008, and 2016-18. In this study, we focus on the first wave of the survey when students were in high school, and the fourth wave of the survey (2008) when respondents were 24 to 32 years of age. From the first wave we collect information regarding individual, family, community, and school cohort characteristics, and from the fourth wave we collect the information on imagination.

For the purposes of this paper, we define 'immigrant' students as those who were born abroad, or those born in the US to at least one foreign-born parent (i.e., first and second generation immigrants). We consider all students who do not fall under this definition of 'immigrant' (i.e., all students who were born in the US to two US-born parents) as 'natives.' In the sample, we limit the analysis to native respondents. As a result, we consider a sample of 9,306 native respondents that we can observe in both waves, and who responded to all questions relevant for this analysis. These respondents attended 127 different schools, spread across the country.

As shown in Table 4.1, most students were aged 14 to 18 during the first interview and the majority of respondents were White. A slight majority of students came from families in which the mother had high school education or less, but close to half of students indicated that their mother would be very disappointed if they did not attend university. Finally, close to 10% of families received assistance from welfare programs.

Please see Appendix 9 for a detailed description of all the variables included in the estimation.

Table 4.1. General Characteristics of the Sample

Variable		Distribution or Mean
Immigrants in Cohort		18
Total Students in Cohort		68
Sex – Male		0.465
Race	White (non-Hispanic)	0.658
	Hispanic	0.072
	Black (non-Hispanic)	0.247
	Asian (non-Hispanic)	0.012
	Other (non-Hispanic)	0.010
Age		
	12	0.002
	13	0.084
	14	0.138
	15	0.170
	16	0.189
	17	0.189
	18	0.169
	19	0.053
	20	0.004
	21	0.0005
High Achievers		0.065
Mother's Educational Attainment		
	High school or less	0.540
	Some college	0.197
	College or more	0.262
Mother's Educational Expectations of Their Child		
	5 - Very Disappointed	0.493
	4	0.186

	3	0.187
	2	0.062
	1 - Not at all Disappointed	0.071
On Benefits		0.099

4.3.2. Dependent Variable

We consider W4 self-reported imagination of participants. Our W4 Imagination dependent variable was constructed from the following Add Health W4 survey question:

> *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination*.

Response options for this question ranged from '1 – Strongly Agree' to '5 – Strongly Disagree.' We dichotomized this variable and assigned high imagination (responses of '5 – Strongly Disagree') to one category (= 1) and all other responses to another category (= 0). Participants who perceived they had a good imagination represented 22% of the sample.

Note that this variable reflects the self-perception of having a good imagination, rather than an objective evaluation of this by another person. Hence, the results of our paper should be interpreted in that way (i.e., self-perceptions). While, ideally, any measure of imagination would combine self-reporting with imaginative tasks or other performance-based measures – and this is certainly a recommendation for future research – ample literature suggests that self-reported measures can provide a good indication of actual imaginative performance (Batey et al. 2010, Furnham et al. 2008, Silvia 2008, Silvia et al. 2012).

Nonetheless, we recognize some limitations in this self-reported variable. First, that participants' understanding of the concept of 'imagination' may differ from the academic definition of the concept which we have reviewed in the literature. This is, in part, a strong motivation for us selecting the question '*How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination'* as our main dependent variable for analysis, instead of an alternative question available for use in the W4 survey which reads '*How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have a vivid imagination*.' We believe including 'vivid' in the phrasing of the question would encourage participants to consider only imaginative exercises which produced possible or non-fantastical thoughts; whereas phrasing the question with 'good' instead of 'vivid' would prompt participants to also evaluate the extent to which they produce imaginative ideas with expanding outside the physical and realistic possibilities of their world. We do, nonetheless, use the 'vivid' phrasing of the question as a robustness test (which we label W4 Vivid Imagination).

We also recognize the possibility that our selected question for the measurement of imagination (*How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination*) could be capturing – or be related to – other participant qualities, such as confidence or self-concept, as opposed to imagination itself.

In choosing our dependent variable we also consider the significant overlap between the concept of imagination as we make use of it, and the concept of 'Openness' in the widely-used 'Big Five' categorization of Personality Traits (De Pauw 2017, Sutin 2017). Imaginative thought is, in fact, often identified as a component of (if not completely synonymous with) the

Openness trait in the Big Five, with some scholars even suggesting that the Openness trait be re-labelled as 'Imagination' (DeYoung 2014, Saucier 1992, Saucier 1994).

We argue, however, that the overlap between these two concepts supports and strengthens our choice of dependent variable. The NEO Personality Inventory, a widely-recognized instrument for the measurement of Big Five traits, also requires individuals make self-assessments of their own imagination, explorative nature, intellectual curiosity, and tolerance to ambiguity (Costa and McCrae 1991, McCrae 2004). Similarly, the Rokeach Value Survey, another widely-recognized personality assessment instrument, asks individuals to self-assess and rank the degree to which they value being imaginative (Rokeach 1973).

Nonetheless, looking to address possible concerns about the validity of our dependent variable, we carry out a brief analysis to consider the relationship between our 'W4 Imagination' variable and other possibly relevant variables (including other survey questions which resemble survey items in the NEO Personality Inventory). We describe the considered variables in Table 4.2 below, and subsequently consider their relationship with our selected 'W4 Imagination' variable in Table 4.3.

Table 4.2. Description of Variables Possibly Related to W4 Imagination

Variable	Description	Mean
W4 Understands Abstract Concepts	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have difficulty understanding abstract ideas.* We dichotomized this variable, with participants expressing strong disagreement (5) being coded as 1, and all others coded as 0.	0.088
W4 Vivid Imagination	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have a vivid imagination.* We dichotomized this variable, with participants expressing strong agreement (1) being coded as 1, and all others coded as 0.	0.198
W4 Interested in Abstract Concepts	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I am not interested in abstract ideas.* We dichotomized this variable, with participants expressing strong disagreement (5) being coded as 1, and all others coded as 0.	0.081
W4 Creative Job	Question asking participants what their current job is. We then code responses as a binary variable where occupations traditionally considered creative/imaginative are coded as 1, and all others as 0. See Appendix 13 for a full list of occupations included.	0.024
W4 Perceived Relative Intelligence	Question asking participants the following statement: *Compared with other people your age, how intelligent are you?* Response options ranged from '1- Moderately below average' to '6- Extremely above average'. We dichotomized this variable, with participants expressing high perceived intelligence (5 or 6) being coded as 1, and all others coded as 0.	0.326
W4 Number Recall Test	Test where participants receive the following instructions*: I am going to say some strings of numbers, and when I am done I would like you to repeat them backwards, in the reverse order from which I said them. So if I said '3, 8,' you*	0.225

	would say '8, 3.' Do you understand? The sets will get larger as we go. Scores Range from 0 to 7. We dichotomized this variable, with participants with scores of 6 or 7 being coded as 1, and all others coded as 0.	
W4 Word Recall Test	Test where participants receive the following instructions*: I am going to read a list of 15 words. Listen carefully. When I am finished, you are to repeat as many of the words as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can. I will say each word only one time, and I cannot repeat any words. Do you have any questions? Are you ready? (The list of 15 words is displayed on the screen at 1 second intervals. After the last word is displayed the following text appears below the word list for the interviewer: 'Now tell me as many words as you can remember.' The computer counts down 90 seconds during which the respondent recalls the words.* Scores range from 0 to 15. We dichotomized this variable, with participants with scores of 8 or higher being coded as 1, and all others coded as 0.	0.123
W4 Arrogance	Constructed variable where 1 indicates participants ranked themselves as highly intelligent in the Perceived Relative Intelligence question above, but did not score as highly intelligent in the Number Test above.	0.226
W4 Perceived Relative Success	Question asking participants: *Think of this ladder as representing where people stand in the United States. At the top of the ladder (step 10) are the people who have the most money and education, and the most respected jobs. At the bottom of the ladder (step 1) are the people who have the least money and education, and the least respected jobs or no job. Where would you place yourself on this ladder? Pick the number for the step that shows where you think you stand at this time in your life, relative to other people in the United States.* We dichotomized this variable, with participants ranking themselves as 7 or higher being coded as 1, and all others coded as 0.	0.185

Table 4.3. Relationship Between 'Good Imagination' and Other Potentially-Related Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
W4 Understands Abstract Concepts	0.516***								
	(0.012)								
W4 Vivid Imagination		0.510***							
		(0.008)							
W4 Interested in Abstract Concepts			0.493***						
			(0.013)						
W4 Creative Job				0.201***					
				(0.024)					
W4 Perceived Relative Intelligence					0.173***				
					(0.008)				
W4 Arrogance						0.146***			
						(0.009)			
W4 Number Recall Test							0.053***		
							(0.009)		
W4 Word Recall Test								0.034***	
								(0.011)	
W4 Perceived Relative Success									0.049***
									(0.010)
Constant	0.178***	0.122***	0.183***	0.218***	0.166***	0.190***	0.211***	0.219***	0.214***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
R2	0.223	0.338	0.204	0.106	0.138	0.121	0.103	0.102	0.101
Observations	9,306	9,306	9,306	9,306	9,306	9,306	9,306	9,306	9,306

Note: These are the coefficients from regressions in which the dependent variable is a dummy indicating a high level of imagination. We consider the relationship between the W4 Imagination variable we use in our main estimations and a variety of other possibly-related variables such as: self-reported understanding of abstract concepts (Column 1), self-reported vivid imagination (Column 2), self-reported interest in abstract concepts (Column 3), having a creative job (Column 4), perceived intelligence relative to others (Column 5), Arrogance (Column 6), performance on a number recall test (Column 7), performance on a word association test (Column 8), and perception of their general success relative to others (Column 9). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Table 4.3 shows a positive, statistically significant relationship between our W4 Imagination variable and the other nine potentially-related variables selected. This is expected, as imaginative abilities, cognitive abilities, and self-concept do not exist in isolation of each other. However, it is worth noting that the relationship is strongest for the variables related to the understanding of and interest in abstract concepts (Columns 1 and 3, respectively), as well as for the W4 Vivid Imagination variable (Column 2). A weaker relationship is found between our selected imagination variable and W4 Perceived Relative Intelligence (Column 5) and W4 Ladder of Success (Column 9), or with the more external measures of W4 Arrogance (Column 6), performance on the number recall test (Column 7), and performance on the word recall test (Column 8).

The stronger relationship found in Columns 1 – 4 would suggest that our W4 Imagination variable is, in fact, capturing a unique element of imagination and creative thinking, as opposed to mere intelligence or self-belief/confidence.

Table 4.4. Mean of Dependent Variable

Variable	Mean
Good Imagination	0.224

4.4. Methods

4.4.1. Empirical Strategy

The main analysis consists of a series of regressions along the following lines:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta C_{gs} + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 4.1)}$$

In this case, y_{igs} is the W4 Imagination variable explained above for student i in grade g in school s. α_s represents a school dummy variable to control for differences across schools, and M_{gs} represents the number of immigrant students in grade g in school s. We adjust this number by dividing by 100. C_{gs} is the total number of students in grade g in school s, and R_i is an indicator of the racial group of the student with the White group as the reference category. X_i are a series of other characteristics of the student and their family which we deem important to control for, and which we discuss, in greater detail, in Section 4.4.2 below.

Our main interest from Equation 4.1 is on δ which provides information on the impact of one additional immigrant classmate on the likelihood of having a high imagination, once we control for school differences and the number of total students in a given cohort. According to Hypothesis 4.1 we expect δ to be positive.

In addition, we estimate:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta C_{gs} + \sum_{i=1}^{4} \rho_i R_i + \sum_{i=1}^{4} \pi_i M_{gs} R_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 4.2)}$$

In this case, we are interested in the coefficients for π_i, which reflect the interaction between the number of immigrant students in the classroom and the racial categories of natives. Given that White is the reference category, according to Hypothesis 4.2, we expect the π_i coefficients to be negative. That is, the effect of immigrant classmates should be smaller for non-White students. Note that in this case, we still expect to find an overall positive effect (i.e., positive δ).

Finally, we estimate:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta C_{gs} + \sum_{i=1}^{4} \rho_i R_i + \tau F_i + \gamma M_{gs} * F_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 4.3)}$$

In this estimation, we are interested in exploring Hypothesis 4.3, which relates to the impact of having close immigrant friends in school. In order to explore this, we use information from the first wave of the survey, in which students are asked to nominate their ten closest friends. We create two variables with this information. First, we create a dummy variable representing having a close friend who is an immigrant. Second, we create a variable that reflects the share of close friends who are immigrants. We then include these variables in the estimation (F_i), including an interaction with the number of immigrants in the classroom. Close to a quarter of students did not report information on their best friends, therefore, the sample for this estimation decreased to 6,359 students. According to Hypothesis 4.3, we would expect γ to be positive.

4.4.2. Controls

As mentioned above, X_i in our empirical strategy represents a series of controls for the students and their parents, which we deem important to control for in order to be able to establish a stronger causal relationship between interaction with immigrant peers and native imagination.

As was summarized above, according to SCA one could foster imagination in an individual by promoting one or more of the following: new personal experiences, new experiences through others, new or powerful emotions, and new environmental challenges or opportunities for

adaptation. In addition, imagination may be influenced by the biological factors such as innate cognitive ability (to dissociate, modify, and associate parts of an impression), as well as the physical change brought on by adolescence. Consequently, when looking to evaluate the extent to which exposure to immigrant peers affects imagination, we aim to control for other factors and mechanisms which could simultaneously affect the imagination of natives. A more detailed description of all control variables, and their distributions, can be found in Appendix 9.

Individual Controls:

At the individual level, we control for gender, age, and race, as these may all affect physical and cognitive development, and as a result, imaginative capabilities. We attempt to control for intelligence and biologically-determined cognitive ability through a school achievement variable (High Achiever, a binary variable indicating the student received an A across all four core subjects in school).

Parent Controls:

We include a binary variable representing whether a student's parent participated in a welfare assistance program (On Benefits), as an indicator of socioeconomic status. With ample literature suggesting parental influence could be key in shaping a child's imaginative abilities, we also control for mother's educational attainment and the mother's academic expectations of their child (the degree to which a mother would be disappointed if a child did not complete university).

School Control:

In our estimation, α_s plays the role of controlling for unobserved differences across schools and the possibility of self-selection into particular schools (Arieli et al. 2016). By controlling for unobserved differences across schools, our analysis focuses on within-school variation in the number of immigrants per grade (M_{gs}).

This is important for our estimation because factors such as general school quality, availability of resources, or teacher experience could significantly bias our results if they were to be correlated with the concentration of immigrant students in a given school while simultaneously affecting imagination (Brandén et al. 2016, Brandén et al. 2019, Clotfelter et al. 2005, Hanushek et al. 2004). This would represent a selection problem and as well as an endogeneity problem.

In response, our primary specification uses School Fixed Effects (SFE). By exploiting differences in cohort composition within schools, we are able to address the problem of unobserved school heterogeneity, controlling for broader school differences (such as resources, teacher quality, average class size). This also allows us to account for circumstances in which parents purposely select a school for their children based on its demographic composition (with parents being able to observe which schools are 'better' or 'worse-suited' for their child), as well as situations in which children from a particular geographical area are assigned to a district/local school. This approach assumes that the characteristics of specific cohorts are not only more random, but also more difficult to observe by parents.

4.4.3. Alternative Specifications

We assume that the majority of students within a school live in the same community, or communities which are relatively similar. In this scenario, including a school dummy variable as we do in the SFE approach described above would also control for most community/environmental factors which influence an individual's imagination. Nonetheless, we entertain the possibility that students within the same school could live in significantly different communities, and consequently be presented with additional challenges and opportunities for adaptation, affecting their imagination. We consider a number of alternative specifications which include additional controls for the characteristics of the community in which each individual resides (measured at the Census Tract level), including: poverty level (proportion of persons with income in 1989 below poverty level), average educational attainment (proportion aged 25 years and over with university degree or more), unemployment rate, proportion of the population which was foreign-born, and proportion of the population which was White.

While we acknowledge that teacher influence may be a highly significant factor in developing the imaginative abilities of children (Van den Broeck et al. 2020, Van Houtte and Demanet 2016), the Add Health dataset did not include cohort or classroom-level teacher data. Consequently, we were not able to control for teacher characteristics more specifically than at the school-level. Nevertheless, we attempted to capture the extent to which each individual student had a positive relationship with their teachers by carrying out an alternative specification which controlled for responses to the question 'How often have you had problems getting along with your teachers?'

The three parental controls described above (socioeconomic status, educational attainment, and educational expectations of their child) should control for a significant amount of the influence

that parents could have on the imagination of their child. Nonetheless, carry out additional specifications which include additional variables to capture the extent to which parents might encourage exploratory, curious, and creative mindsets on behalf of the child, and hence exposure to new personal experiences or new experiences through others. We control for responses to the question 'How often have you and your mother gone to a movie, play, museum, concert, or sports event?' (We label this variable 'Mother Encourages Exploratory Activities') and the extent to which a participants' mother allowed them to make their own decisions about which TV programs they watch (we label this variable 'Mother Encourages Autonomous Curiosity'). There were no significant changes resulting from the addition of the aforementioned controls to our main specifications; as such, we did not include them in this dissertation.

Additionally, we carry out a number of specifications in which we treat our dependent variables as continuous (and hence employ OLS to analyze the relationship between our dependent and independent variables), as ordinal (and consequently employ ordinal logistic regression), and where we fit a logit model instead of OLS.

While the significance and magnitude vary across these specifications, the directionality of relationships remains consistent with the results obtained with the SFE specification selected. The results of these specifications can be found in Appendix 10, Appendix 11, and Appendix 12.

4.5. Results

4.5.1. The Impacts of Immigrant Classmates on Imagination

Table 4.5 presents the results for the estimation of Equation 4.1. First, note that the size of the student cohort (Total Students in Cohort) has a negative impact on the likelihood of reporting a high value for good imagination. Hence, larger cohorts can have a detrimental effect in this regard. Second, and more importantly for our purposes, the results suggest that the presence of immigrants in the classroom (Immigrants in Cohort) has a positive impact on the likelihood of reporting a high imagination. Increasing the number of immigrants in the cohort by 20 students, would increase the likelihood of reporting a high level of imagination by 0.03 (i.e., three percentage-points). This corresponds to our expectations based on Hypothesis 4.1.

In order to explore whether the results are driven by a specific immigrant group, in Columns 2 to 6 of Table 4.5 we repeat the exercise using five groupings of immigrants as Hispanics, Whites, Asians, Blacks and Other-race. Each of the columns in Table 4.5 represents a separate regression, with the coefficient only being statistically significant for Hispanic and Other-race immigrants.

Table 4.5. Effect of Immigrant Classmates on the W4 Imagination of Natives

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.147***					
	(0.056)					
Hispanic Immigrants		0.165**				
		(0.072)				
White Immigrants			0.169			
			(0.159)			
Asian Immigrants				0.122		
				(0.101)		
Black Immigrants					0.157	
					(0.256)	
Other-race Immigrants						0.281**
						(0.125)
Total Students in Cohort	-0.001***	-0.0004***	-0.0002*	-0.0002*	-0.0002	-0.0004**
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Constant	0.068	0.063	0.076	0.078	0.080	0.068
	(0.359)	(0.359)	(0.359)	(0.359)	(0.359)	(0.359)
R2	0.148	0.148	0.147	0.147	0.147	0.148
Observations	9,306	9,306	9,306	9,306	9,306	9,306

Note: These are the coefficients from six regressions in which the dependent variable is a dummy indicating a high level of imagination. The independent variable for Column 1 is the total number of immigrants in a cohort. The independent variable for Columns 2 – 6 is the number of immigrants in different racial groups, in a cohort. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

4.5.2. The Role of Race

Next, we explore the role of the race of the individual respondent. Hypothesis 4.2 suggests that the effect of more immigrants in the classroom, and therefore greater possible exposure to different ideas and experiences, should be smaller for those coming from non-White backgrounds compared to White students. The estimations in Table 4.6 suggest that all the interaction coefficients between race and the number of immigrants are negative as expected based on Hypothesis 4.2. However, the coefficient is only statistically significant for Asian students and students from Other racial groups (i.e., not White, Hispanic, or Black). The difference is not only of statistical significance, but the size of the coefficient is also larger for these groups. This means that we have some support for Hypothesis 4.2, but only for certain non-White groups. There are several potential explanations for the results in Table 4.6. For instance, it is possible that many Black and Hispanic students are closer to mainstream experiences in the US, hence, also gain substantially from the exposure to different ideas and experiences represented by immigrant students.

Table 4.6. Effect of Immigrant Classmates on the W4 Imagination of Natives, with Race Interactions

	(1)
Immigrants in Cohort	0.161***
	(0.057)
Hispanic* Immigrants in Cohort	-0.017
	(0.020)
Asian* Immigrants in Cohort	-0.070**
	(0.033)
Black* Immigrants in Cohort	-0.007
	(0.018)

Other race* Immigrants in Cohort	-0.072**
	(0.036)
Hispanic	-0.012
	(0.020)
Asian	0.006
	(0.053)
Black	0.043**
	(0.017)
Other-race	0.018
	(0.026)
Total Students in Cohort	-0.001***
	(0.0002)
Constant	0.055
	(0.359)
R2	0.149
Observations	9,306

Note: These are the coefficients from a regression in which the dependent variable is a dummy indicating a high level of imagination. The number of immigrants in a cohort is then interacted with native race. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

4.5.3. Friends Versus Classmates

In this section, we explore our results further in order to better understand the channels by which the presence of immigrant students in the classroom affects future imagination. As stated by Hypothesis 4.3, one possibility is that the presence of immigrant students leads to more imagination in natives if they become close friends with immigrant students. As is shown in Table 4.7, the regression coefficients for the two variables we used as indicators of having close immigrant friends (a dummy indicating the participant nominated one immigrant peer amongst their ten top friends, and the share of top friends who are immigrants) are not statistically significant. This is contrary to our expectations based on Hypothesis 4.3. Hence, it seems that

the effect of immigrant classmates is not coming via direct friendship and more related to exposure to different experiences and ideas because of the presence of these immigrants in the classroom.

Table 4.7. Effect of Immigrant Classmates on the W4 Imagination of Natives, with Friendship Interactions

	(1)	(2)
Immigrants in Cohort	0.222***	0.224***
	(0.066)	(0.066)
Immigrants in Cohort * Close Immigrant Friend	0.007	
	(0.016)	
Close Immigrant Friend	-0.022	
	(0.21)	
Immigrants in Cohort * Share of Friends who are Immigrant		-0.015
		(0.084)
Share of Friends who are Immigrant		-0.131
		(0.183)
Total Students in Cohort	-0.001***	-0.001***
	(0.0002)	(0.0002)
Constant	0.210	0.207
	(0.444)	(0.444)
R2	0.152	0.152
Observations	6,359	6,359

Note: These are the coefficients from two regressions in which the dependent variable is a dummy indicating a high level of imagination. In Column 1, the number of immigrants in a cohort is interacted with a binary variable indicating that a native respondent has a close immigrant friend. In Column 2, the number of immigrants in a cohort is interacted with a variable the share of a native respondent's friends who are immigrants. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

4.6. Robustness Checks

In order to show the robustness of the results we conduct two types of exercises. First, we conduct the analysis with a different measure of imagination. Second, we conduct the analysis using a sibling sub-sample to show that the results hold even when we control for differences across families.

4.6.1. Alternative Measures of Imagination

Our original measure of imagination (W4 Imagination) was based on the question:

How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination.

In our alternative measure (which we label W4 Vivid Imagination), we used the following question:

How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have a vivid imagination.

That is, an affirmative version of the previous question, in which the word 'good' is replaced for 'vivid.' As with the previous question, respondents could agree or disagree with the premise on a scale of one to five ('1 – Strongly Agree'; '5 – Strongly Disagree'); we then dichotomize this variable and assign vivid imagination (responses of '1 – Strongly Agree') to one category (= 1) and all other responses to another category (= 0). As shown in Table 4.8, participants who confidently perceived themselves as having a vivid imagination represented 20% of the sample.

This is close to the 22% who indicated having a good imagination based on the previous question.

Table 4.8. Mean of W4 Vivid Imagination

Variable	Mean
Vivid imagination	0.2001

The results from this estimation are presented in Table 4.9. The results suggest dynamics that are broadly in line with those of Table 4.5, Table 4.6, and Table 4.7. We find positive and statistically significant relationships between exposure to immigrant peers during school-age and having a vivid imagination during adulthood (in parallel to Table 4.5). Our interactions with native race differ slightly from those in the original estimation (Table 4.6) as, when using this alternative dependent variable, the coefficients for all race interactions lose statistical significance. The lack of effect of friendship with immigrant peers we witnessed in the original estimation (Table 4.7) is consistent when using this alternative dependent variable.

Table 4.9. Effect Of Immigrant Classmates on the W4 Vivid Imagination of Natives

	(1)	(2)	(3)	(4)
Immigrants in Cohort	0.110**	0.113**	0.179***	0.177***
	(0.054)	(0.055)	(0.064)	(0.064)
Hispanic* Immigrants in Cohort		-0.016		
		(0.019)		
Asian* Immigrants in Cohort		-0.048		
		(0.032)		
Black* Immigrants in Cohort		0.007		
		(0.018)		
Other race* Immigrants in Cohort		-0.026		
		(0.034)		
Immigrants in Cohort * Close Immigrant Friend			0.0002	
			(0.015)	
Close Immigrant Friend			-0.008	
			(0.021)	
Immigrants in Cohort * Share of Friends who are Immigrant				0.031
				(0.081)
Share of Friends who are Immigrant				-0.128
				(0.176)

Total Students in Cohort	-0.0004***	-0.0004**	-0.001***	-0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Constant	0.047	0.037	1.052**	1.052**
	(0.345)	(0.346)	(0.427)	(0.427)
R2	0.143	0.144	0.149	0.149
Observations	9,306	9,306	6,359	6,359

Note: These are the coefficients from regressions in which the dependent variable is a dummy indicating a high self-reported vivid imagination. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

4.6.2. Sibling Estimation

In the previous estimations, we included a series of family control variables including a mother's educational attainment, parental educational expectations of their child, and participation in welfare programs (as an indicator of socioeconomic status). However, it is possible that many family-specific factors remain unobserved. In order to address this possibility, we also conduct an estimation in which we limit the sample to families with siblings. While this creates a biased sample (i.e., there are selection issues related to having more than one child), it allows us to include sibling dummies and conduct a within-families comparison. That is, comparing children from the same family that are in two different grades and, hence, have a different number of immigrant classmates.

Our sibling sample is comprised of 2,713 respondents (1,311 sibling groups, which excludes groups where siblings attended different schools). As can be seen in Table 4.10, the vast majority (93%) of sibling groups are comprised of two siblings, however 3+ sibling groups represent 7% of the sample.

Table 4.10. Description of Sibling Sample

	Share
2 Siblings	0.932
3+ Siblings	0.068

The equation for the sibling estimation is as follows:

$$\boldsymbol{y_{ijg} = \lambda_j + \alpha_s + \delta M_{gs} + \theta C_{gs} + \beta X_i + \varepsilon_{ijg}} \qquad \textbf{(Equation 4.4)}$$

In this case, λ_j is a family specific dummy variable.

The small sample size of the sibling dataset is a significant limitation, resulting in the results losing statistical significance. However, as we can see in Table 4.11 below, the relationship between exposure to immigrant peers and W4 Imagination remains positive when comparing between siblings. With this sibling sample, we also see that exposure to immigrant peers in the classroom does not affect native individuals who have close immigrant friends any more than it affects those who have not. Note that we do not include the estimations with student race, given the low level of variation at the family level.

Table 4.11. Effect of Immigrant Classmates on W4 Imagination of Natives, Sibling Sample

	(1)	(2)	(3)
Immigrants in Cohort	0.051	0.127	0.141
	(0.105)	(0.173)	(0.175)
Immigrants in Cohort * Close Immigrant Friend		-0.088	
		(0.093)	
Close Immigrant Friend		0.167**	
		(0.079)	
Immigrants in Cohort * Share of Friends who are Immigrant			-0.613
			(0.408)
Share of Friends who are Immigrant			1.185*
			(0.609)
Total Students in Cohort	-0.0002	0.0002	0.0002
	(0.0004)	(0.0005)	(0.0005)
Constant	0.062	-0.114	-0.115
	(0.397)	(0.403)	(0.402)
R2	0.715	0.750	0.750
Observations	2,713	2,713	2,713

Note: These are the coefficients from three regressions in which the dependent variable is a dummy indicating a high level of imagination. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

4.7. Conclusion

There is a growing body of literature arguing that the impact of having immigrant children in the classroom goes beyond traditional educational outcomes. We contribute to that body of evidence by exploring the impact of immigrant classmates on native adult imagination, an aspect that has so far been largely neglected. In particular, we look at the number of immigrant classmates that a native respondent had during high school, and explore the association with self-reported imagination during their late 20s and early 30s.

Our results suggest that exposure to immigrant classmates during school-age has long-term effects on the imagination of natives. In particular, increasing the number of immigrants in a grade by 20 students, would increase the likelihood of reporting a high level of imagination by 0.03 (i.e., three percentage-points). The effects do not seem to be the result of direct friendships but of exposure to different experiences and ideas in the classroom. The evidence also suggests that the race of a native student, as well as that of the immigrants in the cohort, can be relevant moderators in the effect of immigrant classmates on native imagination.

This work is not without limitations; the more subjective nature of self-reported measures is, for instance, an important weakness of this study. Objective assessment of an individual's imagination is, in itself, a complicated task for which researchers have attempted an extensive variety of methods. As evidence of this, literature is still to identify a tool or method which is universally recognized. We acknowledge that a simple self-assessment of one's own imaginative capabilities, as we use in this paper, may not represent with complete accuracy the

real levels of imagination an individual possesses. Simultaneously, what is meant by 'imagination' in the literature we discuss could very well be different from what participants understand or interpret when they are asked about their own imagination.

Nonetheless, in the methodology section of this paper, we do our best to establish a relationship between our selected measure and other metrics which could also signal high imagination, as well as to assess the degree to which our W4 Imagination variable could be capturing other characteristics such as cognitive ability or self-confidence. Even so, the self-reported nature of our imagination variable leaves room for improvement; we suggest future studies consider an imaginative task in order to assess adult-stage imaginative abilities more objectively. Similarly, further research into this topic could consider differentiating between types of imagination (e.g., reproductive imagination and creative imagination).

Our analysis also invites further investigation into a number of research questions. Further exploration into teacher effects, as well as the behaviors, practices and dynamics taking place inside the classroom, could represent a promising next step. Because Add Health data does not record classroom or cohort-level data on teachers and their characteristics, we were unable to control for teacher effects on the imagination of natives, which literature has suggested can be significant (Bereczki and Kárpáti 2018, Paek and Sumners 2019, Perry and Karpova 2017). In a similar fashion, the lack of within-classroom data meant we were unable to explore (or control for) the potential effects of class norms, practices, and collaboration dynamics- which are often established, promoted, and upheld by teachers. While our research shows that the mere presence of immigrant students in a classroom is sufficient to impact the imagination of natives, it is highly likely that the manner in which students are encouraged (or discouraged) to interact with one another, as well as the degree to which teachers promote sharing of different

perspectives and ideas, would also moderate the degree of influence these immigrant peers can have.

Similarly, while in our analyses we focus on the increasing exposure to different experiences and ideas represented by a higher number of immigrant classmates as the channel by which adult imagination is impacted, research has also shown that teachers adjust their approach to the classroom in response to a higher number of immigrant children (Borja et al. 2015, Lowenhaupt and Reeves 2015, Valiandes et al. 2018). It is possible that those adjustments also have implications for future adult imagination. While the lack of teacher data at the classroom level also inhibits us from exploring this mechanism, an analysis of such connection could have important implications for improving the link between teaching during school years and adult imagination.

The surprising finding that friendship with immigrant peers does not have a stronger impact on the imagination of natives than the mere exposure to immigrant peers in the classroom also opens the door to further research, urging further investigation into the mechanisms through which immigrant students are causing these effects. How exactly are natives benefitting from the exposure to different perspectives, and experiences *without* necessarily needing to create an affectionate (friendly) attachment to the person providing these new experiences? Perhaps the unfamiliar nature of foreign peers, and the perception of difference (in-group v. out-group, or 'us v. them' dynamics) is an important element in creating the cognitive contrasts and challenging environments necessary for imagination to thrive. Perhaps it is not necessary to completely understand or relate with immigrant peers in order to reap the benefits from interaction with them, and perhaps it is precisely the lack of complete understanding which

encourages minds to roam, to consider distinct possibilities, and imagination to flourish. Ultimately, our findings invite further research into these questions.

Despite its limitations, this study makes significant contributions to our understanding of both the development of imagination, and the potential impacts of diverse classrooms, and in doing so, also has significant implications for practice and policy. The fact that immigrant classmates have an impact on adult imagination of natives is not merely a simple intellectual curiosity; imagination plays a major role in many areas of society including being a key driver of innovation in the business sector (Witt 1998), policy creation (Pereira et al. 2019), and arts (Dominguez Rubio 2020). Therefore, the immigration-imagination link represents another way in which immigrants can be beneficial for the economies and societies of receiving countries.

In order to maximize these benefits, our research points to a number of key considerations which should be made at the class, school, and policy levels.

The positive effect of immigrant peers on the adulthood imagination of natives suggests that, at the classroom-level, it could be beneficial to promote the sharing of new ideas and perspectives between students of different backgrounds. As suggested by SCA, imagination develops by (a) providing direct access to new ideas and concepts; (b) creating the ability to see multiple underlying functions behind the same form; (c) destabilizing routinized knowledge structures, in turn increasing the accessibility of otherwise inaccessible knowledge and creating a psychological readiness to recruit ideas from unfamiliar sources; and (d) promoting readiness to synthesize seemingly incompatible ideas. With this in mind, ensuring that immigrant students have a space to contribute with their own experiences and perspectives could yield

benefits. Creating respectful, tolerant, and inquisitive environments within classrooms could be a positive first step.

At the school level, similar considerations apply. Encouraging a diverse school population, and diverse cohorts in terms of country of origin, race and experiences could allow schools to maximize the benefits of the results seen in this research. Schools which carry out Ability Tracking (a system in which students are sorted into classes based on ability, with sorting often being done by language proficiency), could also consider alternative ways of encouraging interactions between immigrant and native sub-populations, as many immigrant students might concentrate in LEP ability groups and otherwise may not have significant interaction with their native peers.

At the policy level, the positive effects on the imagination of natives as a result of interaction with immigrant peers can perhaps encourage policy-makers to ensure that enough resources are made available to schools in order to help immigrant students achieve English proficiency, and to be able to share their experiences and perspectives with their native peers. Additionally, developing the high school curriculum, so it continues to progress in encouraging dialogue between students and in considering alternative perspectives, experiences, and background, could prove beneficial.

5. Establishing Expectations: Immigrants in the Classroom and the Educational Expectations of Natives

Abstract

Using data for the United States, we explore how interactions with immigrant classmates during school-age affect native educational expectations during the same academic year, as well as educational outcomes during adulthood. Through the National Longitudinal Study of Adolescent to Adult Health survey (Add Health), we focus on the variation in cohort composition within schools. By doing so, we can explore the impact of the demographic composition of a cohort, while controlling for school differences and accounting for self-selection into schools. The data provides us with a nationally-representative sample of students who were in grades 7 to 12 during the 1994 – 1995 academic year, and four additional waves, covering a period of 24 years, allowing participants to be followed into adulthood. Our results suggest that exposure to immigrant classmates has positive effects on the educational expectations of native students. More specifically, results show that increasing the number of immigrants in the grade by 20 students would increase the likelihood of a native student considering it highly certain that they will go to university by 0.06 (i.e., six percentage-points). We also find, however, that the number of immigrant peers has no statistically significant impact on university completion by the time natives reach adulthood. This suggests that, in the long term, the influence of immigrant peers on the university education of natives largely disappears. Moreover, looking only at those natives who had not completed a university education by adulthood, we find the number of immigrant peers during school-age has a positive effect on adult-age educational satisfaction.

5.1. Introduction

The impact of immigrant students on the educational outcomes of native peers has been explored, extensively, by scholars in various social science disciplines (Betts and Lofstrom 1998, Betts 1998, Brunello et al. 2020, Hunt 2017, Llull 2018, McHenry 2015, Silveira et al. 2019). This study contributes to this literature by exploring the impact of immigrant peers on educational expectations during school-age, as well as university completion during adulthood.

Research exists to highlight the importance of educational expectations to future achievement in education, and even in the labor market. While certainly multifaceted, there is general agreement in the literature that optimism and confidence in one's ability to perform are key factors which may help predict achievement in school (Jowkar et al. 2014, Suárez-Orozco et al. 2009), in addition to leading to more ambitious educational and career decisions (Erikson and Jonsson 1996, Jackson 2012, Portes et al. 2010).

Scholars have also found that, particularly in industrialized countries, immigrants and their children have higher educational aspirations and expectations than their otherwise-comparable native counterparts (Brinbaum and Cebolla-Boado 2007, Jackson 2012, Kao and Tienda 1995, Tjaden and Hunkler 2017). At the same time, there is ample literature which suggests that, especially during adolescence, peers are important factors in the development of perception of the value of education, and consequently, contribute significantly to the setting of aspirations and expectations (Antonio 2004, Brechwald and Prinstein 2011, Sewell et al. 1969, Youniss and Smollar 1985). Additionally, economic literature explores contexts in which natives seek to differentiate themselves from incoming low-skilled immigrants by pursuing additional qualifications or years in education.

Considering this existing scholarship, it is important to bear in mind the possibility that, when developing educational expectations, native students might be impacted by their immigrant peers. Consequently, in this paper, we explore the following specific research questions:

Does the presence of immigrant students in US classrooms affect the educational expectations of their native peers during school-age? Are these effects still present, or perhaps manifest only, during adulthood? In particular, does the presence of immigrant students in US classrooms affect the likelihood of degree completion by natives during adulthood? What are the mechanisms by which these effects take place and what is the role of factors such as native and immigrant student race?

In order to explore how interactions with immigrant students during school-age affect the educational expectations of natives during that same school year, as well as university completion during adulthood, we take advantage of The National Longitudinal Study of Adolescent to Adult Health survey (Add Health) (Harris 2018). This is a longitudinal study in the United States (US) that includes a nationally-representative sample of students in grades 7 to 12 during the 1994-95 school year. The students were interviewed in four additional waves, covering a period of 24 years. The survey collects detailed information on individual and family characteristics, as well as community and school composition during school-age. Importantly for our research, the survey also collects information on educational expectations in the first wave and university completion in the fourth wave, at a time when respondents were 24 to 32 years of age.

While educational expectations are most often studied during adolescence (13 – 18 years of age) or emerging adulthood (18 – 25) (Erb and Drysdale 2017, Klassen 2002, Klassen and Usher 2010, Panadero et al. 2017, van Dinther et al. 2011), the availability of data for the 24-32 age bracket of adulthood yields the opportunity to explore how educational goals and desires are modified once many individuals have entered and experienced the labor market, having gained a sense of whether or not further educational qualifications would help them achieve their career goals (Moss-Pech et al. 2021).

In the analysis we focus on the impact of differences in the concentration of immigrants across cohorts within schools. This allows us to focus on the implications of the demographic composition of a student's cohort, while controlling for broader school differences and the possibility of self-selection into schools.

Our results suggest that, while the effect of immigrant peers on the university-going expectations of school-age natives is positive and statistically significant, the influence of immigrant peers seems to decrease with time, and has no impact on educational outcomes by the time natives reach the 24 – 32 age bracket.

More specifically, an increase of 20 immigrant students in a cohort resulted in a six percentage-point increase in the probability of a school-age native having strong certainty of future university attendance. Into adulthood, however, the effect of school-age interaction with immigrant peers had no statistically significant effect on the university completion of adult-age natives. Moreover, when focusing exclusively on the native sub-set who had not completed university education by the W4 survey, interaction with immigrant peers during school-age was found to have a positive effect on adult-age educational satisfaction.

5.2. Literature Review and Conceptual Background

Though similar and often-conflated, educational aspirations and expectations are two distinct concepts (Kirk et al. 2012, Nygård 2017, Reynolds and Pemberton 2001, Sharp et al. 2020). The key difference is that aspirations refer to an idealistic indicator of students' academic desires for the future (Goodman et al. 2011, Khattab 2015, Madeeha et al. 2022), while the expectations are considered a more realistic indicator of their perceived future educational possibilities, taking into account likely obstacles and constraints- including the social, economic, and personal conditions of an individual (Beal and Crockett 2010, Gorard et al. 2012, Koo 2012, Reynolds and Pemberton 2001, Sharp et al. 2020).

While increasing attention is being given to contexts in which aspirations and expectations do not align (Beal and Crockett 2010, Bohon et al. 2006, Bozick et al. 2010, Carter-Wall and Whitfield 2012, Gorard et al. 2012, Harrison and Waller 2018, Kirk et al. 2012, Sharp et al. 2020), research continues to find that, regardless of conceptual differences, educational aspirations and expectations may be sensitive to similar influences. Determinants such as race, ethnicity, socioeconomic status, parental expectations, academic attitudes, and achievement have all been found to play a similar and significant role in shaping both aspirations and expectations (Almroth et al. 2020, Baars et al. 2016, Berrington et al. 2016, Lazarides et al. 2016, Nygård 2017). In addition, both aspirations and expectations are considered essential in understanding an individual's educational goals and trajectory (Boxer et al. 2011, Koo 2012, Madeeha et al. 2022).

In the following sections, we examine the development processes of educational expectations through Social Cognitive Career Theory (SCCT), a widely-accepted and implemented theoretical framework of career and academic choice. We establish this theoretical backdrop as we consider the extent to which interaction with immigrant peers could affect the educational expectations of native students.

5.2.1. Development of Educational Expectations

SCCT was first developed by Lent, Brown, and Hackett (Lent et al. 1994, Lent and Brown 2006), based on Bandura's (1986) general social cognitive theory. SCCT aims to explain the processes through which people develop interests, make choices, achieve goals, and feel satisfied in educational and career contexts (Lent and Brown 2006, Lent et al. 2017). According to SCCT, throughout childhood and adolescence individuals are exposed -via their environment- to a variety of activities which may be of potential career relevance. Through this exposure children develop interests, and throughout their development are able to refine their skills, as well as develop a sense of their particular ability relative to others (Lent and Brown 2006, Lent et al. 2017). Children and adolescents also develop a notion of their expected results (results are referred to, in SCCT, as 'outcome expectations') in that specific field. In SCCT, outcome expectations are seen as both extrinsic and intrinsic. That is to say, in pursuing a particular academic or career path, an individual may hope to gain status, money, or autonomy (extrinsic), but could also seek to gain self-satisfaction or enjoyment (intrinsic) (Domene et al. 2011, Lent and Brown 2006).

Individuals eventually choose particular interests or paths they wish to pursue, and begin to take part in activities related to that pursuit. This produces 'performance achievements' (in

other words, an individual may succeed or fail at a specific task), through which they then re-assess their self-efficacy beliefs and likelihood of achieving their outcome expectations (Lent and Brown 2006, Schaub and Tokar 2005).

As a result of their successes and failures, individuals modify their goals and the tasks they plan to carry out to achieve them. Consequently, in SCCT choices are not static, but continuously modified by performance outcomes and perceived capabilities (Lent et al. 2017). The theory further differentiates between preferred pursuits, chosen pursuits, and attained pursuits. This acknowledges early theorists (Ginzberg et al. 1951, Vroom 1964) who suggest that when choosing pursuits, a compromise must often be made between what one would like to do, what is actually attempted, and what someone is successful at achieving.

5.2.2. Social and Peer Effects on Educational Expectations

SCCT highlights the role which relevant others (e.g., parents, teachers, peers) can play in the formation of outcome expectations. According to SCCT, as individuals begin to choose and pursue interests, they refine their skills, form a sense of their individual abilities, and establish outcome expectations. This perception of individual performance is very often measured relative to others, particularly peers, with whom student perceive different degrees of similarity (Schaub and Tokar 2005, Wang et al. 2022). These skills and perceptions can also be reinforced through modelling and validation from others (Schaub and Tokar 2005).

Literature has found that, when comparing themselves to their peers, students not only compare performance and achievement (how well they did, relative to their classmates or friends), but also the cost and effort required to achieve results (Domina et al. 2011, Dong et al. 2023, Foster

and Frijters 2010, Menéndez-Aller et al. 2021). As SCCT highlights, individuals develop a sense of their abilities relative to others, as well as their expected results in a field through successes and failures at activities, which in turn cause them to re-assess self-efficacy beliefs and likelihood of achieving outcome expectations (Lent and Brown 2006, Lent et al. 2017, Schaub and Tokar 2005). Literature confirms that in these comparisons, individuals may also assess the costs of achieving a goal, including the effort, work or persistence that was required by similar others who have succeeded, and evaluate whether achieving the task themselves would require similar investments (Domina et al. 2011, Dong et al. 2023, Foster and Frijters 2010, Menéndez-Aller et al. 2021). These appraisals of required costs, as well as an evaluation of whether the benefits of achieving a goal would outweigh the costs, results in choices constantly being modified, as well as individuals having to differentiate between preferred pursuits, chosen pursuits, and attained pursuits (Domina et al. 2011, Foster and Frijters 2014, Lent et al. 2017, Levi et al. 2014, Schoon and Ng-Knight 2017, Xie and He 2023).

SCCT also emphasizes how the notion of value is highly important in determining outcome expectations (Lent and Brown 2006, Lent et al. 2017). That is to say, interest in pursuing a specific academic activity may depend, in part, on the outcomes which are expected to result from successful completion of the activity, but also from the relative value or importance given to these outcomes by the individual (Ali et al. 2005, Domene et al. 2011, Lent et al. 2017). For example, a postgraduate degree might be perceived as more valuable by certain cultures or demographic groups. Interaction with relevant others or observation of them, as well as cultural, religious, and societal influences, all play a role in imparting value to specific outcomes.

SCCT develops the concept of 'Contextual Determinants' to refer to additional ways in which social, environmental, or contextual factors can affect an individual's academic and career decisions. While SCCT sees actors as having agency, it also recognizes the existence of opportunity structure factors, which serve to facilitate, restrict, or override personal volition in the choice process (Huebner and Corazzini 1984, Lent and Brown 2006, Lent et al. 2017). This, of course, strongly suggests that an individual's social milieux can have a strong influence on expectations.

SCCT posits, for example, that observing similar others succeed or fail at a particular activity (vicarious learning) can have a direct effect on confidence (and consequently, outcome expectations, goal-setting, and choice of pursuit) (Garriott et al. 2014, Lent and Brown 2006). This may relate to direct interactions with parents, peers, teachers, or others in their close social network, but also observations regarding their communities or society as a whole (Wang et al. 2022). Children and adolescents make appraisals of their opportunities, and how these may differ from peers of a different gender or race, for example. Both objective features of the environment, as well as individual *perceptions* of the environment (regardless of whether or not these perceptions are, in fact, true), may act as contextual determinants which together with personal agency, influence academic and career decisions (Huebner and Corazzini 1984, Lent et al. 2017).

Gender role or racial stereotyping, for instance, may have objectively noticeable effects on goals and the ability of an individual to accomplish them, regardless of whether or not an individual perceives them (Inda et al. 2013, Lent and Brown 2006, Turner et al. 2019). However, an individual's appraisal of the opportunities, supports, and barriers available to them may be just as impactful as the objective contextual realities (Vondracek et al. 1986). In

adopting this perspective, SCCT gives high importance to cognitive appraisal processes in guiding behavior, and highlights the individual's role as a phenomenological interpreter of contextual inputs.

The possibility that relevant others, particularly peers, and social contexts may affect the educational expectations is also echoed in other well-recognized theories in educational and career literature, mainly: Status Attainment Theory (SAT), Reference Group Theory (RGT), Expectancy Value Theory (EVT), and Human Capital Accumulation Theory (HCAT). The four theories provide support for factors which SCCT highlights as key determinants of expectations such as:

(1) The importance of reference groups -mainly parents, peers, and teachers- in assigning intrinsic and extrinsic value to possible outcomes (Eccles and Wigfield 2002, King and Ganotice 2014, Martin and Dowson 2009, Sewell et al. 1969, Sewell et al. 1970, Wigfield and Tonks 2002, Woelfel and Haller 1971, Wood et al. 2007);

(2) Comparison mechanisms through which children make appraisals of their own abilities and chances of success relative to others (Areepattamannil et al. 2017, Becker, M. and Neumann 2016, Breen and Goldthorpe 1997, Chiu 2012, Chmielewski et al. 2013, Davis 1966, Destin et al. 2012, Eccles and Wigfield 2002, Erikson and Jonsson 1996, Fang et al. 2018, Huguet et al. 2009, Marsh and Hau 2003, Martin and Dowson 2009, Merton 1949, Mijs and Nieuwenhuis 2022, Möller et al. 2009, Niepel et al. 2014, Parker et al. 2013, Stouffer et al. 1949, Thijs et al. 2010, Wigfield et al. 2009); and

(3) The role of social structures and perceptions of available opportunities (Betts 1998, Betts and Lofstrom 1998, Brunello et al. 2020, Chiswick 1989, Eberhard 2012, Fordham and Ogbu 1986, Kao and Tienda 1998, McHenry 2015, Peri and Sparber 2009, Sue and Okazaki 2009, Tumen 2019, Vowell and May 2000).

5.2.3. The Aspirations and Expectations of Immigrants

The SCCT literature above (as well as the overlaps with SAT, RGT, EVT, and HCAT outlined) would suggest that the average educational expectations of children might vary across certain sociodemographic groups (Howard et al. 2011, Lent et al. 1994, Lent and Brown 2006, Porchea et al. 2010, Stoessel et al. 2015). More specifically, SCCT provides reason to believe that the expectations of immigrant children could, on average, be different to that of their native counterparts.

Existing literature on the educational goals of immigrants often treats the concepts of aspirations and expectations separately, as there is increasing evidence that immigrant children may be more eager and willing to progress through education than their native counterparts, but simultaneously more aware of additional obstacles or structural constraints they could face in the process (Bravo et al. 2016, Engzell and Ichou 2019, Feliciano and Lanuza 2017, Khattab 2018, Kirui and Kao 2018, Roche and Kuperminc 2012, Tjaden and Hunkler 2017).

Differences between native and immigrant children in a number of important factors shaping both aspirations and expectations (i.e. differences in the opportunities immigrant children perceive as being available to them, the perceived additional obstacles which immigrants believe they must face to progress through education, the extent to which this perception of

obstacles affects their self-efficacy beliefs, as well as differences in the value assigned to outcome expectations by immigrant children, their parents, or others in their support network, etc.) are highlighted in literature.

Literature in migration widely supports the finding that, in many industrialized countries, immigrants and other ethnic minorities tend to display higher educational aspirations and expectations than their native counterparts from similar socioeconomic backgrounds (Brinbaum and Cebolla-Boado 2007, Jackson 2012, Kao and Tienda 1995, Kao and Tienda 1998, Salikutluk 2016, Tjaden and Hunkler 2017). These findings persist even in situations where immigrants are often more disadvantaged in terms of educational resources (i.e., language skills, knowledge of the educational system in the US) (Friberg 2019, Hadjar and Scharf 2019). This seemingly-contradicting determination despite disadvantage is often referred to in literature as 'immigrant optimism'' (Kao and Tienda 1995, Kirui and Kao 2018), or 'bold choices'' (Engzell 2019, Jackson 2012).

To explain the higher aspirations and expectations of immigrants with regards to schooling, literature often highlights the overall tendency of immigrants being positively-selected for ambition and determination (Engzell and Ichou 2019, Feliciano 2005, Feliciano and Lanuza 2017, Ichou 2014). The need to integrate, and the importance of education to integration in Western industrialized societies, have also been highlighted by scholars as relevant factors contributing to high educational aspirations and expectations on behalf of immigrants (Alba and Holdaway 2013, Salikutluk 2016, Stromquist 2012).

In addition to these factors, however, scholars have identified other dynamics driving immigrant educational aspirations and expectations. A common finding is that investment in

education can often be seen as a 'defiance strategy,' through which immigrants expect to counterbalance the structural barriers facing ethnic minorities (Khattab 2018). Anticipating labor market discrimination and societally-imposed barriers to social mobility, immigrant populations may often place higher value than natives on education (Jonsson and Rudolphi 2011, Khattab 2018, van de Werfhorst and van Tubergen 2007). Similarly, there is literature suggesting that in forced migration contexts, investment in education (human capital) may be preferred over investment in material possessions, with human capital being perceived as more mobile (Becker, S. O. et al. 2020).

Research has also found that the attribution of a greater value to education as a result of expected labor-market discrimination is not only experienced by first-generation immigrants; children of immigrants also tend to display higher aspirations than their native counterparts (Khattab 2018, Kirui and Kao 2018, Scandone 2018). Several scholars suggest that immigrant parents often instill high educational aspirations and expectations in their children with hopes for future social mobility (Khattab 2018, Li 2018, Modood 2004, Scandone 2018).

Empirical examples abound. Scandone (2018), for example, finds that young women of Bangladeshi heritage attribute a high value to education, and consequently hold high aspirations, as a result of perceiving more limited opportunities than their White counterparts due to enthnicized, religious, classed, and gendered social and economic circumstances. Kirui and Kao (2018), in turn, find that children of immigrants have higher aspirations than students with no immigrant backgrounds, and that these aspirations translate to higher persistence and attainment. The authors interpret the results as meaning that American-born children of immigrants continue to respond to the high optimism conferred to them by their immigrant parents after youth and adolescence.

5.2.4. Hypothesis and Mechanisms

Considering the literature above, we develop the following hypothesis regarding the impact of exposure to immigrant classmates on the educational expectations of natives.

Hypothesis 5.1: ***Increased exposure to immigrant classmates during school-age has a positive effect on the academic expectations of native students.***

We suggest three distinct mechanisms could be taking place in order to produce these effects during school-age. These mechanisms are explored further in Section 5.2., which explores channels for influence.

Mechanism 5.1: Ambitious immigrant peers act as social models of high expectations and aspirations for native students who, in turn, adapt their attitudes to more resemble their peers.

Mechanism 5.2: The expectations of natives are increased when their immigrant peers are low-achieving, as this consequently increases native confidence regarding their own academic abilities, mastery of the educational system, and chances of success.

Mechanism 5.3: The expectations of natives are increased when their immigrant peers are visibly investing more effort than natives. Immigrants' disproportionate effort

increases native confidence regarding their own academic potential and chances of success if they were to invest similar effort.

In addition to the three mechanisms above we consider two factors which may act as moderators for the effects of immigrant peers on the educational expectations of natives: race and closeness.

There is reason to believe that, due to initial self-selection and sorting based on socioeconomic status, race, and other factors, as well as tracked school systems, educational expectations during school-age might be relatively homogeneous within schools and classrooms (Legewie and DiPrete 2012, Raabe and Wölfer 2019). However, one cannot discard the argument that, due to within-classroom interactions and networks, there might be additional variation in educational expectations within classrooms, not only between native and immigrant students, but within these groups as well. Recent evidence suggests that students within classrooms cluster based on aspects such as favorite subjects, smoking, or sports (Haas and Schaefer 2014, Raabe and Wölfer 2019, Raabe et al. 2019, Simpkins et al. 2013, Wölfer et al. 2012). This has led scholars to believe that there are social systems which develop within classrooms, with interactions taking place more frequently between certain students, and consequently, distinct cultural practices developing even within cohorts (Raabe and Wölfer 2019).

With this in mind, we develop the following hypotheses:

Hypothesis 5.2: ***An increase in the number of immigrant peers in the classroom will lead to a larger increase in the academic expectations of non-White native students compared to White native students.***

This hypothesis assumes that the degree to which native students feel they are different from immigrants is smaller amongst non-White native students than amongst White native students. We assume that, as racial minorities, non-White native students are more likely to adapt to match their highly-ambitious immigrant peers, compared to White native students. This hypothesis also considers the possibility that native racial minorities will more directly (relative to White natives) compare themselves to low-achieving immigrant peers because of their similar status as minorities or out-group members, and hence see their expectations increased more strongly. Note that we expect greater presence of immigrants in the classroom to affect all native students, including those with a White background, but expect the effect to be stronger for non-White students.

Hypothesis 5.3: ***An increase in the number of immigrant peers in the classroom will lead to greater increase in the academic expectations of those natives with close immigrant friends during school-age.***

This moderator suggests that a greater closeness, via friendship, to immigrant students will result in increased interaction time, which will amplify the two mechanisms described above.

5.3. Data

5.3.1. Description of the Data Used

Add Health is a longitudinal study conducted in the US. The first wave was conducted in the academic year 1994-95 and it included a nationally-representative sample of students in grades

7 to 12. There were four additional waves of the survey in 1996, 2001–02, 2008, and 2016-18. In this study, we focus on the first wave of the survey when students were in high school, and the fourth wave of the survey (2008) when respondents were 24 to 32 years of age. From the first wave we use information regarding individual, family, community, and school cohort characteristics, and from the fourth wave we use the information on adult-age university completion and educational satisfaction.

We define immigrant students as those who were born abroad, or those born in the US to at least one foreign-born parent (i.e., first and second generation immigrants). We consider all students who do not fall under this definition 'natives' (i.e., all students who were born in the US to two US-born parents). In the sample we limit the analysis to native students. As a result, we consider a sample of 11,662 native respondents who we can observe in both waves, and who responded to all questions relevant for this analysis. These respondents attended 127 different schools, spread across the country.

Table 5.1. General Characteristics of the Sample

Variable		Mean
Immigrants in Cohort		19
Total Students in Cohort		69
Sex – Male		0.493
Race	White (non-Hispanic)	0.639
	Hispanic	0.079
	Black (non-Hispanic)	0.256
	Asian (non-Hispanic)	0.013
	Other (non-Hispanic)	0.012
Age		
	12	0.003
	13	0.082
	14	0.134
	15	0.168
	16	0.188

	17	0.193
	18	0.172
	19	0.054
	20	0.005
	21	0.001
High Achiever		0.061
Mother's Educational Attainment		
	High school or less	0.552
	Some college	0.195
	College or more	0.253
Mother's Educational Expectations of their Child		
	5 - Very Disappointed	0.489
	4	0.186
	3	0.188
	2	0.062
	1 - Not at all Disappointed	0.075
On Benefits		0.107

5.3.2. Dependent Variables

In this paper we consider the school-age educational expectations of participants, as well as their adulthood university completion and educational satisfaction. We make use of these variables to examine both the impact of immigrant peers on expectations during school-age as well as the adulthood educational outcomes of natives.

Our W1 Educational Expectations variable was constructed from the following Add Health W1 survey question:

> *On a scale of 1 to 5, where 1 is low and 5 is high, how likely is it that you will go to college?*

Response options for this question ranged from '1 – Low likelihood' to '5 – High likelihood.' We dichotomize this variable and assign high-confidence responses (responses of '5 – High

likelihood') to one category (= 1) and all other responses to another category (= 0). Participants expressing high confidence in their likelihood of going to university represented 54% of the sample (see Table 5.2).

We then consider the effect of interaction with immigrant peers during school-age on university completion during adulthood (W4).

Our W4 University Completion variable was constructed from the following Add Health W4 survey question:

What is the highest level of education that you have achieved to date?

The survey offered a total of 13 response options for this question, ranging from '8th grade or less' to 'completed post baccalaureate professional education (e.g., law school, medical school, nurse)' and 'completed a doctoral degree.' For simplicity of analysis, we grouped categories and dichotomized this variable, assigning all participants who had completed an undergraduate degree or higher the value of 1, and all those who had not a value of 0. Participants who had achieved a university education by W4 represented 31% of the sample.

Table 5.2. Distributions of Dependent Variables

Variable		**Mean**
W1 Educational Expectations (full range)	5 - It will happen	0.540
	4	0.212
	3	0.142
	2	0.048
	1 - It will not happen	0.056
W1 Educational Expectations (Binary)		0.540
W4 University Completion (Binary)		0.310

We also develop additional dependent variables in order to test our proposed mechanisms; these additional dependent variables are described in Section 5.5.2.

5.4. Methods

5.4.1. Empirical Strategy

The main analysis consists of a series of regressions along the following lines:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta C_{gs} + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 5.1)}$$

In this specification, y_{igs} represents each of the dependent variables explained above, for student *i* in grade *g* in school *s*. α_s represents a school dummy to control for any differences across schools, and M_{gs} represents the number of immigrant students in grade *g* in school *s*. In specifications where we explore the effects of different categories of immigrants, M_{gs} is the number of Hispanic, White, Asian, Black, or Other-race immigrants in a cohort, depending on the specification. We adjust the number of immigrant students in a cohort by dividing by 100. C_{gs} is included in the empirical specification as a control for cohort size, R_i is an indicator of the racial group of the student with the White group as the reference category, and X_i are a series of characteristics of the student and their family, which are discussed further in the Controls sub-section below.

Our main interest from Equation 5.1 is on δ, which provides information regarding the impact of one additional immigrant student in a cohort (controlling for cohort size) on the likelihood of each of our dependent variables, once we control for school differences.

As shown in Table 5.1, the average size of a cohort was 69 students; the average number of immigrant students in a cohort was 19. Additionally, the majority of respondents were White. Please see Appendix 14 for a detailed description of all the variables included in the estimation.

In addition, we estimate:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \sum_{i=1}^{4} \rho_i R_i + \sum_{i=1}^{4} \pi_i M_{gs} R_i + \theta C_{gs} + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 5.2)}$$

In this case, we are interested in the coefficients of π_i, which reflect the interaction between the number of immigrant students in the cohort and the racial categories. Given that White is the reference category, according to Hypothesis 5.2 we expect the π_i coefficients to be positive. That is, the effect of immigrant classmates should be larger for non-White students. Note that in this case, we still expect to find an overall positive effect (i.e., positive δ).

Finally, we estimate:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \sum_{i=1}^{4} \rho_i R_i + \tau F_i + \gamma M_{gs} * F_i + \theta C_{gs} + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 5.3)}$$

In this estimation we are interested in exploring Hypothesis 5.3, which relates to the impact of having close immigrant friends in school. In order to explore this, we use information from the first wave of the survey in which students are asked to nominate their ten closest friends. We

create two variables with this information. First, we create a dummy variable for a native having nominated an immigrant peer within their ten closest friends (which we label 'Close Immigrant Friend'). Second, we create a variable that reflects the share of a native's close friends who are immigrants (we label this variable 'Share of Friends who are Immigrant'). We then include these variables in the estimation (F_i), and carry out an interaction with the number of immigrants in the classroom. According to Hypothesis 5.3, we would expect γ to be positive.

5.4.2. Controls

As mentioned above, X_i in our empirical strategy represents a series of controls for the students, their parents, and their communities that we deem important to control for in order to be able to establish a stronger causal relationship between the number of immigrant peers in a cohort and native educational expectations and adulthood outcomes.

As was summarized above, according to SCCT a number of factors could influence an individual's educational expectations. Consequently, when looking to evaluate the extent to which exposure to immigrant peers affects educational expectations and their completion, we aim to control for factors outside of cohort composition which could influence the educational expectations of natives. A more detailed description of all control variables, and their distributions, can be found in Appendix 14.

Personal Controls:

In our empirical strategy, we control for the race and gender of an individual. As SCCT literature points out, personal characteristics such as race and gender may influence an

individual's educational expectations by determining the learning experiences and opportunity structures available to them. By observing similar others succeed or fail at achieving specific goals, an individual's perception of their own likelihood of achieving similar goals can be affected (Garriott et al. 2014, Lent and Brown 2006). Individuals often observe peers, parents, and teachers, but are also likely to notice opportunity structures in their communities and society more generally (Wang et al. 2022). Their appraisals of how opportunity structures differ for people of different groups and characteristics may be both objective observations of the environment, as well as individual *perceptions* of structural barriers (Huebner and Corazzini 1984, Lent et al. 2017).

In addition to representing an important (and often very visible) characteristic which individuals may feel affects the opportunity structures available to them, literature has also demonstrated that race can play a role in assigning value to academic pursuits, with certain races or ethnic groups in the US seeing higher education as inherently more valuable -or useful- than others (Suárez-Orozco and Suárez-Orozco 1995, Sue and Okazaki 2009, Turcios-Cotto and Milan 2013).

Additionally, we control for an individual's age, as older individuals are more likely to have received more information regarding higher education and the opportunities available to them (as well as the realistic constraints they might face). Older individuals are also likely to have devoted more time to exploring their career interests and goals, and more likely to have evaluated their relative capabilities, chances of success, and outcome expectations for academic pursuits.

We control for high school achievement at the individual level. According to SCCT, an individual's educational expectations may also be influenced by that person's outcome expectations. A respondents' school achievement is likely to affect both outcome expectations (how far an individual expects to progress academically) with high achievers at the high school level expecting to progress further in higher education than low achievers.

Parental Controls:

We include a binary variable representing whether a student's parent participated in a welfare assistance program, as an indicator of socioeconomic status. In SCCT, the process of forming a sense of individual ability is often influenced by significant others (in academic contexts, often parents, peers, and teachers), with modelling and validation from role models playing a significant role (Schaub and Tokar 2005, Wang et al. 2022). In our empirical strategy, we control for parental educational attainment, as well as parental educational expectations of their child. While parental education may influence an individual's outcome expectations (through modelling, with children observing the lifestyle and benefits resulting from a given level of educational attainment), parental educational expectations of their child may also influence goal and interest formation (Davis-Kean 2005, Froiland and Davison 2014, Yamamoto and Holloway 2010).

Both parental education and parental educational expectations of their child can simultaneously influence the inherent value assigned by the individual to higher education (Lent and Brown 2006, Lent et al. 2017). SCCT stipulates that interest in pursuing a specific academic activity may depend not only on the outcomes which are expected to result from successful completion of the activity, but also from the relative value or importance given to these outcomes (Ali et

al. 2005, Domene et al. 2011, Lent et al. 2017). The completion of a university may be perceived as more valuable by some parents, who will in turn, transmit this higher sense of value to their child.

School Control:

Our empirical strategy includes a school dummy variable, represented by α_s, to control for differences -both observed and unobserved- between schools, as well as the possibility of self-selection into schools (Arieli et al. 2016). This School Fixed Effects (SFE) approach considers the possibility that school-specific factors (including general school quality, resources, teacher characteristics, etc.) could bias results in contexts where school characteristics are simultaneously correlated with the concentration of immigrant students in a school and the educational expectations of students at that school (Brandén et al. 2016, Brandén et al. 2019, Clotfelter et al. 2005, Hanushek et al. 2004).

By using SFE, we are able to consider the composition differences between cohorts, while controlling for general school characteristics. This approach also allows us to control for situations in which parents enroll their child in a specific school based on the institution's specific characteristics or demographic composition. SFE also accounts for situations in which children from a particular geographical area are assigned to a district/local school. In choosing to focus on the variation in the number of immigrant students across cohorts within the same school, we assume that the composition of cohorts within a school is more not only more random than the composition of schools themselves, but also less easily observable by parents.

5.4.3. Alternative Specifications

While SCCT suggests that individuals have significant agency in developing their educational expectations, it also recognizes the existence of opportunity structure factors, which can facilitate, restrict, or override personal agency in the expectation-development process (Huebner and Corazzini 1984, Lent and Brown 2006, Lent et al. 2017). The concept of 'Contextual Determinants' is used to refer to additional ways in which social, environmental, or contextual factors can affect an individual's academic and career decisions. We consider the possibility that, just as observation of parents, teachers, and peers may influence the self-efficacy beliefs and outcome expectations of an individual, so can observation of their community (Wang et al. 2022) (Huebner and Corazzini 1984, Lent et al. 2017).

When using the SFE approach described above, we work under the assumption that the majority of students attending a specific school would most likely also live in the same community (or communities with similar sociodemographic profiles), and so, including a school dummy in the specification simultaneously controls for most community/environmental differences between individuals. However, we also consider alternative specifications which do not make this assumption, and include additional controls for the characteristics of the community in which each individual resides (measured at the Census Tract level) such as: poverty level (proportion of persons with income in 1989 below poverty level), average educational attainment (proportion aged 25 years and over with university degree or more), unemployment rate, proportion of the population which was foreign-born, and proportion of the population which was White.

Literature suggests that teachers (including their attitudes and practices) may also influence the educational expectations of students (Van den Broeck et al. 2020, Van Houtte and Demanet 2016). However, the Add Health dataset did not include cohort or classroom-level teacher data, and consequently, we were not able to control for teacher characteristics more specifically than at the school-level. In our alternative specifications, we attempt to address this concern, and capture the extent to which each individual student had a positive relationship with their teachers, controlling for responses to the question 'How often have you had problems getting along with your teachers?'. There were no significant changes resulting from the addition of the aforementioned controls to our main specifications; as such, we did not include them in this dissertation.

Furthermore, we carry out additional specifications which use the full range of response values for dependent variables (using OLS to analyze the relationship between our dependent and independent variables), where the dependent variable is considered ordinal (and consequently employ ordinal logistic regression), and where we fit a logit model instead of OLS. Significance and magnitude vary across these models (Appendix 15, Appendix 16, and Appendix 17); however, the directionality of relationships remains consistent throughout.

5.5. Results

5.5.1. The Impact of Immigrant Classmates on Educational Expectations

Our results suggest that exposure to immigrant peers has a positive effect on the university expectations of native students. As can be seen in the first column of Table 5.3 below, a ten-immigrant-student increase in a cohort resulted in a three percentage-point increase in the

probability of a native student having strong certainty regarding their future university attendance.

We then explore the possibility that different categories of immigrant students could be driving results more than others. We focus, specifically, on immigrant students of Hispanic, White, Asian, and Black, and Other-race. We choose to focus on the impact of these specific groups of immigrants as literature has shown that racial factors have a major impact on both mechanisms of interests: educational expectations and university completion. Columns 2 – 6 in Table 5.3 each represent a separate regression, using a different sub-category of immigrant student as the independent variable.

As can be seen in the table below, the effects of Hispanic immigrants and Other-race immigrants were statistically significant. Column 2 shows how a ten-Hispanic-immigrant-student-increase in a cohort resulted in a four percentage-point increase in the probability of a native student considering it is highly likely that they will go to university (W1 Educational Expectation). A ten-student increase in the number of Other-race immigrants in a cohort would, in turn, result in a six percentage-point increase in the likelihood of a native having high expectations. The effects of Asian and Black immigrant students were not found to be statistically significant. While integration policies and practices fall outside the scope of this paper, the more significant effect of Hispanic and Other-race immigrants should encourage further research into how inter-group dynamics may differ between natives and immigrants of different ethnicities, or how classroom practices and school programs affect students of different ethnicities.

Table 5.3. Effect of Immigrant Classmates on W1 Educational Expectations of Natives

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.273***					
	(0.091)					
Hispanic Immigrants		0.371***				
		(0.114)				
White Immigrants			0.219			
			(0.226)			
Asian Immigrants				0.049		
				(0.116)		
Black Immigrants					-0.019	
					(0.566)	
Other-race Immigrants						0.570***
						(0.159)
Total Students in Cohort	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.002***
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Constant	0.340***	0.335***	0.337***	0.337***	0.336***	0.333**
	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)
R2	0.256	0.256	0.255	0.255	0.255	0.256

Observations	11,662	11,662	11,662	11,662	11,662	11,662

Note: These are the coefficients from individual regressions in which the dependent variable is a dummy indicating that the student has high confidence of attending university (W1 Educational Expectations). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

5.5.2. Mechanisms

As previously stated, literature suggests that immigrant students could be affecting the educational expectations of natives in various ways: on one hand, high-expecting immigrant peers could heighten native expectations in situations where natives modify their expectations to match their immigrant peers (Mechanism 5.1).

Thus, we analyze the relative expectations and aspirations of immigrant students -compared to native peers- during W1. Columns 1 and 2 in Table 5.4 show regressions where a binary independent variable, indicating if a participant is immigrant (= 1) or native (= 0), is regressed on our W1 Educational Aspirations variable (Column 1), and our W1 Educational Expectations variable (Column 2). As an additional measure of comparison, we carry out Welch Two-Sample t-Tests comparing native and immigrant samples for both of these variables (see Table 5.5).

Table 5.4 shows how being an immigrant is responsible for a 12 percentage-point increase in the likelihood of having high educational aspirations, and a similar 12 percentage-point increase in the likelihood of having high educational expectations. Table 5.5, comparably, demonstrates how, on average, participants in the immigrant sample more often had a strong desire to attend university (with a mean of 0.723 amongst immigrants, compared to 0.687 amongst natives), as well as more often being certain in their likelihood of attending (0.541 amongst immigrants, compared to 0.537 amongst natives). With a p-value indicating high statistical significance, we show that aspirations do, in fact, differ between immigrants and natives during their time in high school (W1). Immigrants in our sample also showed higher university expectations than natives, however the t-statistic was not significant.

Consequently, Mechanism 5.1, which indicates that high-aspiring, high-expecting immigrant peers could heighten native aspirations and expectations in situations where they modify their aspirations and expectations to match their immigrant peers, seems plausible.

Table 5.4. Effect of W1 Being Immigrant on W1 Educational Aspirations and W1 Educational Expectations

	(1)	(2)
W1 Being Immigrant	0.119***	0.120***
	(0.025)	(0.027)
Total Students in Cohort	-0.001*	-0.002***
	(0.0003)	(0.0004)
Constant	3.987***	3.133***
	(0.179)	(0.196)
R2	0.209	0.264
Observations	20,081	20,081

Note: These are the coefficients from two regressions in which the dependent variables are dummies indicating that the student has high educational aspirations (Column 1) and expectations (Column 2) during W1. The independent variable is a dummy variable where 1 indicates the respondent being an immigrant. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Table 5.5. Means and T-test for Native and Immigrant W1 Educational Aspirations and W1 Educational Expectations

	Native Mean (1)	Immigrant Mean (2)	t-statistic
W1 Educational Aspirations	0.6872	0.7233	-4.6081***
W1 Educational Expectations	0.5367	0.5408	-0.4654

Note: *p<0.1; **p<0.05; ***p<0.01.

Native W1 Educational Expectations could also be impacted by immigrant peers if natives were to see their self-confidence increased when comparing their chances of success to low-

achieving immigrant classmates (Mechanism 5.2). Conversely, immigrant peers could also lower native W1 Educational Expectations if, reciprocally, exposure to high-performing immigrant peers lowered native self-confidence and optimism in future success.

Thus, we explore the educational achievement of immigrant students, compared to native peers. Differences between natives and immigrants are far less clear when examining achievement. As can be seen in Table 5.6, being immigrant is only associated with a one percentage-point increase in the probability of being a high achiever in high school, and this result is only statistically significant at the 10% level. Table 5.7 would confirm the observation that this relationship is far weaker, as the difference in sample means (6.13% of immigrants are high achievers, compared to 6.08% of natives) is small and a p-value of 0.909 demonstrates weak statistical significance. Hence, there is less evidence in favor of Mechanism 5.2.

Table 5.6. Effect of Being Immigrant on School Achievement, During W1

	Achievement (1)
Being Immigrant	0.010*
	(0.006)
Total Students in Cohort	-0.00005
	(0.0001)
Constant	0.225***
	(0.041)
R2	0.170
Observations	20,081

Note: These are the coefficients from a regression in which the dependent variable is a dummy indicating that the student is a High Achiever in school, during Wave 1. The independent variable is a dummy variable where 1 indicates the respondent being an immigrant. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Table 5.7. Means and T-test for Native and Immigrant Achievement in School

	Native Mean (1)	Immigrant Mean (2)	t-statistic
W1 High Achiever	0.061	0.061	-0.11456
Note: *p<0.1; **p<0.05; ***p<0.01.			

With this analysis of Mechanism 5.2 showing that differences in the achievement of natives and immigrants are small in magnitude and not statistically significant, we consider Mechanism 5.3, that the expectations of natives are increased when their immigrant peers are visibly investing more effort than natives. Immigrants' disproportionate effort could increase native confidence regarding their own academic potential and chances of success if they were to invest similar effort.

We compare the effort levels of native and immigrant peers during W1. Our effort variable considers responses to the W1 Survey Question: '*In general, how hard do you try to do your school work well?*' (where responses ranged from '1 – I try very hard to do my best,' to '4 – I never try at all'). The responses to this question were then dichotomized, with responses of '1 – I try very hard to do my best' assigned to one category (=1), and responses of 2 – 4 to another (=0). We find that, as can be seen in Table 5.8, being immigrant is associated with a 4.5 percentage-point increase in the probability of investing high effort into schoolwork (this result is significant at the 1% level). Similarly, Table 5.9 confirms the existence of a statistically significant difference between natives and immigrants in terms of effort, with 36% of natives self-reporting high effort, compared to 40% of immigrants. A t-statistic of -3.97 (significant at the 1% level) contributed to establishing the difference in school effort between these two samples.

Consequently, Mechanism 5.3, which indicates that the expectations of natives are increased when their similarly-achieving immigrant peers visibly invest more effort than natives to obtain the same results, seems plausible.

Table 5.8. Effect of Being Immigrant on W1 Effort

	Effort (1)
Being Immigrant	0.045***
	(0.014)
Total Students in Cohort	-0.00002
	(0.0003)
Constant	1.251***
	(0.121)
R2	0.165
Observations	20,081
Note: These are the coefficients from a regression in which the dependent variable is a dummy indicating that the student invests high-effort into their schoolwork. The independent variable is a dummy variable where 1 indicates the respondent being an immigrant. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.	

Table 5.9. Means and T-test for Native and Immigrant W1 Effort in School

	Native Mean (1)	Immigrant Mean (2)	t-statistic
W1 Effort	0.361	0.400	-3.9718***
Note: *p<0.1; **p<0.05; ***p<0.01.			

5.5.3. The Role of Moderators

We continue to test the hypotheses related to the moderators. Hypothesis 5.2 suggested that an increase in the number of immigrant peers in the classroom would lead to greater increases in the expectations of non-White native students compared to White native students. As can be

seen in Table 5.10 below, the effect of immigrant peers was felt more strongly by Black and Hispanic natives than by White native students. This confirms our expectations based on Hypothesis 5.2. The stronger sensitivity of Black and Hispanic natives to their immigrant peers could imply that, rather than perceiving themselves as competing for resources with immigrants, certain native minorities may have higher degrees of contact with immigrant peers, or may be viewing their immigrant peers as social models of high educational expectations and, in turn, adapting their own attitudes to match.

This possibility seems particularly compelling when one considers the reference group dynamics outlined in the literature section above, which show that students often make appraisals of their chances of success based on comparisons with peers who are, to varying degrees, similar to themselves.

Table 5.10. Effect of Immigrant Classmates on the W1 Educational Expectations of Natives, with Race Interactions

	Expectations (1)
Immigrants in Cohort	0.226**
	(0.093)
Hispanic* Immigrants in Cohort	0.059**
	(0.024)
Asian* Immigrants in Cohort	-0.035
	(0.041)
Black* Immigrants in Cohort	0.063***
	(0.022)
Other race* Immigrants in Cohort	-0.035
	(0.085)
Hispanic	-0.048**

	(0.021)
Asian	0.064
	(0.054)
Black	0.016
	(0.015)
Other-race	0.065
	(0.069)
Total Students in Cohort	-0.002***
	(0.0004)
Constant	0.345***
	(0.130)
R2	0.257
Observations	11,662

Note: These are the coefficients from a regression in which the dependent variable is a dummy indicating that the student has high W1 Educational Expectations. We interact the number of immigrants in a cohort with native race. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Hypothesis 5.3 suggested that an increase in the number of immigrant peers in the classroom would lead to greater increase in the expectations of those with close immigrant friends during school-age. We hypothesized that a greater closeness, via friendship, to immigrant students would lead to more interaction between immigrants and natives, and consequently result in higher transmittance of high expectations from immigrant to native students.

In order to explore this possibility, we use information from W1 of the Add Health survey, in which students are asked to nominate their ten closest friends. We create two variables with this information. First, we create a binary variable identifying natives who nominated at least one immigrant peer amongst their ten closest friends (we label this variable 'Close Immigrant Friend'). Second, we create a variable that reports the share of a respondent's close friends who are immigrants (we label this variable 'Share of Friends who are Immigrant'). We then add

these variables to the estimation (as separate regressions), and include an interaction with the number of immigrants in the cohort.

Table 5.11. Interaction Effects of Friendship with W1 Educational Expectations

	(1)	(2)
Immigrants in Cohort	0.273***	0.273***
	(0.091)	(0.091)
Close Immigrant Friend * Immigrants in Cohort		-0.001
		(0.017)
Close Immigrant Friend		0.023
		(0.027)
Share of Friends who are Immigrant * Immigrants in Cohort	-0.001	
	(0.001)	
Share of Friends who are Immigrant	0.003	
	(0.002)	
Total Students in Cohort	-0.002***	-0.002***
	(0.0004)	(0.0004)
Constant	0.338***	0.339***
	(0.130)	(0.130)
R2	0.256	0.256
Observations	8,675	8,675

Note: These are the coefficients from two regressions in which the dependent variable is a dummy indicating that the student has high W1 Educational Expectations. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

As can be seen in Table 5.11, the interaction with having a close immigrant friend (as well as the share of close friends who are immigrants) is, in fact, small and non-significant. Hence, we do not find support for Hypothesis 5.3.

5.5.4. From School-Age Expectations to Adult Outcomes

The mechanisms and moderators above explore whether interaction with immigrant peers affects the academic expectations of natives during the same academic year. However, as was highlighted in Section 5.2, SCCT and other established theories of expectation development (SAT, RGT and EVT) acknowledge that educational choices are not static, but continuously modified in a feedback dynamic where success or failure when completing a task will then re-define outcome expectations, which in turn feed back into interest formation/development, which will once again affect goal-setting and activity choice (Lent and Brown 2006).

Consequently, in this section we consider the possibility that in the long-run, as natives continue on their chosen educational paths, their successes and failures will continue to shape their educational expectations, which might, in turn, amplify or dilute any effects that immigrant peers had had on natives during school-age. Hence, we also investigate whether exposure to immigrant peers has impacted the longer-term educational outcomes of natives, into adulthood.

Table 5.12 explores the extent to which school-age exposure to immigrant peers correlates with adult-age university completion (W4 University Completion). As can be seen below, while the effects of immigrant peers generally, as well as distinct racial categories of immigrant peers, are all positive, none are statistically significant. This leads us to conclude that the positive effect that immigrant peers had on the W1 Educational Expectations of their native classmates was diluted with time, as native youth progressed through emerging adulthood. These heightened expectations did not translate into successful completion of a university degree by the time the sample reached the 24 – 32 age bracket.

This finding supports literature which, exploring educational trends in the 1990s and early 2000s, highlights how the university expectations of high school students in the US very often did not accurately reflect their educational outcomes later in life (Reynolds et al. 2006). According to Rosenbaum (2001), who cites the 1992 National Education Longitudinal Study, over 90 percent of high school seniors planned to obtain a university degree, however by the 2005-2009 American Community Survey (ACS) less than 30% of Americans over the age of 25 had at least a bachelor's degree (McElrath and Martin 2021).

Table 5.12. Effect of Immigrant Classmates on W4 University Completion

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.057					
	(0.081)					
Hispanic Immigrants		0.025				
		(0.101)				
White Immigrants			0.132			
			(0.200)			
Asian Immigrants				0.017		
				(0.102)		
Black Immigrants					0.068	
					(0.499)	
Other-race Immigrants						0.045
						(0.140)
Total Students in Cohort	-0.001	-0.0003	-0.0004	-0.0003	-0.0003	-0.0003
	(0.0004)	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0003)
Constant	0.201*	0.200*	0.200*	0.200*	0.200*	0.200*
	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)
R2	0.351	0.351	0.351	0.351	0.351	0.351

Observations	11,662	11,662	11,662	11,662	11,662	11,662

Note: These are the coefficients from six regressions in which the dependent variable is a dummy indicating that the participant has completed university in W4. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

An important question is whether those who failed to complete a university degree by adulthood were, nonetheless, satisfied with their educational achievement, and whether the interaction with immigrant students had an impact on this satisfaction. That is, while we do not have evidence on an effect on outcomes, immigrant peers could still have an impact on the satisfaction (or dissatisfaction) associated with having failed to complete university education.

In order to test this possibility, we limit the sample to those who had not completed university education and create a dummy variable indicating that they were satisfied with their level of education (W4 Educational Satisfaction). As can be seen in Table 5.13, amongst the 8,584 individuals who had not completed university by W4 of the Add Health survey, an increase of 20 immigrant students in a cohort resulted in a three percentage-point increase in the likelihood of a non-university completing native being satisfied with their achieved level of education. While the effect is only statistically significant at the 10% level, this result goes against our initial expectation and provides further evidence that the effect of immigrant students on educational expectations dissipates over time.

Table 5.13. Effect of Immigrant Classmates on W4 Educational Satisfaction Amongst University Non-Completers

	W4 Educational Satisfaction (1)
Immigrants in Cohort	0.141*
	(0.085)
Total Students in Cohort	-0.001*
	(0.0004)
Constant	0.353***
	(0.103)
R2	0.156
Observations	8,584

Note: These are the coefficients from a regression in which the dependent variable is a dummy indicating that the participant is satisfied with their achieved level of education during W4. The sample is composed of only individuals who had not achieved a university degree. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

5.6. Robustness Checks

We conducted several robustness checks of our results which are presented in Table 5.14 and Table 5.15. First, we conducted the analysis with different specifications including an OLS estimate using the full range of categorical values for the variable on educational expectations rather than a dummy (Column 2), a logit estimation using the dummy variable (Column 3) and an ordered logit using the categorical values (Column 4). The results are consistent with our main results. The presence of immigrants in the classroom has a positive impact on W1 Educational Expectations and no statistically significant effect on W4 University Completion.

Table 5.14. Alternative Specifications for the Effect of Immigrants on W1 Educational Expectations

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.273***	0.415**	1.334***	0.983**
	(0.091)	(0.210)	(0.443)	(0.420)
Total Students in Cohort	-0.002***	-0.004***	-0.010***	-0.008***
	(0.0004)	(0.001)	(0.002)	(0.002)
Constant	0.340***	2.559***	-0.710	2.321***
	(0.130)	(0.323)	(0.679)	(0.131)
R2	0.256	0.257	0.272	0.210
Observations	11,662	11,662	11,662	11,662

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Table 5.15. Alternative Specifications for the Effect of Immigrants on W4 University Completion

Specification	OLS	OLS	Logit
Dependent variable	Binary	Ordinal (full range)	Binary
Immigrants in Cohort	0.057	0.257	0.318
	(0.081)	(0.232)	(0.475)
Total Students in Cohort	-0.001	-0.002	-0.003
	(0.0004)	(0.001)	(0.002)
Constant	0.201*	1.741***	-14.688
	(0.115)	(0.331)	(390.681)
R2	0.251	0.268	0.222
Observations	11,662	11,662	11,662

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

In the main estimations we included a series of family control variables including mother's educational attainment, parental educational expectations of their child, and participation in welfare programs (as an indicator of socioeconomic status). However, it is possible that many family-specific factors remain unobserved. In order to address this possibility, we also conduct an estimation in which we limit the sample to families with siblings (and exclude families in which siblings attended different schools). While this creates a biased sample (i.e., there are selection issues related to having more than one child), it allows us to include sibling dummies and conduct a within-families comparison. That is, comparing children from the same family that are in two different grades and, hence, have a different number of immigrant classmates.

In the sample we have 3,003 respondents (1,447 sibling groups). As can be seen in Table 5.16, the vast majority (93%) of sibling groups are comprised of two siblings, while 3+ sibling groups represent 7% of the sample.

Table 5.16. Description of Sibling Sample

	Share
2 Siblings	0.928
3+ Siblings	0.072

The equation for the sibling estimation is as follows:

$$y_{ijg} = \lambda_j + \alpha_s + \delta M_{gs} + \theta C_{gs} + \beta X_i + \varepsilon_{ijg} \quad \textbf{(Equation 5.4)}$$

In this case, λ_j is a family specific dummy variable.

The small sample size of the sibling dataset is a significant limitation, resulting in losing statistical significance. However, as we can see in Table 5.17 below, the relationships between exposure to immigrant peers and W1 Educational Expectations and W4 University Completion remain positive when comparing between siblings.

Table 5.17. Effect of Immigrant Classmates on W1 Educational Expectations and W4 University Completion for Natives, Sibling Sample

	(1)	(2)
Immigrants in Cohort	0.022	0.025
	(0.165)	(0.132)
Total Students in Cohort	-0.001	-0.0002
	(0.001)	(0.001)
Constant	1.013***	1.003***
	(0.297)	(0.238)
R2	0.661	0.737
Observations	3,003	3,003

Note: These are the coefficients from two regressions in which the dependent variables are W1 Educational Expectations (Column 1) and W4 University Completion (Column 2), using the sibling sample. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

5.7. Conclusion

There is a growing body of literature arguing that the impact of having immigrant students in the classroom has important effects for natives. We contribute to that body of evidence by exploring the impact of immigrant classmates on educational expectations during school-age and university completion during adulthood of native individuals. We do this by exploiting variation in the composition of cohorts within schools. We analyze potential effects of immigrant students by comparing the university-going expectations of native students in cohorts with varying numbers of immigrant students, and subsequently explore if there is an association with educational expectations during the same academic year, as well as university completion during their late 20s and early 30s.

Our results suggest that exposure to immigrant classmates has an effect on the educational expectations of native students during school-age. In particular, a 20-immigrant-student increase in a cohort would increase the likelihood of a native student feeling confident that they will attend university by six percentage-points. Hispanic immigrants have the most significant effect, with a 20-student increase in a cohort corresponding to an eight percentage-point increase in the likelihood of being confident they will attend university. Black and Hispanic natives were most sensitive to the positive effects of their immigrant peers.

In exploring possible mechanisms, descriptive analysis of our data showed that immigrant students had comparatively higher aspirations and expectations than their native counterparts, as well as investing higher effort into their schoolwork. This offers support for two suggested

mechanisms. First, that high-aspiring, high-expecting immigrant peers could heighten native expectations in situations where natives modify their expectations to match their immigrant peers. Second, that the expectations of natives are increased when their similarly-achieving immigrant peers must visibly invest more effort than natives.

The positive influence of immigrant peers on educational expectations that was identified during school-age, however, did not translate into university completion during adulthood. By the time participants reached their 20s and 30s, the impact of school-age classroom interaction with immigrants on the likelihood of attending university was not statistically significant.

This work is not without limitations; the inability to explore in greater detail the reasons why university non-completers during W4 chose to leave education, for example, is an important weakness of this study. Our analysis of the effect of interaction with immigrant peers on the adulthood educational outputs of natives revealed that the positive effect on W1 Educational Expectations did not, in fact, result in higher W4 University Completion. However, our dataset lacks specific questions regarding the reasons why university non-completers chose to stop pursuing higher education. Considering questions regarding the perceived value of education, particularly its value relative to entering the labor market, would be useful in examining the proposed mechanism further. Similarly, exploration into the extent to which financial and social costs (for example family responsibilities) played a role in driving non-completers away from higher education would help in this exploration. Further research should consider including these elements into their analyses.

Similarly, future research could consider the potential impact of teachers on the educational expectations of students. Despite showing that the simple presence of immigrant peers in a

classroom is enough to affect the educational expectations of natives during school-age, it is likely that they are encouraged to pursue higher education by their teachers, and the degree to which teachers offer guidance about the transition to higher education and the processes involved, will ultimately have an effect on students' educational expectations. Neither classroom-level, nor cohort-level teacher characteristics are available in the Add Health data. Consequently, we are unable to control for possible teacher effects more specifically than at the school level, despite the fact that significant literature suggests that teachers can play an important role in shaping students' educational expectations (Van den Broeck et al. 2020, Van Houtte and Demanet 2016). This lack of access to teacher data (including their strategies for providing feedback to students, their approach to motivation, and their attitudes towards higher education) is an important factor which should be addressed if we wish to further develop our knowledge in this field.

Our study revealed the interesting finding that it is simple exposure to immigrant peers in the classroom, rather than friendship, which results in increased educational expectations during school-age. We do not consider this finding to be a limitation, however it does invite further research into the mechanisms which could be responsible for these dynamics. Future studies should explore the question of how the expectations of native students are influenced by day-to-day classroom interactions with native peers without having to create a friendship. In other words, possible questions which arise include: What degree of emotional closeness is required for Mechanism 5.1 (which suggests ambitious immigrant peers may act as models of high expectations and aspirations, with native students then adapting to match these) to occur? Or, alternatively, is the perception of foreign peers as different or unfamiliar (and the existence of in-group v. out-group, or 'us v. them' dynamics) a necessary component for natives to compare their own effort to the relatively-higher amount of effort invested by immigrants in order to

achieve similar results, and subsequently make a positive assessment of their own chances of future success in higher education? In short, investigation into the degree to which native students see their immigrant peers as similar or different to themselves -as substitutes/competition, or merely as peers- will provide a more in-depth understanding of the effects found in this paper.

Similarly, the finding that differences in the racial composition of immigrant populations, as well as racial differences in natives, were strong moderators for effects, invites further research into integration dynamics, and the extent to which natives see themselves as similar to or different from their immigrant peers. Having seen that the effects of immigrant peers (particularly those of Hispanic race) were experienced strongest by natives of Black and Hispanic race, further research could explore, in greater detail, the existing inter and intra-racial reference-group dynamics, as well as the mechanisms through which multiculturality, race, and educational expectations all interact. The degree to which minority natives (such as those of Black or Hispanic race) may identify with and feel similar to immigrant peers, rather than majority natives, is worthy of exploration. Do immigrants represent substitutes and competition for some natives, while simultaneously being perceived as complements for others?

Even when considering the limitations and opportunities for further research laid out above, this study makes important contributions to our understanding of factors which influence the development of educational expectations, their realization, and educational satisfaction during adulthood. With research highlighting the importance of educational expectations not only for future academic achievement, but also for greater ambition and success in the labor market (Erikson and Jonsson 1996, Jackson 2012, Jowkar et al. 2014, Portes et al. 2010, Suárez-Orozco et al. 2009), economies and societies wishing to maximize the benefits of immigration

and increasingly multicultural communities may wish to consider the immigration-expectations link. In order to maximize these benefits, our research points to a number of key considerations which should be made at the class, school, and policy levels.

The positive effect of immigrant peers on the educational expectations of natives during school-age suggests that, at both the classroom and school level, it could be useful to promote opportunities for open-minded and tolerant interactions between native students and their immigrant peers, where students feel prompted to listen to and learn from each other. Regardless of whether Mechanism 5.1 or Mechanism 5.3 (or both) is responsible for the positive effects seen on native educational expectations, mere classroom interactions with high-ambition, high-effort immigrant students appear to be enough, at least in the short term, to encourage natives to pursue higher education; thus, at the classroom level, it could be beneficial for teachers to encourage multicultural dialogue.

Equally as important as facilitating interactions, however, is ensuring that the positive effects on educational expectations seen in this study are maintained, as opposed to being diluted as natives transition into young adulthood. For natives to be able to materialize their once-high educational expectations into degree completion, teachers, schools, and policies may consider additional measures to provide the appropriate motivation and support.

Within a classroom, it could be useful for teachers identify and promote high educational ambitions by encouraging university-aspiring students to persist in their goal of obtaining a degree, by challenging them academically, and by acting as models of the benefits of higher education themselves.

Similarly, schools can attempt to maximize the yields from high educational expectations by offering university-aspiring students guidance regarding, and support with, the university application process throughout high school. Ensuring that students with university-going expectations are on-track to apply and be accepted into a fitting degree, and that they remain motivated to perform at the level required to be admitted, may contribute to materializing high expectations into completion.

At the policy level, efforts to reduce the costs of pursuing higher education relative to those of entering the labor market could prove beneficial. Working to ensure that financial aid (and knowledge of the aid options available) is accessible to university-aspiring students could encourage those who might be dissuaded from pursuing higher education due to the financial burden of a university education. Similarly, providing attractive opportunities for individuals to study and work simultaneously, or to return to education after a period of time in the labor market, could help encourage those individuals for which higher education represents a high financial cost, relative to entering the labor market.

Finally, policy can also look to invest into research regarding educational motivation, particularly research into strategies and practices for building and maintaining educational drive and resilience. Subsequently, developing programs and initiatives to identify high-aspiring individuals during high school and guide them into the best-fitting university degree, while making sure to keep them motivated, engaged, and challenged, could help materialize high educational expectations into degree completion, and ensure the ambition resulting from interaction with immigrant peers is not lost as individuals transition into adulthood.

6. The Socialization of Gender in Education: Immigrants in the Classroom and the Gender Attitudes of Natives

Abstract

Using data for the United States, we explore the relationship between interactions with immigrant peers during school-age, and the adult-age gender attitudes of natives. We exploit across-cohort, within-school differences in the number of immigrant students to determine the implications of the demographic composition of a cohort, while controlling for school characteristics. The analysis makes use of The National Longitudinal Study of Adolescent to Adult Health survey (Add Health), which includes a nationally-representative sample of students in grades 7 to 12 during the 1994-95 school year, and carries out four subsequent waves covering a 24-year time span. We find that exposure to immigrant peers during high school has no effect on the adulthood gender attitudes of natives once the attitudes of natives' own parents are taken into account. Our results suggest that correlation of gender attitudes is stronger in native parent-child pairs than in immigrant parent-child pairs, and as a result, the (generally more conservative) attitudes of immigrant parents are not transmitted to native students.

6.1. Introduction

Adolescence is a key phase not only in the physical and cognitive development of human beings, but also in the emergence and consolidation of perceived social roles, opportunities, and power relations. Perspectives regarding key milestones and transitions – including the pursuit of tertiary education, romantic relationships, marriage, and career goals – are, to a significant degree, developed during adolescence.

Gender socialization – defined as the process in which individuals 'develop, refine and learn to do gender through internalizing gender norms and roles as they interact with key agents of socialization, such as their family, community, social networks and other social institutions' (Neetu et al. 2017) – intensifies during adolescence (Brechwald and Prinstein 2011, Neetu et al. 2017, Palermo et al. 2020, Prinstein and Dodge 2008).

Through gender socialization, individuals develop gender attitudes. The term 'gender attitudes' refers to an individual's personal evaluation and endorsement of gender norms (which can, in turn, be defined as the widely accepted social rules about the behaviors, traits, and opportunities associated with masculinity and femininity in a given culture (Ryle 2021)). As a social and cultural construction of masculine and feminine identities, roles, norms, and relationships, rather than a trait grounded in biological sex, gender attitudes are constantly defined, challenged, and re-defined by adolescents through interactions with others as well as their environments (Butler 1999, Connell 2003, Ridgeway and Correll 2004, World Health Organization 2023).

Gender socialization and, in turn, the development of gender attitudes, contributes to determining the opportunities and livelihoods of particular groups and individuals, and these perspectives can have a long-term impact on the individual's life course (Neetu et al. 2017, Palermo et al. 2020). Two well-established theoretical streams, Identity Economics and Social Learning Theory, highlight the major influence that relevant others, mainly parents and peers, can have in the development of gender attitudes – be it through direct teaching/interaction, role modeling, or observation.

This paper focuses on the development and consolidation of gender attitudes, and the effect of an individual's relevant others on these attitudes. We focus, more specifically, on the degree to which gender attitudes could be transmitted to native students from not only their own parents, but also from their immigrant peers, and from the parents of immigrant peers.

We explore this relationship through the following research questions:

Do native and immigrant parents have significantly different views on gender? Are the gender attitudes of native and immigrant parents correlated with the gender attitudes of their own children? If so, does interaction with immigrant peers influence the gender attitudes of natives? Do immigrant parents directly influence the gender attitudes of native students?

Existing literature engaging with gender attitude transmission has focused primarily on the short-term influence of parents and, to a lesser extent, the transmission from relevant others such as teachers and peers (also in the short-term). However, in the context of increasingly multicultural communities within the United States (US) (Vespa et al. 2020), the potential effects of the gender attitudes of immigrant students on the gender attitudes of their native peers

have recently become a subject of increasing interest, particularly in contexts where immigrant communities originate from countries with relatively more traditional, conservative, and gendered attitudes towards education (Arends-Tóth and Van de Vijver 2009, Diehl et al. 2009, Roder 2014, Wang, S. 2019). Concerns that interaction with immigrant peers (and the parents of these peers) could shift native gender attitudes away from what are considered the more liberal, egalitarian gender attitudes of the US, have been increasingly voiced within the last two decades (Cabrera and Coll 2004, Chavez 2013, Ciftci 2012, Dragojevic et al. 2017, Henrikson 2007, Jimenez-Castellanos and Gonzalez 2012, Kalkan et al. 2009, Mahmood 2020, Moller 2007, Panagopoulos 2006, Terman 2017, Zárate et al. 2004).

We contribute to this field by exploring the degree to which immigrant students can transmit long-lasting gender attitudes to their native peers. We also contribute to the field by considering the potential impact of a group of key adults in the social world of native students – their peers' parents.

In order to explore how interactions with immigrant students during school-age affect the posterior gender attitudes of natives, we use The National Longitudinal Study of Adolescent to Adult Health survey (Add Health)(Harris 2018). This is a longitudinal study in the US that includes a nationally-representative sample of students in grades 7 to 12 during the 1994-95 school year. The students were interviewed in four additional waves, covering a period of 24 years. The survey collected detailed information on family and school composition, as well as information regarding friendships during school-age. Equally important for our study, the third wave of data collection gathered information on gender attitudes, at a time when respondents were 18 to 26 years of age.

In the analysis we focus on the impact of differences in the number of immigrants across cohorts, within schools. We also identify and control for the effect of the gender attitudes of a native's own parent, and the degree to which parent and child gender attitudes resemble. This allows us to focus on the implications of the demographic composition of a student's cohort, while controlling for parental gender attitudes, as well as broader school differences, and the possibility of self-selection into schools.

Our results suggest that exposure to immigrant classmates has no statistically significant effect on the adulthood gender attitudes of natives. In the exploration of mechanisms of influence, we find evidence of weak correlation between the relatively conservative gender attitudes of immigrant parents and the gender attitudes of their immigrant children, suggesting that immigrant students who are socialized in the US do not strongly adopt (and hence, do not transmit) the more-conservative gender attitudes from their parent's country of origin. We also find that, even in cases where immigrant parents are highly social and consequently interact more often with their children's peers or other parents, transmission from more conservative immigrant parents is not enough to produce a long-lasting effect on the gender attitudes of natives.

6.2. Literature Review and Conceptual Background

Over the last decades, research has focused increasingly on gender gaps, including the differences between men and women in outputs such as educational attainment, labor market participation, and participation in decision-making arenas (Giuliano 2020, Jayachandran 2015, Kandpal and Baylis 2019, Ke 2021, Rodríguez-Planas et al. 2022). Despite the notable progress being made to shrink the gap between genders in these domains – particularly when focusing

on some Western societies – differences between genders persist in almost every country (Charles and Grusky 2004, Cotter et al. 2011, Inglehart and Norris 2003, Mencarini and Sironi 2012).

Different degrees of progress in the elimination of gender gaps have been attributed to both human capital factors, as well as changes – or lack thereof – in gender norms. Recent theoretical frameworks by Goldin (2014), as well as Blau and Kahn (2017), for example, have highlighted how human capital factors such as work force interruption and inflexible job structures, can significantly hinder the shift towards more equitable outcomes for men and women.

Simultaneously, and more relevant to this study, literature has identified how movement towards more egalitarian gender norms and attitudes has been linked to shrinking gender gaps in labor and educational outcomes (Bertrand et al. 2021, Brooks and Bolzendahl 2004, Cotter et al. 2011, Inglehart and Norris 2003), with important differences across generations, countries, and ethnicities (Arends-Tóth and Van de Vijver 2009, Bertrand 2010, Diehl et al. 2009, Fernandez 2011, Fortin 2005, Fortin 2015, Roder 2014, Wang, S. 2019). Recent literature has also extensively explored contexts in which current norms and stereotypes continue to perpetuate gender inequality (Bertrand 2020) affecting skill development (Alesina et al. 2013, Pearse and Connell 2016) and acting as obstacles on the educational trajectories of girls, consequently affecting their future economic outcomes (Bertrand 2020, Fortin 2005).

6.2.1. Development of Gender Norms and Intergenerational Transmission

The afore-mentioned literature, which supports the existence of a relationship between gender norms and educational outcomes, is most often grounded in one of two theoretical streams: Identity Economics (IE) or Social Learning Theory (SLT).

According to IE (Akerlof and Kranton 2000, Akerlof and Kranton 2010) an individual's identity is linked to their belonging in a social category. Within social categories, norms dictate how a person should behave (for example, men could be expected to financially provide for the family, while women may be expected to look after the home). In IE, an individual's identity is seen as an argument in the utility function, with individuals who behave according to assigned behavioral norms receiving a positive payoff, and those who deviate receiving a penalty (Akerlof and Kranton 2000, Akerlof and Kranton 2010, Ewing Lee and Troop-Gordon 2011). In an educational context, IE would suggest that in societies with strongly-gendered norms about the degree of education that women can and should pursue, women would modify their educational expectations and effort in response to the expected positive payoffs from conforming with norms, and negative payoffs from non-conforming.

SLT, in turn, suggests that individuals adopt gender norms through teaching and role modeling (Bandura 1977, Glass et al. 1986, Moen et al. 1997). SLT posits that, by observing their parents and other role models, children identify behavioral patterns and then imitate, adapt, and internalize those behaviors (Bandura 1977, Filler and Jennings 2015). In the specific domain of educational gender attitudes, children may perceive sex-specific division of labor, gendered allocation of tasks, or the relationship between male and female family members, and in turn, modify their own educational desires, expectations, and behaviors to match those of their role models (Chung, K. 2000, Manski 1993).

IE and SLT should not be perceived as mutually-exclusive, but rather complementary explanations to how individuals develop educational gender attitudes. After all, observation of others, particularly parents and role models, could shape an individual's expectations regarding the positive payoffs expected from conforming with assigned behavioral norms, as well as the negative payoffs expected from non-conforming (Ewing Lee and Troop-Gordon 2011, Kranton 2016, Norris, J. 2019). The consequences of conforming and non-conforming could also be explicitly taught by parents and role models to children (Bucx et al. 2010, Min et al. 2012, Phalet and Schönpflug 2001, Sinclair et al. 2005).

Consequently, both theoretical approaches, along with a wide variety of empirical studies (Brechwald and Prinstein 2011, Ewing Lee and Troop-Gordon 2011, Prinstein and Dodge 2008) suggest that the gender attitudes of parents and relevant others play a significant role in determining their child's corresponding attitudes.

This process of cultural transfer of attitudes is also known as 'transmission' (or 'intergenerational transmission' if it occurs across generations, as with parent-child pairs), and is a phenomenon observed not only in the imparting of general attitudes, but also specifically with gender-related attitudes (Carlson and Knoester 2011, Cunningham 2001, Farré and Vella 2013, Idema and Phalet 2007, Kulik 2002, Min et al. 2012, Spierings 2015). The influence of parents on the gender attitudes of their children is, by far, the most widely studied phenomenon, however the effects of non-parent adults (often teachers), or even other children (often school peers) have also been documented in literature.

Empirical studies of intergenerational transmission of gender attitudes have been conducted within the last decade by many scholars in a variety of contexts (Cano and Hofmeister 2023,

Cordero-Coma and Esping-Andersen 2018, Dhar et al. 2019, Kretschmer 2018, Perales et al. 2021, Platt and Polavieja 2016, Rodríguez-Planas and Sanz-de-Galdeano 2019). Though results have differed depending on context and methods, these studies have found strong evidence to support the existence of intergenerational transmission of gender attitudes between parents and their children.

6.2.2. Transmission from Non-Parents

Research on transmission of gender attitudes has focused on the role of family members, particularly parents, and more specifically parents of the same sex as the child (mothers' effects on girls, and fathers' effect on boys). The role of non-family members in gender role transmission has been relatively understudied (Bisin and Verdier 2001, Bisin and Verdier 2011, Borjas 1992, Sáez-Martı´ and Zenou 2012). However, there is growing recognition that the formation of attitudes generally, and specifically of gender norms, involves a variety of actors throughout an individual's lifespan, and that while family may be key in initial stages, with age, peers and non-family relevant-others become increasingly important (Alan et al. 2018, Bisin and Verdier 2001, Chetty 2018, Chung, B. 2020, Eble and Hu 2022, Ewing Lee and Troop-Gordon 2011, Olivetti et al. 2020).

Peer characteristics and school cohort composition, for example, have been found to affect attitudes in two recent studies (Garcia-Brazales 2021, Rao 2019). While Garcia-Brazales (2021) found that higher exposure to female peers during childhood resulted in decreased long-term agreement with traditional gender roles, Rao (2019) identified a dynamic in which the discriminatory attitudes of students from high-income families decreased, and they developed more egalitarian attitudes, through higher exposure to peers from low-income families.

Similarly, teacher attitudes have been found to affect their students' educational gender attitudes. Alan et al. (2018), for example, find that traditional gender views on behalf of teachers have a negative effect on female performance in math (with no effect on males), while Carlana (2019) finds that the gender gap in math performance (in favor of boys) is accentuated by exposure to teachers with strong gender stereotypes.

In addition, and most relevant to our study, a handful of recent empirical studies have found that parents of peers may generate effects through information spill over (Chen et al. 2023, Chung, B. 2020, Chung, B. and Zou 2023, Chung, B. et al. 2022, Eble and Hu 2022, Jang and Kim 2023). These studies have suggested that peer parents may affect the attitudes and behaviors of their child's friends through several mechanisms, including through increased interaction (and consequently social learning by means of direct observation), through influencing other parents (i.e., changes in parental behavior and parenting styles), and by influencing children's educational environment (through increased parent-teacher interaction).

6.2.3. The Gender Attitudes of Immigrants

Recent literature has extensively explored how gender attitudes differ between cultures, the extent to which immigrants living in a new country maintain the gender norms of their country of origin. Research has also studied the degree to which transmission of attitudes might differ between native and immigrant parent-child pairs (Bejarano et al. 2011, Diehl et al. 2009, Idema and Phalet 2007, Maliepaard and Alba 2016, Norris, P. and Inglehart 2012, Roder and Mühlau 2014, Roder 2014, Spierings 2015, Su et al. 2010).

With gender roles being malleable throughout childhood and adolescence, but tending to stabilize over young adulthood (Crouter et al. 2007, Davis 2007, Fan and Marini 2000, Roder and Mühlau 2014), immigrants who were socialized in their country of origin and subsequently moved to the US have been found to generally sustain the traditional gender role attitudes of their home country (Arends-Tóth and Van de Vijver 2009, Barry et al. 2006, Bejarano et al. 2011, Blau et al. 2011, Blau 2015, Diehl et al. 2009, Roder 2014, Villalba et al. 2018, Wang, S. 2019).

In an analysis of 1980 – 2000 Census data, Blau and colleagues (2011) found that the immigrant population living in the US at the time came from countries which had, on average, more traditional gender roles than the US. The researchers share that the average ratio of female-to-male labor force participation was lower, and fertility rates higher, in immigrant source-countries than in the US. Simultaneously, throughout the 20-year period analyzed, the labor force participation of American women increased at a higher rate than the labor force participation of women in immigrant source countries.[6]

While traditional gender roles need not necessarily be linked to religion, literature has also suggested a degree of association between the religiosity of some immigrant populations and their gender attitudes (Diehl et al. 2009, Kretschmer 2018, Roder 2014). The more theoretical work of Gerhards (2007), as well as Inglehart and Norris (2003), posits that the 'natural order' perspective which many religious denominations impose on gender and gender-specific responsibilities, in turn results in more traditional gender norms and attitudes in day-to-day life, with women typically being assigned family-related tasks. The tendency of highly-religious

[6] While outcomes such as labor force participation and fertility rates represent outcomes, and may not necessarily reflect attitudes, it is possible that they signal general cultural patterns about differences between men and women in their acceptable roles, priorities, and pursuits. In an upcoming section, we test whether there are, in fact, differences between the attitudes of immigrant and native participants in our sample.

individuals to also hold more traditional gender attitudes has been demonstrated empirically by a number of scholars (Diehl et al. 2009, Idema and Phalet 2007, Inglehart and Norris 2003, Norris, P. and Inglehart 2012).

Within the context of the US, case-studies have found, more specifically, that Confucian-based gender roles may result in more traditional gender attitudes amongst East Asian immigrants (Barry et al. 2006, Lee 1996, Lu and Lin 1998), that strong Catholicism may lead to more traditional gender roles such as marianismo and machismo amongst the Latino immigrants (Bejarano et al. 2011, Falconier 2013, Miville et al. 2017, Parra-Cardona et al. 2008, Ruiz et al. 2017, Villalba et al. 2018), and that Muslim immigrants also tend to support more traditional gender role structures than average natives (Ajrouch 2007, Al-Qubbaj et al. 2009, Bartkowski and Read 2003, Camarota 2002, Inglehart and Norris 2003).

6.2.4. Intergenerational Transmission of Gender Attitudes Amongst Immigrants

Intergenerational transmission of gender roles may be different for native and immigrant children, if only because immigrant children are very often exposed to two different cultures – and hence, two different sets of gender attitudes – simultaneously (de Valk and Liefbroer 2007, de Valk 2008, Goldscheider et al. 2011, Idema and Phalet 2007, Kretschmer 2018). If, as outlined by the literature above, immigrant adults who were socialized abroad generally keep the gender attitudes of their home culture, it is likely that their children will perceive – and to greater or lesser extents, adopt and normalize – these attitudes (Kretschmer 2018, Pels and Nijsten 2003). At the same time, during day-to-day life in the US, immigrant children are exposed to the culture and gender attitudes of natives (de Valk and Liefbroer 2007, de Valk 2008, Idema and Phalet 2007, Phalet and Schönpflug 2001, Roder and Mühlau 2014).

This process of negotiation between home-country and host-country attitudes is part of a process often referred to as 'acculturation', more formally defined as 'changes in an individual's cultural patterns (i.e., practices, values, identities) resulting from sustained firsthand intercultural contact' (Ward and Geeraert 2016). The general tendency which has been identified is that the attitudes and behaviors of immigrants and natives gradually converge over time, and most notably across generations (Alba and Nee 2003, Gagliarducci and Tabellini 2022, García and Schmalzbauer 2017, Kalmijn and Kraaykamp 2018, Molteni and Dimitriadis 2021, Roder 2014, Vigdor 2015, Yamanaka and McClelland 1994). This convergence has been documented empirically, in the specific case of gender role attitudes, for Latinos in the US (Kranau et al. 1982, Leaper and Valin 1996, Pinto and Coltrane 2009), for Arab women in the US (Read 2003); and for Turks in Germany (Diehl et al. 2009).

According to theory, the extent of change often depends on a number of factors, including the initial size of the gap between cultures, the relative importance of values within a host population, the degree to which immigrants are expected to integrate with the majority culture, and how important it is to an immigrant population that they maintain specific values or cultural identity (Drouhot and Nee 2019, Roder 2014, Roder and Mühlau 2014). Most relevant to our study, intergenerational acculturation has also been found to be sensitive to an immigrant's degree of social and structural integration.

The extent to which an immigrant child is socially integrated in their host country and the peers they associate with has been shown to influence their gender role attitudes (Jacob and Kalter 2013, Maliepaard and Alba 2016). Empirical evidence of this has been found by Phinney and

Flores (2002) for Hispanics in the US and by Maliepaard and Alba (2016) for Turkish and Moroccan immigrants in the Netherlands, for example.

Similarly, structural integration (i.e., the degree to which an individual is embedded in the country's institutions), has been shown to affect the attitudes and values of immigrants (Jacob and Kalter 2013, Maliepaard and Lubbers 2013, Maliepaard and Alba 2016). Greater comfort in navigating a country's educational system and labor market creates opportunities for interaction with natives, and consequently, increases exposure to behaviors and norms in the host country. In a way, participation in these institutions may also signal, in itself, openness on behalf of the immigrant individual to the host country's behaviors and norms. Empirically, increased involvement with educational institutions and higher educational attainment have been found to be associated with more egalitarian gender attitudes (Carlson and Knoester 2011, Idema and Phalet 2007), as has proficiency in the host language (Diehl et al. 2009, Idema and Phalet 2007, Kavli 2015, Phinney and Flores 2002).

In this context, transmission of gender attitudes between immigrant parents and their children may certainly be more complex, if not weaker, particularly in situations where children face norms which are different, or perhaps even contradicting (Guveli et al. 2015, Idema and Phalet 2007, Phinney and Flores 2002, Schonpflug 2001, Spierings 2015).

6.2.5. Contributions and Hypotheses

In summary, the literature above supports four key premises for our study:

(1) Gender roles have been found to directly affect educational outcomes.

(2) The development of gender attitudes can be explored through two perspectives, which need not be mutually exclusive. According to Social Learning Theory, gender roles and attitudes develop through the observation of parents and other role models. According to Identity Economics, an individual's identity is linked to a social category, and individuals are rewarded for complying with assigned behavioral norms for that social category.

(3) While the transmission of gender attitudes is most often studied in parent-child pairs (also known as intergenerational transmission), other role models such as teachers and peer-parents, or peers themselves, may influence the gender attitudes of a child. The influence of non-parents on attitude transmission increases with age, as an individual moves into adolescence.

(4) Adult immigrants who were socialized in their home country have different educational and labor market behaviors than natives (with immigrants generally having more traditional / gendered educational attitudes). The transmission of gender attitudes can be more complex amongst immigrant children, who are in a constant state of negotiation between the attitudes of their parents and that of natives in the host country.

Despite the extensive amount of existing research exploring these premises, a number of areas for further contribution remain. Our paper contributes to this field of study in at least two significant ways:

(1) Most existing literature on transmission of gender attitudes focuses on the effect of parents (particularly parent-child pairs of the same gender) and, to a lesser extent, the effect of teachers. In this paper we explore the effect of a different reference group for the gender role socialization of natives: peers and their peers' parents. More specifically, immigrant peers and immigrant peers' parents.

(2) Over the last decade, literature has recognized the importance of teenage years for long-term educational and labor market outcomes. Yet, few studies consider gender attitudes in their exploration of these long-term influences. We contribute to this literature by exploring link between various influences during adolescence and long-term gender attitudes.

Considering these premises and areas for contribution, the goal of this paper is to assess whether different degrees of interaction with immigrant peers (and immigrant peers' parents) affects the gender attitudes of natives into adulthood, after controlling for the attitudes of a native's own parent. Adopting Manski's (1993) terminology, we are looking to uncover the existence, or lack-thereof, of a contextual peer effect, exploring the possibility that natives who are socialized in contexts with a greater proportion of immigrant peers and immigrant peer-parents with more traditional gender attitudes, have a higher likelihood of developing traditional gender attitudes themselves.

Consequently, we develop the following hypothesis about the effect of immigrant peers on the gender attitudes of natives:

Hypothesis 6.1: ***An increase in the number of immigrant peers in a cohort will result in natives adopting more traditional gender attitudes themselves.***

In our exploration of the hypothesis above, we consider two possible mechanisms which could be responsible for immigrant peers having an effect on the gender attitudes of natives.

Mechanism 6.1: Immigrant parents have more conservative gender attitudes than native parents. These more conservative gender attitudes are transmitted from immigrant parents to immigrant children who, in turn, transmit these attitudes to their native peers.

Mechanism 6.2: More conservative gender attitudes are learnt by native students through direct observation of -and interaction with- the parents of their immigrant peers.

6.3. Data

6.3.1. Description of the Data Used

The National Longitudinal Study of Adolescent to Adult Health survey (Add Health) (Harris 2018) is a longitudinal study conducted in the US. The first wave was conducted in the academic year 1994-95 and it included a nationally-representative sample of students in grades 7 to 12. There were four additional waves of the survey in 1996, 2001–02, 2008, and 2016-18. In this study, we focus on the first wave of the survey, when most students were between 14 and 18 years of age, and the third wave of the survey (2001-2002) when respondents were 18 to 26 years of age. From the first wave we collect information regarding individual, family,

and school cohort characteristics, as well as parental attitudes. From the third wave we collect the information on adult-age gender attitudes.

As shown in Table 6.1, in the general sample there were 19 immigrant students per grade out of an average of 71 students, suggesting that on average close to 27% of students were immigrant. Also, most students were aged 14 to 18 during the first interview and the majority of respondents were White. A slight majority of students came from families in which the mother had high school education or less. Finally, 10% of families received assistance from welfare programs.

See Appendix 23 for a detailed description of all the variables included in the estimation.

Table 6.1. General Characteristics of the Sample

Variable		**Distributions and Means**
Immigrants in Cohort		19
Total Students in Cohort		71
Sex – Male		0.466
Race	White (non-Hispanic)	0.650
	Hispanic	0.014
	Black (non-Hispanic)	0.249
	Asian (non-Hispanic)	0.075
	Other (non-Hispanic)	0.012
Age		
	12	0.003
	13	0.088
	14	0.141
	15	0.170
	16	0.186
	17	0.192
	18	0.163
	19	0.052
	20	0.004
	21	<0.000

Mother's Educational Attainment		
	High school or less	0.540
	Some college	0.197
	College or more	0.263
On Benefits		0.100

6.3.2. Constructed Parent Variables

With literature highlighting the importance of parents in the development of an individual's gender attitudes, and looking to contribute to the scarce research on the role of peers' parents, we construct three Parent Variables to incorporate into our analysis. A detailed description of the construction of these variables, including the distribution of responses for each of the questions used, can be found in Appendix 23.

Traditional Gender Roles (Parent)

The Traditional Gender Roles (Parent) variable is the primary variable used in our analysis of the relationship between the gender attitudes of parents and those of their children, both amongst native and immigrant parent-child pairs. The variable is constructed from the following two questions in the Add Health W1 Parent Survey:

(1) *Of the following, which do you think is the most important thing for a boy to learn?*

(2) *Of the following, which do you think is the most important thing for a girl to learn?*

Response options were: (1) to be well behaved; (2) to be popular; (3) to think for him/herself; (4) to work hard; and (5) to help others.

Parents were identified as having Traditional Gender Roles if they selected either (3) or (4) for Question 1 (traditionally masculine traits), while simultaneously selecting either (1) or (5) for Question 2 (traditionally female traits). Parents who were identified as having Traditional Gender Roles were then coded as 1, and all others as 0.

Social Score (Parent)

The Social Score (Parent) variable looks to measure the extent to which a student's parent may interact with the child's friends or school community. We construct this variable from five different questions in the Add Health W1 Parent Survey.

(1) *Please think about all of {CHILD'S} friends. How many parents of {CHILD'S} friends have you talked to in the last four weeks?*
(2) *The next questions are about {NAME}'s best (male/ female) friend. Have you met this friend in person?*
(3) *Have you met this friend's parents?*
(4) *During this school year, have you participated in school fund-raising or done volunteer work for {NAME}'s school-such as supervising lunch, chaperoning a field trip, etc.?*

Points were assigned to the more social responses for each question, and the sum of points was then calculated for each respondent. Highly-social parents received a score of 4, and non-social parents a score of 0.

Table 6.2. Distributions of Constructed Parent Variables

Variable		Native	Immigrant
Traditional Gender Roles (Parent)		0.024	0.079
Social Score (Parent)	0	0.045	0.097
	1	0.107	0.180
	2	0.485	0.532
	3	0.288	0.165
	4	0.076	0.026

6.3.3. Dependent Variable

To explore the effects of interaction with immigrant peers on natives' adulthood gender attitudes, we develop the W3 Traditional Gender Roles variable below.

W3 Traditional Gender Roles

Our W3 Traditional Gender Roles variable is constructed from the Add Health question below:

> *How much do you agree or disagree with the following statements: It is much better for everyone if the man earns the money and the woman takes care of the home and family.*

Response options ranged from '1 – Strongly Agree' to '5 - Strongly Disagree'. We dichotomize this variable and assign neutral or positive support for Traditional Gender Roles (responses of 1, 2, or 3) to one category (= 1) and negative responses (4 or 5) to another category (= 0).

Table 6.3. Distributions of Dependent Variables

Variable	Native	Immigrant

W3 Traditional Gender Roles	1 – Strongly Agree	0.102	0.105
	2	0.111	0.136
	3	0.265	0.265
	4	0.180	0.170
	5 – Strongly Disagree	0.342	0.323
W3 Traditional Gender Roles (Binary)	1	0.478	0.506

It is worth noting that W1 of the Add Health dataset did not include questions regarding the gender role attitudes of participants during school-age. The W3 variable described above illustrates the gender attitudes of participants which persisted into adulthood. As can be seen in Table 6.3, by the time participants reached adulthood, the likelihood of agreeing with Traditional Gender Roles was only marginally higher for immigrant respondents than for natives (i.e., 48% of natives, compared to 51% of immigrants).

6.4. Methods

Our exploration of a potential relationship between exposure to immigrant peers and the gender attitudes of natives is structured into four questions, which we address in the following order:

(1) Do native and immigrant parents have significantly different views on gender?

(2) Are the gender attitudes of native and immigrant parents correlated with the gender attitudes of their own children?

(3) If so, does interaction with immigrant peers influence the gender attitudes of natives?

(4) Do immigrant parents directly influence the gender attitudes of natives?

We employ linear regression in order to respond to these questions, with one or several unique empirical specifications for each question. In all empirical strategies, α_s is a school dummy to

control for any differences across schools, as well as observable and unobservable characteristics which could drive individuals to self-select into particular schools (Arieli et al. 2016).

6.4.1. Empirical Strategy

Question 1: Do native and immigrant parents have significantly different views on gender?

In order to answer Question 1, we use the following equation:

$$\boldsymbol{T_p = \delta I_p + \theta G_p + \alpha_s + \sum_{p=1}^{4} \rho_p R_p + \beta Z_p + \varepsilon_{ps}} \qquad \textbf{(Equation 6.1)}$$

For this empirical specification, we consider the total parent sample[7], which includes both immigrant[8] and native parents, for a total of 12,468 individuals.

In this case, T_p represents our Traditional Gender Roles (Parent) variable, for (Parent) individual p. I_p is a binary variable, in which 1 represents the respondent is immigrant, and 0

[7] For the Parent Survey, the mother (or other female head of the household) of the originally sampled student was asked to participate in a 40-minute interviewer-administered, paper-and-pencil survey regarding health status and behaviors of the student, home environment, and her interpersonal relationships. The student's mother (or other female head of the household) was identified by Add Health as the desired respondent to complete the questionnaire because, according to the results of previous studies, mothers are generally more familiar than fathers with the schooling, health status, and behaviors of their children. In situations where the mother did not reside in the household, interviewers were asked to interview other potential respondents in the following order: (1) Stepmother, (2) Other female guardian, such as a legal guardian or grandmother, (3) Father (4) Stepfather, (5) Other male guardian, such as a legal guardian or grandfather. The biases and implications resulting from this method of selection are discussed in the conclusion.

[8] The Parent Survey does not record the country of birth of the student's grandparents (parents of parents). Consequently, for specifications requiring us to consider parent nativity, the term "Immigrant" refers to those parents who are foreign-born, and the term "Native" to those who are US-born.

represents they are native. G_p is a control for the individual's gender, where 1 represents males and 0 represents females, and R_p is an indicator of the racial group of the individual with White race as the reference category. In this specification, Z_p represents a series of controlled characteristics of the individual.

Our main interest from Equation 6.1 is on δ which provides information on the degree to which being an immigrant is related with holding more Traditional Gender Roles, amongst the parent sample.

Question 2: Are the gender attitudes of native and immigrant parents correlated with the gender attitudes of their own children?

We then explore Question 2. In order to identify and isolate possible parental effects, we carry out an estimation for the correlation between the gender attitudes of parents and the gender attitudes of their own children.

This estimation is represented by the following two equations:

$$\boldsymbol{y_i = \delta T_i + \theta G_i + \alpha_s + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 6.2)}$$

$$\boldsymbol{y_i = \delta T_i + \varphi I_i + \theta G_i + \alpha_s + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 6.3)}$$

Both empirical specifications consider the total student sample (which includes both immigrant and native respondents) who responded to both W1 and W3 survey questions, and whose parents completed a Parent Questionnaire. This results in a sample of a total of 3,433 individuals.

In Equation 6.2, y_i represents our W3 Traditional Gender Roles variable for individual i. In this equation, our focus is on δ, which provides information on the degree to which a parent having Traditional Gender Roles is correlated with the likelihood of their child also having W3 Traditional Gender Roles. G_i is a control for the individual's gender, where 1 represents males and 0 represents females, and R_i is an indicator of the racial group of the individual with White race as the reference category. In this specification, X_i represents a series of controlled characteristics of the individual.

In Equation 6.3, we add a control for whether a student is an immigrant (measured through a binary variable where 1 indicates the student is an immigrant, and 0 indicates the student is a native).

We then modify Equation 6.3 by including two interactions. Equation 6.4 includes an interaction with the son/daughter's immigrant status. The aim of this interaction is to determine whether or not the correlation between a parent's gender attitudes and the gender attitudes of their child differs between immigrant and native parent-child pairs.

Equation 6.5 then includes an interaction with the son/daughter's gender, as ample literature suggests that gender attitudes are adopted differently by girls than by boys (Brenøe 2018, Houtte 2004, Leight 2021, Mavrokonstantis 2015).

$$\boldsymbol{y_i = \delta T_i + \varphi I_i + \theta G_i + \alpha_s + \sum_{i=1}^{4} \rho_i R_i + \lambda T_i * I_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 6.4)}$$

$$\boldsymbol{y_i = \delta T_i + \varphi I_i + \theta G_i + \alpha_s + \sum_{i=1}^{4} \rho_i R_i + \lambda T_i * G_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 6.5)}$$

Question 3: Does interaction with immigrant peers influence the gender attitudes of natives?

Once we determine the extent to which the attitudes of an individual's parent is related to the individual's own gender attitudes, we focus on the possible effect of interaction with immigrant peers.

For both of these empirical specifications, we consider only the native student sample (excluding immigrant students) who responded to both W1 and W3 survey questions, and whose parents completed a Parent Questionnaire. This results in a sample of a total of 2,821 individuals.

Our estimation for the effect of interaction with immigrants on native gender attitudes is represented by the following equations:

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta G_i + \vartheta A_{gs} + \Omega T_i + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \qquad \textbf{(Equation 6.6)}$$

In Equation 6.6, y_{igs} is the W3 Traditional Gender Roles, for individual i in grade g in school s. As previously mentioned, α_s is a school dummy to control for any differences across schools, and M_{gs} is the number of immigrant students in grade g in school s. We adjusted this number by dividing by 100. Once again, G_i is a control for the individual's gender, where 1 represents males and 0 represents females. A_{gs} is the total number of all students in grade g in school s. T_i is a control for the Traditional Gender Role (Parent) for each individual's own parent. Consistent with previous specifications, R_i is an indicator of the racial group of the individual

with White race as the reference category, and X_i represents a series of controlled characteristics of the individual.

Our main interest from Equation 6.6 is on δ which provides information on the impact of one additional immigrant classmate on the likelihood of a native having W3 Traditional Gender Roles during adulthood, after controlling for school differences, the number of total students in a given cohort, and the influence of a native's own parent. According to Hypothesis 6.1, we expect δ to be positive.

$$\boldsymbol{y_{igs} = \alpha_s + \delta M_{gs} + \theta G_i + \vartheta A_{gs} + \Omega T_i + \sum_{i=1}^{4} \rho_i R_i + \pi M_{gs} * G_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 6.7)}$$

Equation 6.7 modifies Equation 6.6 by considering an interaction between the number of immigrant students in a cohort and a native's gender.

<u>Question 4: Do immigrant parents directly influence the gender attitudes of natives?</u>

Finally, we look to answer Question 4, and use the following equation in this exploration:

$$\boldsymbol{y_{igs} = \alpha_s + \delta S M_{gs} + \theta G_i + \vartheta A_{gs} + \Omega T_i + \sum_{i=1}^{4} \rho_i R_i + \beta X_i + \varepsilon_{igs}} \quad \textbf{(Equation 6.8)}$$

To explore the extent to which the W3 Traditional Gender Roles of natives during adulthood may be influenced by direct observation of – and interaction with – immigrant adults during school-age (i.e., the parents of their immigrant peers), as is suggested by Mechanism 6.2, we replace the independent variable in Equation 6.6 (originally referring to the number of immigrant students in cohort g, within school s, and denoted by M_{gs}) with an alternative

independent variable: Social Parent Immigrants in Cohort (as with the original variable, we adjust this number, dividing it by 100). In this exploration of mechanisms, SM_{gs} represents the number of immigrant students in grade g in school s with a highly social parent.

As with Equations 6.6 and 6.7, for this empirical specification we consider only the native student sample (excluding immigrant students) who responded to both W1 and W3 survey questions, and whose parents completed a Parent Questionnaire, for a sample of 2,821 individuals.

6.4.2. Controls

With both Identity Economics (IE) and Social Learning Theory (SLT) highlighting the important role that personal, social, and environmental factors can play in shaping an individual's gender attitudes (Akerlof and Kranton 2000, Akerlof and Kranton 2010, Ewing Lee and Troop-Gordon 2011), we include a range of personal, social, and environmental controls in our empirical specifications (represented by Z_p in Equation 6.1, and X_i in Equations 6.2 – 6.8). Controlling for these characteristics is essential if we are looking to identify a relationship between interaction with immigrant peers (or immigrant peers' parents) and the gender attitudes of natives. A detailed description of all control variables, as well as their distributions, can be found in Appendix 23.

As Equation 6.1 focuses exclusively on parental gender attitudes, the variables for this equation refer to parent characteristics, not the characteristics of the original Add Health student. The series of controls encompassed by Z_p are: a parent's age, socioeconomic status, and educational attainment.

Equations 6.2 – 6.8, in contrast, focus on the original Add Health adolescent, and so X_i represents both individual characteristics of the student, as well as characteristics of that student's parent which literature has shown may also influence the development of an individual's gender attitudes. These controls and their relevance are described further below.

Personal and Parental Controls in Equations 6.2 – 6.8:

All specifications control for the race, socioeconomic status, and gender of participants. IE stipulates that an individual's identity is linked to their sense of belonging in a social category (Akerlof and Kranton 2000, Akerlof and Kranton 2010); we consider the possibility that gender, race and socioeconomic status are, in themselves, social categories which can to some extent define the behavioral norms assigned to an individual. These three categories, additionally, could play a role in defining which opportunities or paths an individual perceives as being available to them. By observing friends, family members or others of the same social category succeed or fail at a particular pursuit, an individual's assessment of their own likelihood of succeeding could be impacted (Garriott et al. 2014, Lent and Brown 2006).

Age, too, can represent a social category (for example, in situations where it is more acceptable to pursue education at a specific phase of one's life). Age, however, could also influence the degree to which an individual perceives and understands social dynamics, the extent to which they perceive norms as applying to them, and their ability to make appraisals of potential benefits and drawbacks of complying with these norms. Hence, we add age to our list of controls across all specifications.

Controlling for race, age, socioeconomic status, and gender is also supported by SLT, which suggests that individuals adopt gender norms through teaching and role modeling (Bandura 1977, Glass et al. 1986, Moen et al. 1997). Ultimately, race, age, socioeconomic status, and gender can determine who an individual perceives as a role model, subsequently, imitating, adapting, and internalizing those behaviors (Bandura 1977, Filler and Jennings 2015).

In addition to controlling for the individual-level factors listed above, we control for the educational attainment of a participant's mother, as well as the mother's educational expectations of their child. The decision to control for parental education stems from the argument made by SLT that individuals adopt gender norms through role modeling. In addition, including parental educational expectations of their child amongst our controls is meant to account not only for role modeling, but also for explicit teaching regarding norms, expectations, and the value of specific pursuits, which SLT identifies as an important factor in shaping attitudes and behaviors.

School Control:

We consider the possibility that results could be biased in situations where school specific factors (such as general quality, resources, or teacher experience) are simultaneously correlated with the concentration of immigrants at that school as well as with the gender attitudes of students and their parents (Brandén et al. 2016, Brandén et al. 2019, Clotfelter et al. 2005, Hanushek et al. 2004). To address this possibility, we include a school dummy, represented by α_s in our estimation, to control for unobserved differences across schools, as well as accounting for the possibility of self-selection into particular schools (Arieli et al. 2016).

By adopting this School Fixed Effects (SFE) approach, we are able to leverage differences in the composition of cohorts within a school. In doing so, we control for general school differences (resources, teacher quality, average class size), and mitigate for situations in which parents choose a specific school for their child based on the school's unique characteristics or composition. SFE also allows us to account for contexts in which children from a specific geographical area are assigned to a specific local school. This decision to focus on the different compositions of cohorts within schools exploits the more random composition of cohorts, and allows us to account for factors driving students/parents to attend a specific school.

6.4.3. Alternative Specifications

While individuals may see peers, parents, and specific people as role models for gender norms and attitudes, it is also likely that they notice the norms and opportunity structures in their communities and society more broadly (Wang, D. et al. 2022). Their judgement regarding the rigidity of norms, as well as opportunity structures which are available within in a society to people in specific categories, can also shape gender attitudes (Lent et al. 2017). In IE, societal norms regarding the pursuit of higher education, and more specifically a society's expectations from different genders (for example, men could be expected to financially provide for the family, while women may be expected to look after the home), set the standard and indicate to the individual which gender roles they will be expected to comply with (Akerlof and Kranton 2000, Akerlof and Kranton 2010).

Our main specification makes the assumption that students attending the same school will live in the same community, or in communities with similar sociodemographic profiles. In these contexts, the SFE approach described above would also effectively control for most

community/environmental differences between two individuals attending the same school. Nonetheless, we consider the possibility that students from vastly different communities may attend the same school in our alternative specifications. Thus, we carry out specifications with additional controls for the characteristics of the community in which each individual resides (measured at the Census Tract level), including: poverty level (proportion of persons with income in 1989 below poverty level), average educational attainment (proportion aged 25 years and over with university degree or more), the percentage of women in the labor force, proportion of the population which was foreign-born, and proportion of the population which was White.

We also recognize that, just as peers, parents, and the community may influence an individual's gender attitudes by (1) role modeling, (2) through explicit teaching, or (3) by providing a broader sense of the opportunity structures available, teachers could also play a very significant role in shaping an individual's gender attitudes (Van den Broeck et al. 2020, Van Houtte and Demanet 2016). While the Add Health dataset does not include cohort or classroom-level teacher data (and consequently, we are only able to control for teacher characteristics at the school-level) our alternative specifications also try to capture the extent to which each individual student had a positive relationship with their teachers, by controlling for responses to the question 'How often have you had problems getting along with your teachers?'. There were no significant changes resulting from the addition of the aforementioned controls to our main specifications; as such, we did not include them in this dissertation.

6.5. Results

6.5.1. The Gender Attitudes of Native and Immigrant Parents

The hypothesis, mechanisms, and empirical strategies detailed above make the assumption that immigrant parents will generally hold more conservative gender attitudes than native parents. Before proceeding to explore the potential effects of interaction with immigrants on the gender attitudes of natives, we test this assumption and explore whether there are significant differences in the gender attitudes of the immigrant and native parents within our sample.

Table 6.4 below shows how, on average, 7.9% of immigrant parents agreed with traditional gender roles, compared to only 2.4% of native parents. A t-score of -9.25 would confirm that the gender role attitudes of these two groups are different at a statistically significant level.

Table 6.4. Traditional Gender Roles (Parent); Native and Immigrant Sample Comparison

Variable		US-Born	Foreign-Born
Traditional Gender Roles (Parent)	1	0.024	0.079
t-statistic		**p-value**	
-9.2518		2.2e-16	

Similarly, Table 6.5 uses regression to explore the relationship between a parent being an immigrant, and them having Traditional Gender Roles. As can be seen below, the relationship between these two variables was positive and statistically significant, confirming the assumption that foreign-born parents, generally, hold more traditional attitudes regarding gender roles than their US-born counterparts.

Table 6.5. Relationship Between Being Immigrant and Traditional Gender Roles (Parent), Parent Sample

Dependent Variable:	Traditional Gender Roles (Parent)
	(1)
Being Immigrant	0.027***
	(0.006)
Constant	0.009
	(0.031)
R2	0.140
Observations	12,468

Note: This regression explores the correlation between a parent being an immigrant, and them agreeing with Traditional Gender Roles. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

6.5.2. The Traditional Gender Roles of Parents and Their Children

Having confirmed that immigrant parents do, in fact, generally have more Traditional Gender Role attitudes than native parents, we then proceed to consider the correlation between the gender attitudes of a parent and those of their child. Table 6.6 below shows the results of four regressions which explore this. The table shows the relationship between Traditional Gender Roles (Parent), and W3 Traditional Gender Roles (W3) of their sons/daughters. While Column 1 shows that, in general, a parent having traditional gender role attitudes is correlated with an increase in the likelihood of their son/daughter having W3 Traditional Gender Roles (by nearly 13 percentage-points, significant at the 1% level), Column 2 adds a control for the respondent being an immigrant. Column 3, in turn, shows how the relationship between a parent's Traditional Gender Roles and the W3 Traditional Gender Roles (W3) of their child is weaker amongst immigrant respondents than it is amongst native respondents. Column 4 then shows how the correlation does not vary significantly with the child's gender.

Table 6.6. Relationship Between the Traditional Gender Roles of a Parent and Their Child

	(1)	(2)	(3)	(4)
Traditional Gender Roles (Parent)	0.128***	0.128***	0.220***	0.146**
	(0.049)	(0.049)	(0.065)	(0.063)
Being Immigrant		0.001	0.009	0.0002
		(0.031)	(0.032)	(0.031)
Sex – Male	0.210***	0.210***	0.209***	0.211***
	(0.017)	(0.017)	(0.017)	(0.017)
Traditional Gender Roles (Parent)*Being Immigrant			-0.211**	
			(0.098)	
Traditional Gender Roles (Parent)*Sex – Male				-0.044
				(0.097)
Constant	0.670	0.670	0.679	0.668
	(0.492)	(0.492)	(0.492)	(0.493)
R2	0.213	0.213	0.214	0.213
Observations	3,433	3,433	3,433	3,433

Note: These are the coefficients from four different regressions. Regression 1 explores the correlation between a parent agreeing with Traditional Gender Roles and their son/daughter also having W3 Traditional Gender Roles. Regression 2 adds a control for the student being an immigrant. Column 3 adds an interaction effect to the second regression, interacting a parent's having Traditional Gender Roles with the son/daughter being an immigrant. Regression 4 interacts gender of the son/daughter. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

6.5.3. Immigrant to Native Transmission of Traditional Gender Roles

The evidence above confirms a correlation between the Traditional Gender Role attitudes of native parents and their children, and simultaneously shows that this relationship is significantly weaker amongst immigrant parent-child pairs. We then move to analyze whether interaction with immigrant peers could also result in more Traditional Gender Roles in natives, after controlling for the effects of their own parents' attitudes. In doing so, we look to either provide evidence for or against Mechanism 6.1, which stipulated that with immigrant parents

having more conservative gender attitudes than native parents, these more conservative gender attitudes would be transmitted from immigrant parents to their immigrant children who would, in turn, transmit these attitudes to their native peers.

Table 6.7 shows the results of two regressions which aim to explore the relationship between interaction with immigrant peers and native W3 Traditional Gender Roles. Column 1 demonstrates that, once we control for the effect of the attitudes of a native's own parent, interaction with immigrant peers does not have any statistically significant effect on the adulthood gender role attitudes of natives. Column 2 shows that the lack of effect is consistent across natives of both genders.

With neither of the regressions in Table 6.7 indicating that there is a statistically significant relationship between interaction with immigrant peers and agreement with more traditional gender roles on behalf of natives, we discard Mechanism 6.1 as a possible mechanism for influence.

Table 6.7. Effect of Immigrant Classmates on W3 Traditional Gender Roles

	(1)	(2)
Immigrants in Cohort	0.020	0.038
	(0.168)	(0.168)
Traditional Gender Roles (Parent)	0.217***	0.216***
	(0.065)	(0.065)
Sex – Male	0.208***	0.216***
	(0.019)	(0.020)
Immigrants in Cohort*Sex – Male		-0.045
		(0.031)
Constant	0.677	0.672

	(0.494)	(0.494)
R2	0.226	0.226
Observations	2,821	2,821

Note: These are the coefficients from two different regressions. Regression 1 explores the correlation between the number of immigrant students in a native's cohort, and native W3 Traditional Gender Roles. Regression 2 adds an interaction effect to the first regression, the gender of the native with the number of immigrants in a cohort. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

We then test Mechanism 6.2, which suggested the conservative gender attitudes are learned by native students through direct observation of – and interaction with – the parents of their immigrant peers. We do this through the regressions below, in which our original independent variable (the number of immigrant students within a cohort, within a school) is replaced by the number of immigrant students with social parents, hoping this will better capture instances where native students have increased interaction with more conservative immigrant adults, and not merely their immigrant peers.

Table 6.8 below shows how, once we control for the attitudes of a native's own parent, the number of social immigrant parents in a cohort still has no statistically significant effect on natives' W3 Traditional Gender Roles (Column 1). This lack of effect remains regardless of the native's sex (Column 2).

Table 6.8. Effect of Immigrant Classmates with Social Parents on W3 Traditional Gender Roles

	(1)	**(2)**
Social Parent Immigrants in Cohort	-0.991	-0.698
	(1.054)	(1.078)
Traditional Gender Roles (Parent)	0.219***	0.217***
	(0.065)	(0.065)
Sex – Male	0.209***	0.216***
	(0.019)	(0.020)

Social Parent Immigrants in Cohort *Sex – Male		-0.777 (0.607)
Constant	0.678 (0.494)	0.671 (0.494)
R2	0.226	0.226
Observations	2,821	2,821

Note: These are the coefficients from two different regressions. Regression 1 explores the correlation between the number of immigrant students with social parents in a native's cohort, and native W3 Traditional Gender Roles. Regression 2 adds an interaction effect to the first regression, interacting native gender with the number of immigrant students with social parents in a native's cohort. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

This would suggest that even social immigrant parents who interact extensively with their child's friends and school do not transmit their more traditional gender attitudes to native students, allowing us to discard Mechanism 6.2.

6.6. Robustness Checks

As robustness tests, we consider alternative variables to the ones we use in the main analysis above. The two main alternatives we consider are: (1) replacing our Traditional Gender Roles (Parent) variable with a more general and comprehensive measure of Conservative Attitudes Score (Parent) and, (2) replacing our original dependent variable (W3 Traditional Gender Roles) with W3 Prioritizing Marriage Over Education.

Conservative Attitudes Score (Parent)

As a robustness check for the Traditional Gender Roles (Parent) variable, we constructed the Conservative Attitudes Score (Parent) variable. This variable looked to capture the extent to which an individual's parent holds traditional/conservative attitudes more generally.

We construct this variable from three different questions in the Add Health W1 Parent Survey.

(1) Do you work outside the home?

(2) How often have you gone to religious services in the past year?

(3) Talking about birth control with {CHILD} would only encourage (him/ her) to have sex.

Points were assigned to the more conservative responses for each question, and the sum of points was then calculated for each respondent. Highly-conservative parents received a score of 3, and highly-liberal parents a score of 0.

The distribution of the constructed Conservative Attitudes Score (Parent) variable used in the first alternative specification is detailed in Table 6.9 below. As was the case with the original Traditional Gender Roles (Parent) variable, we find a positive and statistically significant relationship between a parent being an immigrant, and them having a higher Conservative Attitudes Score (Table 6.10).

Table 6.9. Conservative Attitudes Score (Parent); Native and Immigrant Sample Comparison

Variable		**Native**	**Immigrant**
Conservative Attitudes Score (Parent)	0	0.259	0.132
	1	0.429	0.363
	2	0.257	0.368
	3	0.055	0.138
Native Mean	**Immigrant Mean**	**t-score**	**p-value**
1.108	1.511	-18.77	< 2.2e-16

Table 6.10. Relationship Between Being Immigrant and Conservative Attitudes Score (Parent), Parent Sample

Dependent Variable:	Conservative Attitudes Score (Parent)
	(1)
Being Immigrant	0.277***
	(0.029)
Constant	1.100***
	(0.155)
R2	0.233
Observations	12,468

Note: This regression explores the correlation between a parent being an immigrant, and their Conservative Attitudes Score (Parent). *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

As we did in our main analysis, we consider the extent to which a parent's Conservative Attitudes Score may be correlated with their child agreeing with Traditional Gender Roles, and explore whether the strength of this relationship differs between native and immigrant parent-child pairs. Table 6.11 shows that having a one-point increase in a parent's Conservative Attitude Score correlates with an increase in the likelihood of their son/daughter having W3 Traditional Gender Roles (by two percentage-points, significant at the 5% level). We do not find the strength of this relationship to differ between native parent-child pairs and immigrant parent-child pairs (Column 3), or between genders (Column 4).

Table 6.11. Relationship Between the Conservative Attitudes of a Parent and the Agreement with Traditional Gender Roles of their Child

	(1)	(2)	(3)	(4)
Conservative Attitudes Score (Parent)	0.023**	0.023**	0.028**	0.027*
	(0.011)	(0.011)	(0.012)	(0.014)
Being Immigrant		0.0001	0.036	0.0004

		(0.033)	(0.048)	(0.033)
Sex – Male	0.206***	0.206***	0.206***	0.216***
	(0.018)	(0.018)	(0.018)	(0.030)
Conservative Attitudes Score (Parent)*Being Immigrant			-0.028	
			(0.027)	
Conservative Attitudes Score (Parent)*Sex – Male				-0.009
				(0.021)
Constant	0.532***	0.532***	0.523***	0.526***
	(0.157)	(0.157)	(0.157)	(0.157)
R2	0.215	0.215	0.215	0.215
Observations	3,433	3,433	3,433	3,433

Note: These are the coefficients from four different regressions. Regression 1 explores the correlation between a parent's Conservative Attitudes Score and their son/daughter agreeing with W3 Traditional Gender Roles. Regression 2 adds control for the child being an immigrant. Regression 3 then adds an interaction effect to the first regression, interacting a parent's Conservative Attitudes Score with the son/daughter being an immigrant. Regression 4 instead interacts the gender of the son/daughter. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Once again echoing the results of our main specification, after we control for the impact of the attitudes of a native's own parent, interaction with immigrant peers does not appear to have any statistically significant relationship with the likelihood of a native having W3 Traditional Gender Roles.

Table 6.12. Effect of Immigrants in a Cohort on W3 Traditional Gender Roles

	(1)	**(2)**
Immigrants in Cohort	-0.041	-0.029
	(0.197)	(0.198)
Conservative Attitudes Score (Parent)	0.030**	0.030**
	(0.012)	(0.012)
Sex – Male	0.202***	0.205***
	(0.020)	(0.021)
Immigrants in Cohort*Sex – Male		-0.024

		(0.033)
Constant	0.542***	0.543***
	(0.167)	(0.167)
R2	0.228	0.228
Observations	2,821	2,821

Note: These are the coefficients from two different regressions. Regression 1 explores the correlation between the number of immigrants in a native's cohort, and the native agreeing with W3 Traditional Gender Roles. Regression 2 adds an interaction effect to the first regression, interacting native gender with the number of immigrants in a cohort. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Our second means of robustness testing involved replacing the original dependent variable (W3 Traditional Gender Roles) with an alternative measure of a native's gender attitudes. We selected W3 Prioritizing Marriage Over Education as an alternative dependent variable.

While only 3,433 students (2,821 natives) responded to the survey question used for our original dependent variable, W3 Traditional Gender Roles[9], a larger number of students (10,445 students, or 9,766 natives) responded to the question used to develop our alternative dependent variable (W3 Prioritizing Marriage Over Education).

W3 Prioritizing Marriage Over Education

Our W3 Prioritizing Marriage Over Education variable makes use of the Add Health question below:

> *Suppose that in the next few years you were going to school full time and met someone you really wanted to marry, but the only way for you to get married was to*

[9] The survey question used to assess Traditional Gender Roles (W3) was only asked of participants who were in a romantic couple at the time of the W3 Survey.

drop out of school completely. Would you get married then or wait until you finished your education?

The question gave participants two response options: (1) Get married, and (2) Wait until their education was finished. Our W3 Prioritizing Marriage Over Education variable assigns all participants who selected '1 – Get Married' into one category (= 1) and all others into another (= 0).

Participants who confirmed they would choose marriage over continuing their education represented 7% of the native sample, and 6% of the immigrant sample.

Table 6.13. Distributions of Dependent Variables

Variable		Native	Immigrant
W3 Prioritizing Marriage Over Education	Get married	0.065	0.058

Table 6.14 shows that having a parent with Traditional Gender Roles (Parent) did not have a statistically significant relationship with their son/daughter's W3 Prioritizing Marriage Over Education. These results are consistent regardless of whether the parent-child pair was immigrant or native (Column 3), and regardless of sex (Column 4).

Table 6.14. Relationship between the Traditional Gender Roles of a Parent and their Child

	(1)	(2)	(3)	(4)
Traditional Gender Roles (Parent)	-0.004	-0.005	0.003	0.001
	(0.014)	(0.014)	(0.018)	(0.020)
Being Immigrant		0.010	0.010	0.010

		(0.009)	(0.009)	(0.009)
Sex – Male	-0.009*	-0.009*	-0.009*	-0.008*
	(0.005)	(0.005)	(0.005)	(0.005)
Traditional Gender Roles (Parent)*Being Immigrant			-0.018	
			(0.028)	
Traditional Gender Roles (Parent)*Sex – Male				-0.010
				(0.028)
Constant	1.838***	1.836***	1.835***	1.835***
	(0.079)	(0.079)	(0.079)	(0.079)
R2	0.127	0.127	0.127	0.127
Observations	10,445	10,445	10,445	10,445

Note: These are the coefficients from four different regressions. Regression 1 explores the correlation between a parent agreeing with Traditional Gender Roles and a son/daughter's W3 Prioritizing Marriage Over Education. Regression 2 adds a control for the son/daughter being an immigrant. Regression 3 interacts a parent's having Traditional Gender Roles with the son/daughter being an immigrant. Regression 4 interacts parent agreement with Traditional Gender Roles, with the gender of the son/daughter. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Table 6.15 shows consistency with the main analysis results, with Column 1 demonstrating that, after we control for the impact of the attitudes of a native's own parent, interaction with immigrant peers does not appear to have any statistically significant influence on W3 Prioritizing Marriage Over Education.

Table 6.15. Effect of Immigrant Classmates on W3 Prioritizing Marriage Over Education

	(1)	(2)
Immigrants in Cohort	0.026	0.026
	(0.055)	(0.055)
Traditional Gender Roles (Parent	0.004	0.004
	(0.019)	(0.019)
Sex – Male	-0.011**	-0.011**
	(0.005)	(0.006)

Immigrants in Cohort*Sex – Male		0.001
		(0.008)
Constant	1.816***	1.816***
	(0.098)	(0.098)
R2	0.131	0.131
Observations	9,766	9,766

Note: These are the coefficients from two different regressions. Regression 1 explores the correlation between the number of immigrants in a native's cohort, and the native's W3 Prioritizing Marriage Over Education. Regression 2 adds an interaction effect to the first regression, interacting the number of immigrants in a cohort with the gender of the native. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

6.7. Conclusion

With increasingly multicultural communities within the US (Vespa et al. 2020), the potential effects of the gender attitudes of immigrant students on the gender attitudes of their native peers have recently become a subject of increasing interest, particularly in contexts where immigrant communities originate from countries with relatively more traditional, conservative, and gendered attitudes towards education (Arends-Tóth and Van de Vijver 2009, Diehl et al. 2009, Roder 2014, Wang, S. 2019). Concern that interaction with immigrant peers (and the parents of these peers) could shift native gender attitudes away from the generally more liberal, egalitarian gender attitudes of the US, have been increasingly voiced within the last two decades (Cabrera and Coll 2004, Chavez 2013, Ciftci 2012, Dragojevic et al. 2017, Henrikson 2007, Jimenez-Castellanos and Gonzalez 2012, Kalkan et al. 2009, Mahmood 2020, Moller 2007, Panagopoulos 2006, Terman 2017, Zárate et al. 2004).

We contribute to that body of evidence by exploring the impact of immigrant classmates on the long-term gender attitudes of natives. In particular, we look at the number of immigrant classmates that a native respondent had during high school and explore the association with them agreeing with Traditional Gender Roles later in adulthood. In this exploration we control

for the attitudes of a native's own parent, as well as exploring the effect of immigrant peers' parents on native gender attitudes.

Our results suggest that exposure to immigrant classmates has no effect on the adulthood gender attitudes of natives. We find that, while the correlation between a parent having traditional gender attitudes and their child having them too is positive and statistically significant amongst native parent-child pairs, this correlation is significantly weaker amongst immigrant parent-child pairs. This, together with descriptive analysis of both immigrant and native samples, shows that, while immigrant participants do, in fact, have more conservative parents, their own gender attitudes during early adulthood (W3) are not radically different from those of natives. We also consider the possibility that native students might not only be impacted by their immigrant peers, but by interactions with the more conservative parents of these immigrant peers. However, we find – similarly – that the number of immigrant students with social parents in a cohort does not impact the adulthood gender attitudes of natives.

The finding that interaction with immigrant classmates and their parents does not appear to have an impact on the adult gender attitudes of natives provides evidence against the concern that interaction with immigrant peers (particularly those from more conservative cultures) could shift native gender attitudes away from the more liberal, egalitarian gender attitudes of the US. Additionally, it provides evidence of well-established assimilation theories which stipulate that, with time, immigrants adapt their attitudes, beliefs, and behaviors to more closely resemble natives (Alba and Nee 2003, Gagliarducci and Tabellini 2022, García and Schmalzbauer 2017, Kalmijn and Kraaykamp 2018, Molteni and Dimitriadis 2021, Roder 2014, Vigdor 2015, Yamanaka and McClelland 1994).

This research is not without limitations. A significant weakness in our investigation is the possible bias resulting from the fact that the Parental Questionnaire used to construct our Traditional Gender Roles (Parent) variable, as well as our Social Score (Parent) variable, was mostly administered to mothers, with fathers only being interviewed in cases where a mother was not available to complete the survey. It is not only possible, but also likely, that an individual's mother and father could have different gender attitudes, if only because the lived experiences of gender roles are different for men and women. This could, in turn, have resulted in our Parent variables only partially capturing parental attitudes, or ignoring instances in which gender attitudes differ between both parents.

The fact that the Add Health Parent Questionnaire was administered mostly to mothers could also bias results in instances where, as is suggested by literature (Brenøe 2018, Houtte 2004, Leight 2021, Mavrokonstantis 2015), transmission of gender attitudes is moderated by both the gender of the child and the gender of the parent jointly (i.e., boys being more influenced by the gender attitudes of their fathers, and girls more influenced by the attitudes of their mothers). Thus, future research which incorporates data on the gender attitudes of both parents (as well as research which explores how attitudes differ between parents depending on gender, occupation, and other factors) could provide additional depth to analyses of this kind.

In addition to considering the gender attitudes of both parents, we suggest future research could build on our methods and findings in two meaningful ways: by (1) working with teachers and looking *inside* classrooms, as opposed to merely observing them from the outside, and (2) including a greater variety of variables to more comprehensively measure both factors which may influence gender attitudes, as well as gender attitudes themselves.

The lack of cohort-level teacher data has already been identified as a limitation of this study; however, we would also suggest that future studies consider not only teacher characteristics in their analysis, but also adapt methodologies to take into account potential dynamics which occur within classrooms and may not be observable through purely quantitative tools such as the Add Health dataset. With our findings showing that conservative gender attitudes are not transmitted to native students through their immigrant peers, further exploration into how native students perceive their immigrant classmates (i.e., the extent to which they consider themselves similar or different, the degree to which they perceive the attitudes and experiences of immigrants as incompatible or inapplicable to the day-to-day life in the US) could prove insightful.

Future research could also expand on the findings of this paper by considering additional variables which more comprehensively measure both the factors which may influence gender attitudes, as well as gender attitudes themselves. For instance, the lack of specific geographic data represented a significant obstacle in our analysis. While in the Add Health dataset each participant was given a set of pseudo state, county, tract, and block group variables to be able to group respondents geographically, data privacy and protection restrictions meant that the Add Health data did not provide specific geographic locations for participants. As a result, we were unable to know specifically, what state, city or district a participant was in, and this hindered our ability to consider location-specific variables outside of those already provided by Add Health. While we considered specifications which controlled for the percentage of women in the labor force, as well as the percentage of the population aged 25+ with a university degree or more, it would have proved useful to be able to control for the average university enrollment rate of women in a community or census tract, a variable which was not included in the dataset.

Future research could also expand on other variables used in this study. For example, while we focus on W3 Traditional Gender Roles as an indicator of gender attitudes (and W3 Prioritizing Marriage Over Education as a robustness test), both gender attitudes and educational attitudes are complex in nature and can be measured through a variety of indicators. Additional research efforts which explore gender attitudes through different indicators, could make important contributions to the field.

7. Conclusion: Closing Remarks and Implications

7.1. Revisiting the Research Question and Aims

This doctoral thesis sought to fill two significant gaps in the existing literature regarding the relationship between immigration and the educational outcomes of natives:

(1) An existing tendency to focus almost exclusively on achievement metrics as means of measuring educational outcomes, along with the relative lack of exploration of potential effects on non-achievement outcomes; and

(2) The need for greater analysis of long-term effects, beyond the immediate high school graduation and university-enrollment temporal scope, effectively linking childhood exposure to adult outcomes.

Looking to address these two important gaps, the thesis developed two primary research questions, as well as three sub-questions which invited a more in-depth exploration of the topic:

Research Questions:

Does the presence of immigrant students in US classrooms affect the non-achievement educational outcomes of their native peers?

Are these effects still present, or perhaps manifest only, during adulthood?

Sub-questions:

Do the racial and sociodemographic characteristics of immigrant students in a cohort play a role in determining what impact they have on native peers?

Do immigrant peers have different effects on the various racial groups of natives?

Does emotional closeness between immigrants and natives (friendship, as opposed to merely being classmates) moderate the effects of immigrant students on their native peers?

In attempting to answer these questions, the investigation selected four specific, non-achievement educational outcomes for analysis: (1) self-belief, (2) imagination, (3) educational expectations, and (4) gender attitudes. Each of the aforementioned outcomes represented one core chapter.

With an extensive amount of existing research looking to understand the educational impact of immigrant students on their native classmates, this thesis considered the two major approaches in the field – labor market theories and peer effects theories – and allowed for the possibility that the dynamics highlighted by both strands of literature could exist and operate simultaneously.

From the start, the choice of SCT as the main theoretical framework to guide the analysis allowed for the possibility of simultaneous influences on the outcomes of natives, recognizing that surge in immigration could, at once, be causing a disproportionate consumption of school resources (as per crowding-out theories), while also motivating native youths to pursue

occupations which differentiate them from the incoming foreigners (according to HCA theories), while also yielding changes in the attitudes, beliefs, and behaviors of natives resulting from mere interaction with their immigrant peers (in line with peer-effects theories).

The investigation also considered the possibility that increased exposure to immigrant peers could affect population sub-groups differently. Large variety in the results of previous studies suggested that interactions with immigrant peers could be beneficial to the educational outcomes of some native students, while worsening those of others (depending on factors such as socioeconomic status, achievement levels, race, etc.). The thesis recognized that results were likely to vary according to specific characteristics of an educational environment (resources available at a given school or community), characteristics of the immigrant population (skill-level, educational background), and many other variables.

The aim of this doctoral thesis was, in essence, an exploration of the relationship between exposure to immigrant peers and the non-achievement, adult-age educational outcomes of natives. This exploration sought to bring together market-based and peer-effects theories, and take into account in its analysis an individual's personal characteristics, beliefs, perceptions, environment, and context.

7.2. Contributions

A summary of results across the four core chapters can be found in Table 7.1 below. We find that interaction with immigrant peers during high school has a positive and statistically significant effect on self-belief, both during school-age and adulthood. A positive and statistically significant effect is also found on adulthood imagination. The effect of interaction

with immigrant peers on educational expectations was found to be positive and statistically significant during school-age, however, this effect did not translate to attainment (completion of an undergraduate degree) by the time natives reached adulthood. The research did find, however, a positive relationship between exposure to immigrant peers during high school and adult-age educational satisfaction. No statistically significant relationship was found between interaction with immigrant peers during high school and adult-age gender attitudes.

Through these results, we are able to confirm that the presence of immigrant peers can, in fact, affect the outcomes of natives during school-age (answering RQ1), as well as into adulthood (answering RQ2), but only for specific outcomes.

Table 7.1. Summary of Results of Core Chapters

	School-Age (W1) Effects	Adulthood (W3/4) Effects
Self-Belief		
Self-Efficacy	+**	+**
LOC	+**	+**
Self-Belief	+**	+**
Imagination		
Good Imagination	N/A	+**
Educational Expectations		
Expectations	+**	N/A
University Completion	N/A	+
Educational Satisfaction (non-completers)	N/A	+**
Gender Attitudes		
Traditional Gender Roles	N/A	-
Prioritizing Marriage Over Education	N/A	-

Summary of results across the four core chapters. + represents a positive relationship between the independent and dependent variables; - represents a negative relationship; ** represents statistical significance at the 5% level or higher.

Across all chapters in this thesis, the definition of 'immigrant students' encompassed all those participants in the Add Health survey who were either, (a) born outside of the US, or (b) born

in the US but had at least one foreign-born parent. In other words, when considering the potential impact of interaction with 'immigrant' students on their native peers, we not only considered the impact of foreign-born students, but also the impact of children of immigrants (CoIs). The joint use of child and parent country of birth as a measure of 'immigrant-ness' has been supported by recent scholars such as Ohinata and van Ours (2016) and Brandén et al. (2019), as literature overwhelmingly highlights how immigrant parents often transfer attitudes, behaviors, and beliefs to their children, even when the children are born and raised in the new host country. The decision to include CoIs in our definition of 'immigrant' also considered the important possibility that, having been born and raised in the US, CoIs could have significantly better language proficiency (and less structural barriers, due to possessing American citizenship) than foreign-born children, and that this could make CoIs more likely to interact with – and consequently have an effect on – their native peers. Nonetheless, we are aware that including CoIs in our definition of immigrants could have significantly influenced results; consequently, we conducted additional analyses with an alternative definition of immigrant which *only* considered foreign-born individuals as immigrants. Alternative results for the main regressions of each core chapter can be found in Appendix 27, however, generally speaking, results were found to be similar to the main specifications conducted with our CoI-inclusive definition across all chapters.

The race of both natives and immigrants in a cohort was found to be – at least in some specifications – an important moderator across several chapters. While the races of natives which were most sensitive to the effects of immigrants, as well as the race of immigrants which had the most significant effects, varied across outcomes and specifications (see Table 7.2 below), our results allow us to answer both Sub-question 1 (*Do the racial and sociodemographic characteristics of immigrant students in a cohort play a role in determining*

what impact they have on native peers?) and Sub-question 2 (*Do immigrant peers have different effects on the various racial or sociodemographic groups of natives?*) affirmatively.

These results highlight the need for further study into integration and identification dynamics, particularly as they relate to race. With several of the content chapters above finding differentiated effects of immigrants on natives depending on native race, a more in-depth exploration of why certain natives react more strongly or positively to immigrants than others would be insightful. The extent to which different categories of natives consider themselves similar to the different racial categories of immigrants could help maximize the positive effects of immigrants on their native peers, while making sure that no category of native student gets left behind.

Table 7.2. Summary of Moderator Effects Across Core Chapters

	Race of natives most sensitive to effects	**Race of immigrants with greatest effect**	**Effect of friendship**
Self-Belief			
W1 Self-Belief	Hispanic; Black	Hispanic; White	Insignificant
W4 Self-Belief	Hispanic; Asian; Black	Hispanic; White; Other	Insignificant
Imagination			
W4 Good Imagination	Asian; Other	Hispanic; Other	Insignificant
Educational Expectations			
W1 Expectations	Hispanic; Black	Hispanic; Other	Insignificant
W4 University Completion	Insignificant	Insignificant	Insignificant
W4 Educational Satisfaction (non-completers)	Insignificant	Insignificant	Insignificant
Gender Attitudes			
W3 Traditional Gender Roles	Insignificant	Insignificant	Insignificant

W3 Prioritizing Marriage Over Education	Insignificant	Insignificant	Insignificant

Summary of relevant moderators across the four core chapters. Note that specifications which show no effects of race or friendship may not be included in the chapters themselves, but can be found in the corresponding Appendix.

Sub-question 3 inquired if emotional closeness between immigrants and natives (friendship, as opposed to merely being classmates) could moderate the effects of immigrant students on the educational outcomes of their native peers. Friendship with immigrant peers, as opposed to mere exposure to immigrants as classmates, was not found to be a significant moderator for any of the educational outcomes studied.

One would expect that, through friendship (relative to only being classmates), interaction time between immigrant and native students would be maximized and the extent to which natives consider immigrant peers social models or part of their reference group would also intensify. One would consequently expect that the positive effects of immigrants on the educational outcomes of natives would be stronger in those natives with close friendships with immigrants. Hence, the somewhat surprising finding that this is not the case urges us to consider possible reasons for the lack of significance of friendship as a moderator. While future research should no doubt consider exploring this issue more extensively, we offer one possible explanation: that the value of immigrant peers to natives might be inherently linked simply to immigrant peers being perceived as different, new, foreign, and, to some degree separate from natives, and that friendship is not a necessary component in this process.

In its exploration of potential mechanisms responsible for the positive effect of immigrants on the self-belief of natives, Chapter 3 offered support for the possibility that immigrant students, being generally less disruptive than their native peers, contributed to creating a calm and

conductive classroom environment which, in turn, resulted in natives feeling more in control of their own learning, subsequently increasing their self-belief. With immigrant students often coming from cultures with more strict, demanding, and rigid academic environments (Al Kadri et al. 2011, Altinyelken 2010, Bridger 2007, Chan 1999, Frambach et al. 2014, Gwee 2008, Khoo 2003, Leung, D. Y. P. et al. 2008, Nguyen et al. 2009, Wang et al. 2012), as well as potentially having language barriers and increased difficulty making friendships, it is possible that immigrant students could be inherently more quiet and less disruptive than natives, directly contributing to calmer classrooms, and consequently increasing native self-belief. In these situations, simple exposure to immigrants would be sufficient to trigger the positive effects on the self-belief of natives, without friendship being a requirement.

Similarly, Chapter 4 drew from SCT and the Social Cognition Approach (SCA) to explain the positive effect of immigrants on the imagination of their native peers. Both SCT and SCA highlight the value of new ideas, perspectives and experiences for the development of imagination emphasizing how exposure to difference can prompt creativity by: (a) providing direct access to novel ideas and concepts from other cultures; (b) creating the ability to see multiple underlying functions behind the same form; (c) destabilizing routinized knowledge structures, thereby increasing the accessibility of otherwise inaccessible knowledge and creating a psychological readiness to recruit ideas from unfamiliar sources; and (d) promoting readiness to synthesize seemingly incompatible ideas (Leung et al. 2008). As was the case with self-belief, we suggest that simple exposure to difference is enough to trigger the positive effects of immigrants on the imagination of natives, without friendship being a requirement.

This ‘value-in-difference’ dynamic could also explain why immigrant students had a positive effect on the school-age educational expectations and adulthood educational satisfaction of

natives (as seen in Chapter 5). SCCT and Reference Group Theory suggest that natives evaluate their chances of success at a specific task or pursuit based, at least in part, on the performance and effort of their peers (Gilbert et al. 2022; Marsh et al. 2020; Salchegger 2016). Hence, it is possible that the positive impact of immigrants on the school-age educational expectations of natives seen in Chapter 5 was due, to some degree, to natives perceiving the relatively higher amount of effort invested by immigrant students in order to achieve at similar levels, and judging that if they were to invest similar amounts of efforts themselves, they could out-perform their immigrant peers. This contrast in effort levels would, once again, be a way in which natives derive value from the differences between them and their immigrant peers, without needing to form friendships. The finding that interaction with immigrants during school-age resulted in increases in educational satisfaction during adulthood but not in attainment could also be explained by 'value-in-difference', given the possibility that natives, with time, realize immigrant peers could be equally (if not more) likely to complete university education as themselves, and instead opt to pursue their career ambitions more directly in the labor market.

Chapter 6 found that the correlation of gender attitudes is stronger between native parent-child pairs than immigrant parent-child pairs, and as a result, the (generally more conservative) attitudes of immigrant parents are not transmitted to native students, neither via their immigrant peers nor via direct interaction with peers' parents. The fact that friendship was not a significant moderator in these effects could suggest that, regardless of friendship, natives perceive themselves as significantly different from their immigrant peers, and hence do not consider immigrant peers (or immigrant peers' parents) similar enough to act as strong social models capable of influencing their own gender attitudes.

The possible policy implications of 'value-in-difference' as a possible explanation for our results are discussed further in Section 7.4.

7.3. Limitations and Directions for Future Research

This thesis is not without limitations. We identify four key areas, mostly methodological in nature, where this research can be improved, and suggest directions in which future research can build from our findings: (1) the use of self-reported measures; (2) the need to explore teacher characteristics and effects, as well as within-classroom dynamics; (3) the exclusion of certain key respondents from analysis; and (4) the lack of specific geographic data. Additionally, we identify the potential for future research to expand on our work by considering, with greater depth, possible heterogeneities among the immigrant population, particularly as they relate to the interaction between race and culture.

Throughout the previous chapters, we make use of self-reported measures of characteristics such as imagination, socioeconomic status, and conservative attitudes. We recognize that while the use of self-reported measures offers some insight into the characteristics of an individual, these measures may not always represent the most objective reality. Some research exists which validates the accuracy of self-reported measures, particularly for traits such as imagination or an individual's own values and beliefs (Batey et al. 2010, Furnham et al. 2008, Silvia 2008, Silvia et al. 2012). We also, however, recognize there is room for error when using self-reported measures. For example, ranking their levels of agreement with statements like 'I do not have a good imagination,' and 'talking about birth control with {CHILD} would only encourage (him/ her) to have sex,' or when answering questions like 'Does [your mother] receive public assistance, such as welfare?' participants could merely respond the way they

believe would most please the interviewer, or the way they believe would make them look most favorable. It is also possible that participants, despite believing they were providing accurate responses to the interviewer's questions, made inaccurate assessments of their own traits, like imagination, or socioeconomic situation, and that perhaps the self-reported levels recorded for participants were not a realistic representation of the participant's traits.

It follows that additional measures, perhaps external assessments or diagnostic tasks, of some of our self-reported traits would improve the validity of results. While we do explore the relationship between imagination and several cognitive tasks performed by participants during W1, a more in-depth classroom activity, aimed *specifically* at measuring a student's imagination, as well as an additional adult-age imagination task, would aid in making our results more robust. Similarly, an additional measure of socioeconomic need/deprivation based on income, cost of living, household size, access to services, etc., as well as more comprehensive measures of conservative attitudes, would contribute significantly to analyses in this field.

A second limitation of this thesis involves the lack of cohort-level teacher data. The Add Health dataset includes figures regarding the characteristics of a school's teachers/faculty (race, years of experience, qualifications, etc.), however this data is only available at the school level. Because this thesis focuses on cross-cohort, within-school variations in immigrant concentrations, the more general school-level data on teacher characteristics offered by Add Health did not help account and control for teacher effects at the classroom or cohort level. An extensive literature (Fallon and Goetz 1975, Hong et al. 2009, Hosseini and Watt 2010, Karwowski et al. 2015, Kraft 2019, Paek and Sumners 2019, Van den Broeck et al. 2020, Van Houtte and Demanet 2016) documents the significance of teacher effects in shaping virtually

all aspects of a student's educational outcomes; together with parents and peers, teachers are considered a key influence in a student's academic attitudes and performance. We argue that the effect of peers may outweigh the effects of teachers, if only due to the fact that in the American school system students change teachers every few years (if not *every* year), while their cohort of peers remains relatively unchanged as students progress through their high school experience. We suggest that, comparatively speaking, the prolonged interaction between native students and their immigrant peers across several years of high school should lead to more significant effects than year-long interactions with teachers. However, peer effects and teacher effects are not mutually exclusive, and future studies which account and control for teacher characteristics would contribute greatly to the findings of this study.

In addition to accounting for teacher characteristics, future research could improve on the work carried out in this thesis by *collaborating with* teachers, and through teachers gaining insight regarding the dynamics happening inside the classroom. The chapters above hypothesize about possible mechanisms which could explain results, and through descriptive analysis we attempt to evaluate which mechanisms seem most likely to occur, however considering teacher experiences and observations would allow for a far more detailed and comprehensive understanding of how student interactions take place, as well as the classroom environments and behaviors of both natives and immigrants.

A third limitation of this thesis is the exclusion of certain key respondents from our analysis. Two important categories of respondents were excluded: (1) respondents living abroad during the fieldwork stages of W3 and W4 of the survey, and (2) siblings who did not attend a school surveyed by Add Health.

Respondents who were overseas for the duration of data-collection for each of the survey waves were not eligible to be interviewed in W3 and W4 of the Add Health Survey. During W3, 175 of the original W1 participants were not interviewed because they were out of the country for the duration of the fieldwork. Of the W4 sample, 184 participants were out of the country. We highlight the exclusion of these respondents as a key limitation, separate from other cases of non-response (such as participants who were deceased/not located/physically or verbally unable/incarcerated/unwilling), because participants who decided to move abroad would have been of high interest for our research. With extensive literature suggesting that interaction with individuals from other cultures can foster curiosity, open-mindedness, willingness to explore, and the desire to leave one's own comfort zone concepts (Leong 2007, Leung, A. K. et al. 2008, Leung, A. K. and Chiu 2010, Liang and Schartner 2022, Niehoff et al. 2017, Richter et al. 2021, Weisberg 1999), the exclusion of those natives who chose to leave the US during adulthood could mean excluding from analysis the individuals who were perhaps *most* affected by interactions with immigrant peers. Further research could, thus, look to consider exploring the possibility of a relationship between school-age interaction with immigrants and the likelihood of moving abroad during adulthood.

Another important exclusion worth noting is those siblings who, during W1 of the survey, did not attend a school surveyed by Add Health. In our Sibling Sample analyses, we compared two (or more) siblings who had belonged to different school cohorts, and consequently, had different exposures to immigrant peers during class time. The characteristics of the schools and cohorts were obtained from both the In-School application of the W1 survey, as well as the School Administrator Questionnaire provided by schools in W1. In the majority of cases, siblings attended the same school (or a sister school), allowing us access to all the information regarding both siblings, as well as cohort and school composition/characteristics. However, a

number of cases in each paper had to be discarded because one of the siblings (in a sibling pair) did not attend an Add Health School. This was, in part, responsible for us having a small Sibling Sample to carry out our analyses and robustness checks, which in turn, affected the possibility of statistical significance.

The fourth limitation we identify was the lack of specific geographic data, which impaired us from fully considering the context (political, social, economic, etc.) in which trends and effects were observed. While each participant was given a set of pseudo state, county, tract, and block group variables to allow the geographical grouping of respondents, for data privacy and participant protection reasons the Add Health data did not provide specific geographic locations for participants. This meant that, while we could pair respondents with location-specific variables such as state/city/district/tract crime rates, government investment into services, average educational attainment, average income, voting patterns, etc., we were unable to know, specifically, what state, city or district a participant was in, and this hindered our ability to consider location-specific variables outside of those already provided by Add Health. This was a particularly significant limitation for our analysis in Chapter 6, where we would have benefitted from considering the average educational attainment of women in a community (at the Census Tract level), but the variable was not included in the Add Health data. Further research could consider requesting permission to carry out an Ancillary Study for Add Health, and link participants to specific locations for a more in-depth exploration (with a more robust set of controls or mechanisms considered).

In addition to the four limitations identified above, we also suggest that future research efforts consider exploring the relationship between race and culture in greater detail. When exploring the effects of immigrant students on their native peers, our implemented approach

disaggregates students (both native and immigrant) by race, thus evaluating a combination of racial and cultural influences, rather than merely cultural influences. For example, in our approach, White immigrants of Polish decent are assigned to the same category as White immigrants of Canadian decent (i.e., the "White Immigrant" category). While racially, White immigrants of Polish decent and White immigrants of Canadian decent may, in fact, be similar, it is not only possible but also likely that there would be significant cultural differences between members of these groups. These cultural differences could result in the individuals having notably different attitudes towards education, as well as being significantly different in the ways they communicate and interact with their native peers. These cultural differences, and their effect, were not explored in our research, and could provide additional depth to our findings if future research were to engage with them.

Our methodological choice to disaggregate students by race rather than culture stemmed primarily from the additional subjectivity and researcher bias that would have been introduced during the task of assigning individuals to cultural groups. Add Health participants did, in fact, respond to questions regarding their ancestry as well as the country of birth of both their parents. These responses could have, in theory, allowed us to evaluate the effects of cultural proximity between students of different nationalities, had we linked them to an existing index of cultural similarity. However, we were unable to find an existing index which contained values for all the nationalities represented in our sample. Unable to find such index, we considered the task of assigning individuals to cultural groups ourselves. However, we ultimately decided that this task fell outside of the scope of our research and expertise. By using self-reported race as a means of categorizing individuals, we avoided the introduction of our own biases regarding similarities and differences between cultures. Nonetheless, researchers

with greater expertise in the field of multicultural studies could certainly provide valuable insights by building on the findings of this research.

7.4. Policy Implications

Despite its limitations, this thesis makes significant contributions to our understanding of both the development of non-achievement educational outcomes, and the potential benefits of diversity and multiculturalism in classrooms. In doing so, this doctoral thesis could also have significant implications for educational practice and policy. With all core chapters reporting either no effects or positive effects – and none reporting negative effects – this research urges us to consider what measures could be taken at the classroom, school, local, and national levels in order to maximize the benefits of multicultural cohorts, and ensure no one – native or immigrant – gets left behind in the process.

At the classroom level, ensuring teachers promote respectful and curious interaction between all students could prove useful. With this thesis highlighting the finding that simple exposure to immigrant peers is enough to produce significant benefits for natives, without necessarily needing to develop friendships (i.e., the 'value-in-difference' explanation offered in Section 7.2 above), providing classroom environments where students from different backgrounds feel comfortable not only being themselves, but also expressing themselves to others, could be beneficial. Encouraging students to listen to one another, to recognize differences, and to consider alternative perspectives, regardless of the extent to which students feel similar to – or different from – their peers, could help maximize the positive effects observed in this research thesis.

Similarly, at the school level, considering policies which bear in mind the potential benefits of multicultural interactions, and take steps to encourage these further, could result in positive effects. Schools could revise enrollment policies and advertising strategies with the aim of diversifying their student body to include a variety of countries of origin, races, and experiences. The benefits of immigrant-native interactions could also be considered when revising practices for grouping into and within cohorts, and in contexts where these sub-populations might be separated (for example in schools which practice Ability Tracking and sort students into classes based on language ability) alternative spaces and activities for interaction between them could be offered.

At the local and national levels, ensuring that enough resources are made available to schools in order to help immigrant students achieve English proficiency could be helpful; only through language are immigrant students able to share their experiences and perspectives with their native peers. Local and national bodies can also continue to develop the high school curriculum, making sure that it adapts to the increasingly multicultural demographic composition of the US, and that it is persistent in encouraging dialogue between students from different backgrounds and with alternative perspectives and experiences.

Additionally, this research has highlighted the need to add two essential items to the research agenda at the national level: (1) the interaction between multicultural classrooms and race; and (2) strategies to sustain educational expectations and ensure these materialize into attainment.

With the results of this thesis showing that race can be an important moderator in the positive effects of interaction with immigrants on the educational outcomes of natives, further research is needed into how inter-group dynamics may differ between natives and immigrants of

different races/ethnicities, and how classroom practices and school programs affect students in these groups. The government, as well as universities and research institutions, can encourage investigation into identity dynamics, and the extent to which natives see themselves as similar to or different from their immigrant peers. Further research can explore inter and intra-racial reference-group dynamics, as well as the mechanisms through which multiculturality, race, and educational outcomes all interact. The degree to which minority natives (such as those of Black or Hispanic race) may identify with and feel similar to immigrant peers, rather than majority natives, is worthy of exploration. Do immigrants represent substitutes and competition for some natives, while simultaneously being perceived as complements for others? Although this research has found the effects of immigrants on natives to be positive, answering these questions is key in order to make sure that no one gets left behind, and that the positive effects we have found are not just benefiting one sub-group of the native population.

Similarly, at the local and national levels, research into the link between multicultural education, reference group dynamics, expectations, and motivation should be encouraged. In Chapter 5 we found that interaction with immigrants positively influenced native educational expectations during school-age (making natives more confident in their realistic chances of attending university), however the positive effect was lost by the time natives reached young adulthood, and it had not materialized into an increased likelihood of attainment of a university degree. This finding highlights the need to research possible methods for sustaining the positive effect of immigrant peers on the educational expectations of natives. Further investigation is needed into strategies, tools, and incentives for maintaining motivation and successfully achieving expectations throughout high school and early adulthood. Research is increasingly engaging with the topic of motivation and its determinants (Skilling et al. 2021; Durksen et al. 2017), and our research highlights the need to keep pushing in this direction.

Additionally, this research highlights the potential benefits of ensuring that, at all four levels (classroom, school, local and national), key actors are trained in effective multicultural communication, as well as in strategies to mediate cultural clashes. Teachers, particularly, can be taught how to respectfully speak to their students regarding different cultures, attitudes, norms, and values, and while doing so, to encourage their open-minded curiosity. Teachers, school administrators, and local authorities can also be educated on the potential dangers of xenophobia, prejudice, and discrimination. Educational campaigns, as well as professional training, could be developed and implemented in order to ensure that stereotypes and fears regarding the risks of immigrants 'imposing' their values on native students, as well as worries regarding the disproportionate consumption of resources by immigrants, are addressed and rectified.

8. References

8.1. Chapter 1 References

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8.7. Chapter 7 References

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9. Appendices

9.1. Introduction and Chapter 2 Appendices

Appendix 1. Description of Add Health Datasets Used in this Thesis

Instrument	Year	N	Notes
W1 School-Administrated Survey	1994 – 1995	90,118	From September 1994 until April 1995, in-school questionnaires were administered to students in selected schools. Each school administration occurred on a single day within one 45- to 60- minute class period. Add Health completed in-school questionnaires from over 90,000 students. The in-school questionnaire provided measurement on the school context, friendship networks, school activities, future expectations, and a variety of health conditions.
W1 At-Home Survey	1994 – 1995	20,745	Add Health obtained rosters of all enrolled students in each school. From the union of students on school rosters and students not on rosters who completed in-school questionnaires, Add Health chose a sample of adolescents for a 90-minute in-home interview constituting the W1 in-home sample. To form a core sample, Add Health stratified students in each school by grade and sex and randomly chose about 17 students from each strata to yield a total of approximately 200 adolescents from each pair of schools. (Students who did not participate in the in-school survey were eligible to be selected for participation in this sample.) The core in-home sample is essentially self-weighting, and provides a nationally-representative sample of 12,105 American adolescents in grades 7 to 12. From answers provided on the in-school survey, Add Health drew supplemental samples based on ethnicity (Cuban, Puerto Rican, and Chinese), genetic relatedness to siblings (twins, full sibs, half sibs, and unrelated adolescents living in the same household), adoption status, and disability. Add Health also oversampled Black adolescents with highly educated parents.

W1 Parent Survey	1994 – 1995	17,670	The mother (or other female head of the household) of the originally sampled adolescent was asked to participate in a 40-minute interviewer-administered, paper-and-pencil survey.
W1 Siblings Data	1994 – 1995	3,139	N represents household groups, which may include more than 2 siblings living in the same household
W1 Friendship Data	1994 – 1995	89,940	N represents the total number of questionnaires; however, many adolescents did not nominate 10 friends (5 male; 5 female), or any friends at all.
W1 Contextual Data	1994 – 1995	90,118	Contextual variables, linked to the Add Health respondent IDs, at the state, county, Census tract and Census block group summary levels. We use data at the Tract level. W1 Contextual data represented 2,449 tracts.
W1 School Administrator Data	1994 – 1995	132	Add Health used a school-based design. The primary sampling frame was derived from the Quality Education Database (QED). From this frame Add Health selected a stratified sample of 80 high schools (defined as schools with an 11th grade and more than 30 students) with probability proportional to size. Schools were stratified by region, urbanicity, school type (public, private, parochial), ethnic mix, and size. For each high school selected, Add Health identified and recruited one of its feeder schools (typically a middle school) with probability proportional to its student contribution to the high school, yielding one school pair in each of 80 different communities. More than 70 percent of the originally selected schools agreed to participate in the study. Replacement schools were selected within each stratum until an eligible school or school-pair was found. Overall, 79 percent of the schools that were contacted agreed to participate in the study. Because some schools spanned grades 7 to 12, we have 132 schools in our sample, each associated with one of 80 communities. School size varied from fewer than 100 students to more than 3,000 students. Our communities were located in urban, suburban, and rural areas of the country.
W3 At-Home Survey	2001 – 2002	15,197	W3 data contains follow-up interviews from 15,197 original W1 Respondents. Respondents who were overseas for the duration of the fieldwork or who were in the Armed Forces and deployed overseas for the duration of the fieldwork, were not eligible for a W3 interview.

W4 At-Home Survey	2008 – 2009	15,701	The W4 data set contains follow-up interviews from 15,701 W1 respondents. The W4 fielded sample consisted of 19,962 of the original 20,745 W1 respondents. Respondents who were confirmed deceased (N=96) at W3 and the 687 cases not sampled at W3 were excluded. Of the 19,962 cases, 80.25% consented to participate in W4. Cases ineligible at W4 were sample members who had moved out of the country (N=184), or who were on active-duty military stationed out of the country for the duration of the field work (N=87), or who were deceased (N=126).

9.2. Chapter 3 Appendices

Appendix 2. Description of Variables Used in Chapter 3 Estimations

Variable	Construction	Categories	Mean / Distribution	Source
Dependent variables				
W1 Self-Efficacy	Our W1 Self-Efficacy variable considered responses from the following Add Health W1 Survey question: "How often was each of the following true during the last week? You felt that you were just as good as other people." Response options ranged from 0 (never or rarely), to 3 (most of the time or all of the time).	0 – Never or rarely 1 2 3 – All the time	0.108 0.211 0.327 0.355	W1 SURVEY
W1 Self-Efficacy (Binary)	Binary variable constructed from responses to **W1 Self-Efficacy.** Responses of "3 – All the time" were coded as 1, and all others as 0.	1	0.355	W1 SURVEY
W1 LOC	Our W1 Locus of Control variable considered the following question, "On a scale of 1 to 5, where 1 is strongly agree and 5 is strongly disagree, please tell me whether you agree or disagree with each of the following statements: When you get what you want, it's usually because you worked hard for it." We recoded the responses, inverting values in order to have 1 signal strong disagreement, and 5 signal strong agreement. We also subtracted 1 from all responses to remain consistent with the scales used in other variables, where 0 -not 1- represents the lower-most value in a scale.	0 – Strongly Agree 1 2 3 4 – Strongly Disagree	0.011 0.066 0.184 0.494 0.246	W1 SURVEY

W1 LOC (Binary)	Binary variable constructed from responses to **W1 LOC.** Responses of "5 – Strongly Disagree" were coded as 1, and all others as 0.	1	0.246	W1 SURVEY
W1 Self-Belief	Our W1 Self-Belief variable was constructed from W1 Self-Efficacy and W1 LOC. We combined the total possible points for both questions, with highest self-belief signaled by 8 total points (high frequency for Q1, and strong agreement with Q2), and the lowest by 1.	0 1 2 3 4 5 6 7	0.002 0.011 0.039 0.112 0.221 0.279 0.233 0.104	W1 SURVEY
W1 Self-Belief (Binary)	Binary variable constructed from responses to **W1 Self-Belief.** Responses of 6 or 7 were coded as 1, and all others as 0.	1	0.337	W1 SURVEY
W4 Self-Efficacy	Our W4 Self-Efficacy variable considered responses from the following Add Health W4 Survey question: On a scale of 0 to 4, where 0 equals never and 4 equals all the time, in the last 30 days, how often have you felt confident in your ability to handle your personal problems?	0 – Never 1 2 3 4 – All the time	0.025 0.028 0.177 0.383 0.388	W4 SURVEY
W4 Self-Efficacy (Binary)	Binary variable constructed from responses to **W4 Self-Efficacy.** Responses of "4 – All the time" were coded as 1, and all others as 0.	1	0.387	W4 SURVEY
W4 LOC	Our W4 Locus of Control variable considered the following question: On a scale of 0 to 3, where 0 equals never and 3 equals all the time, overall, how often do you have the freedom to make important decisions about what you do at work and how you do it?	0 – Never 1 2 3 – All the time	0.093 0.250 0.339 0.318	W4 SURVEY

W4 LOC (Binary)	Binary variable constructed from responses to **W4 LOC.** Responses of "3 – All the time" were coded as 1, and all others as 0.	1	0.314	W4 SURVEY
W4 Self-Belief	Our W4 Self-Belief variable was constructed from the two W4 variables described above. We combined the total possible points for both questions, with highest self-belief signaled by 7 total points (high frequency for both W4 Self-Efficacy and W4 LOC).	0 1 2 3 4 5 6 7	0.005 0.011 0.043 0.104 0.196 0.254 0.239 0.148	W4 SURVEY
W4 Self-Belief (Binary)	Binary variable constructed from responses to **W4 Self-Belief.** Responses of 6 or 7 were coded as 1, and all others as 0.	1	0.387	W4 SURVEY
Independent variables				
Total Students in Cohort	Number of children (both immigrant and native) in School X, Grade Y.		68	W1 SURVEY
Immigrants in Cohort	Number of children with at least one foreign-born parent, in School X, Grade Y.		18	W1 SURVEY
Hispanic Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of Hispanic ethnicity, in School X, Grade Y.		8	W1 SURVEY
White Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially White, in School X, Grade Y		5	W1 SURVEY

Asian Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Asian, in School X, Grade Y		8	W1 SURVEY
Black Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Black, in School X, Grade Y.		1	W1 SURVEY
Other-race Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of a race other than Hispanic, White, Asian, or Black, in School X, Grade Y		5	W1 SURVEY
Close Immigrant Friend	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Close Immigrant Friend variable is a binary variable where 1 represents a child who nominated at least one immigrant peer amongst their top-10 friends. Note that 25% of respondents did not nominate any friends.	1	0.055	W1 SURVEY
Share of Friends who are Immigrant	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Percent of Close Friends Who are Immigrant variable is a continuous variable which shows the share of an individual's top-10 friends who are immigrants. Note that 25% of respondents did not nominate any friends.	1	0.007	W1 SURVEY
Other control variables				
Sex – Male	Self-identified sex, in response to the question "What sex are you?"	Male	0.465	W1 SURVEY

Race	Variable constructed from participant answers to two W1 Survey questions: (1) Are you of Hispanic or Spanish origin? (2) What is your race? (Options included: White/Black/Asian/Native American/ Other) We categorise all participants who identified as Hispanic as being of Hispanic race. We categorise the remaining participants as White non-Hispanic, Black non-Hispanic, Asian non-Hispanic or Other non-Hispanic.	White (non-Hispanic) Hispanic Black (non-Hispanic) Asian (non-Hispanic) Other (non-Hispanic)	0.656 0.073 0.250 0.012 0.010	W1 SURVEY
Age	Age at the time of the W1 Survey	12 13 14 15 16 17 18 19 20 21	0.003 0.085 0.139 0.171 0.189 0.187 0.168 0.053 0.004 0.001	W1 SURVEY
High Achiever	Binary variable where 1 represents participants who received an A in all four subjects (English, Math, History, and Science) during the last grading period before the W1 Survey.		0.065	W1 SURVEY
Mother's Educational Attainment	Constructed variable from W1 question with the following options: 1- eighth grade or less 2- more than eighth grade, but did not graduate from high school 3- high school graduate	High school or less Some college College or more	0.540 0.199 0.261	W1 SURVEY

	4- completed a GED 5- went to a business, trade, or vocational school after high school 6- went to college but did not graduate 7- graduated from college 8- professional training beyond a four-year college			
Mother's Educational Expectations of Their Child	On a scale of 1 to 5, where 1 is low and 5 is high, how disappointed would your mother be if you did not graduate from college?	5 4 3 2 1	0.498 0.190 0.182 0.060 0.069	W1 SURVEY
On Benefits	Variable constructed from participant answers to two W1 Survey questions: (1) Which description comes closest to describing your mother's job? (2) Which description comes closest to describing your father's job? A binary variable was then created where 1 represents participants who responded "19 – He/she receives Public Assistance, such as welfare" for either one of their parents.	1	0.100	W1 SURVEY
Family Code	Add Health-assigned household code. Some households have more than 1 pair of adolescents. This number is the same for all the pairs within a single household. Range 1001 to 3785.	2 Siblings 3+ Siblings	0.927 0.071	SIBLING PAIRS
School Code	Add Health-assigned school code. Range 001 to 371, with a total of 172 schools in the original dataset. 28 schools (and participants from these			W1 SURVEY

	schools) were excluded because school administrators indicated that students at their school did not complete the In-School W1 questionnaire. In addition, schools with cohorts smaller than 20 students were excluded, resulting in 128 schools considered for analysis.			

The following variables were not used in the regressions examining the effects of immigrant students on native peers, but for comparisons between immigrant and natives (comparing academic achievement, self-appraisals of intelligence, perceived likelihood of future career and educational success, and disruptiveness). Nonetheless, we include them in this Appendix for easy reference.

Variable	Description	Native	Immigrant	Source
Low Achievement	Binary variable where 1 represents participants who received an D or lower in all four subjects (English, Math, History, and Science) during the last grading period before the W1 Survey.	0.014	0.008	W1 SURVEY
W4 Perceived Relative Intelligence	From the W1 Survey question asking: *Compared with other people your age, how intelligent are you?* Response options ranged from "1- Moderately below average" to "6- Extremely above average'.	3.879	3.786	W1 SURVEY
Disruptiveness	Binary variable from a W1 Survey question asking: *Have you ever received an out-of-school suspension?* (0 = No; 1 = Yes)	0.303	0.212	W1 SURVEY

Appendix 3. Alternative Specifications for Main Estimations (Effect of Immigrant Classmates on the W1 Self-Belief of Natives)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Ordinal (full range)	Binary	Binary	Ordinal (full range)
Immigrants in Cohort	0.746***	0.168*	0.809**	0.902***
	(0.256)	(0.090)	(0.410)	(0.387)
Total Students in Cohort	-0.005***	-0.001***	-0.007***	-0.007***
	(0.001)	(0.0004)	(0.002)	(0.002)
Observations	12,439	12,439	12,439	12,439

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 4. Alternative Specifications for Main Estimations (Effect of Immigrant Classmates on the W4 Self-Belief of Natives)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Ordinal (full range)	Binary	Binary	Ordinal (full range)
Immigrants in Cohort	0.843***	0.182**	0.877*	1.060***
	(0.276)	(0.092)	(0.451)	(0.333)
Total Students in Cohort	-0.003**	-0.001	-0.002	-0.004**
	(0.001)	(0.0004)	(0.002)	(0.002)
Observations	12,439	12,439	12,439	12,439

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 5. Alternative Specifications for Main Estimations (Effect of Immigrant Classmates on the W1 Self-Belief of Natives, Sibling Sample)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Ordinal (full range)	Binary	Binary	Ordinal (full range)
Immigrants in Cohort	0.641*	0.065	0.476	0.444**
	(0.387)	(0.094)	(0.615)	(0.139)
Total Students in Cohort	-0.003*	0.00001	0.0003	-0.0002
	(0.002)	(0.001)	(0.003)	(0.001)
Observations	3,003	3,003	3,003	3,003

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 6. Alternative Specifications for Main Estimations (Effect of Immigrant Classmates on the W4 Self-Belief of Natives, Sibling Sample)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.617	0.067	0.613	0.060
	(0.398)	(0.098)	(0.677)	(0.133)
Total Students in Cohort	-0.003*	-0.0004	-0.004	0.001
	(0.002)	(0.001)	(0.003)	(0.0008)
Observations	3,003	3,003	3,003	3,003

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 7. Race Interactions for W1 Self-Belief and W4 Self-Belief

	(1)	(2)
Immigrants in Cohort	0.443*	0.597**
	(0.268)	(0.288)
Hispanic* Immigrants in Cohort	0.138*	0.177**
	(0.071)	(0.076)
Asian* Immigrants in Cohort	0.187	0.305**
	(0.117)	(0.126)
Black* Immigrants in Cohort	0.230***	0.247***
	(0.063)	(0.067)
Other race* Immigrants in Cohort	0.209	0.071
	(0.244)	(0.262)
Hispanic	-0.151**	-0.043
	(0.060)	(0.064)
Asian	-0.194	0.009
	(0.155)	(0.167)
Black	-0.044	-0.139***
	(0.043)	(0.046)
Other race	0.231	0.134
	(0.200)	(0.215)
Total Students in Cohort	-0.005***	-0.003**
	(0.001)	(0.001)
Observations	12,439	12,439

Note: These are the coefficients from regressions in which the dependent variables are W1 Self-Belief (Column 1), and W4 Self-Belief (Column 2). We interact the number of immigrant classmates with native race. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 8. Interaction Effects of Friendship with W1 Self-Belief and W4 Self-Belief

	(1)	(2)
Immigrants in Cohort	0.192	0.997**
	(0.377)	(0.407)
Close Immigrant Friend	-0.121	0.034
	(0.078)	(0.084)
Immigrants in Cohort * Close Immigrant Friend	0.080	-0.025
	(0.053)	(0.057)
Total Students in Cohort	-0.004***	-0.003**
	(0.001)	(0.001)
Observations	9,175	9,175

Note: These are the coefficients from two regressions in which the dependent variables are W1 Self-Belief and W4 Self-Belief. The independent variable is the number of immigrants in a cohort, and the interaction term is a binary variable where 1 represent a respondent who nominated at least 1 immigrant friend amongst their top-10 friends. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

9.3. Chapter 4 Appendices

Appendix 9. Description of Variables Used in Chapter 4 Estimations

Variable	Construction	Categories	Mean	Source
		Dependent variables		
W4 Imagination	From a W4 Survey question asking: "How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination." Participants has to select an option ranging from "5 - Strongly Disagree" to "1 - Strongly Agree".	5 – Strongly Disagree	0.224	W4 SURVEY
		4	0.586	
		3	0.121	
		2	0.061	
		1 – Strongly Agree	0.008	
W4 Imagination Binary	Constructed from the Good Imagination variable, this is a binary variable where 1 represents participants who strongly disagreed with the statement "How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I do not have a good imagination."	1	0.224	W4 SURVEY
W4 Vivid Imagination	From a W4 Survey question asking: "How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have a vivid imagination." Participants has to select an option ranging from "5 - Strongly Disagree" to "1 - Strongly Agree".	5 – Strongly Disagree	0.017	W4 SURVEY
		4	0.131	
		3	0.236	
		2	0.416	
		1 – Strongly Agree	0.200	
W4 Vivid Imagination Binary	Constructed from the Good Imagination variable, this is a binary variable where 1 represents participants who strongly disagreed with the statement "How much do you agree with each statement about you as you generally are now, not	1	0.200	W4 SURVEY

	as you wish to be in the future? I have a vivid imagination."			
	Independent variables			
Total Students in Cohort	Number of children (both immigrant and native) in School X, Grade Y.		68	W1 SURVEY
Immigrants in Cohort	Number of children with at least one foreign-born parent, in School X, Grade Y.		18	W1 SURVEY
Hispanic Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of Hispanic ethnicity, in School X, Grade Y.		8	W1 SURVEY
White Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially White, in School X, Grade Y		5	W1 SURVEY
Asian Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Asian, in School X, Grade Y		8	W1 SURVEY
Black Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Black, in School X, Grade Y.		1	W1 SURVEY
Other-race Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of a race other than Hispanic, White, Asian, or Black, in School X, Grade Y		5	W1 SURVEY
Close Immigrant Friend	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Close Immigrant Friend variable is a binary variable where 1 represents a child who nominated at least	1	0.072	W1 SURVEY

	one immigrant peer amongst their top-10 friends. Note that 25% of respondents did not nominate any friends.			
Share of Friends who are Immigrant	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Percent of Close Friends Who are Immigrant variable is a continuous variable which shows the share of an individual's top-10 friends who are immigrants. Note that 25% of respondents did not nominate any friends.	1	0.007	W1 SURVEY
Other control variables				
Sex – Male	Self-identified sex, in response to the question "What sex are you?"	Male	0.465	W1 SURVEY
Race	Variable constructed from participant answers to two W1 Survey questions: (1) Are you of Hispanic or Spanish origin? (2) What is your race? (Options included: White/Black/Asian/Native American/ Other) We categorise all participants who identified as Hispanic as being of Hispanic race. We categorise the remaining participants as White non-Hispanic, Black non-Hispanic, Asian non-Hispanic or Other non-Hispanic.	White (non-Hispanic) Hispanic Black (non-Hispanic) Asian (non-Hispanic) Other (non-Hispanic)	0.658 0.072 0.247 0.012 0.010	W1 SURVEY
Age	Age at the time of the W1 Survey	12 13 14 15 16 17 18	0.002 0.084 0.138 0.170 0.189 0.189 0.169	W1 SURVEY

		19	0.053	
		20	0.004	
		21	0.0005	
High Achiever	Binary variable where 1 represents participants who received an A in all four subjects (English, Math, History, and Science) during the last grading period before the W1 Survey.		0.065	W1 SURVEY
Mother's Educational Attainment	Constructed variable from W1 question with the following options: 1- eighth grade or less 2- more than eighth grade, but did not graduate from high school 3- high school graduate 4- completed a GED 5- went to a business, trade, or vocational school after high school 6- went to college but did not graduate 7- graduated from college 8- professional training beyond a four-year college	High school or less	0.540	W1 SURVEY
		Some college	0.197	
		College or more	0.262	
Mother's Educational Expectations of Their Child	On a scale of 1 to 5, where 1 is low and 5 is high, how disappointed would your mother be if you did not graduate from college?	5 - Very Disappointed	0.493	W1 SURVEY
		4	0.186	
		3	0.187	
		2	0.062	
		1 - Not at all Disappointed	0.071	
On Benefits	Variable constructed from participant answers to two W1 Survey questions: (1) Which description comes closest to describing your mother's job?	1	0.099	W1 SURVEY

	(2) Which description comes closest to describing your father's job? A binary variable was then created where 1 represents participants who responded "19 – He/she receives Public Assistance, such as welfare" for either one of their parents.			
Family Code	Add Health-assigned household code. Some households have more than 1 pair of adolescents. This number is the same for all the pairs within a single household. Range 1001 to 3785.	2 Siblings 3+ Siblings	0.932 0.068	SIBLING PAIRS
School Code	Add Health-assigned school code. Range 001 to 371, with a total of 172 schools in the original dataset. 28 schools (and participants from these schools) were excluded because school administrators indicated that students at their school did not complete the In-School W1 questionnaire. In addition, schools with cohorts smaller than 20 students were excluded, resulting in 127 schools considered for analysis.			W1 SURVEY

The following variables were not used in the regressions examining the effects of immigrant students on native peers, but for analysis of variables potentially related to imagination. Nonetheless we include them in this Appendix for easy reference.

Variable	Description	Mean	Source
W4 Understands Abstract Concepts	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have difficulty understanding abstract ideas.* We dichotomized this	0.088	W4 SURVEY

	variable, with participants expressing strong disagreement (5) being coded as 1, and all others coded as 0.		
W4 Vivid Imagination	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I have a vivid imagination.* We dichotomized this variable, with participants expressing strong agreement (1) being coded as 1, and all others coded as 0.	0.198	W4 SURVEY
W4 Interested in Abstract Concepts	Question asking participants to rate their agreement (1 = Strongly Agree; 5 = Strongly Disagree) with the statement: *How much do you agree with each statement about you as you generally are now, not as you wish to be in the future? I am not interested in abstract ideas.* We dichotomized this variable, with participants expressing strong disagreement (5) being coded as 1, and all others coded as 0.	0.081	W4 SURVEY
W4 Creative Job	Question asking participants what their current job is. We then code responses as a binary variable where occupations traditionally considered creative/imaginative are coded as 1, and all others as 0. See Appendix 13 for a full list of occupations included.	0.024	W4 SURVEY
W4 Perceived Relative Intelligence	Question asking participants the following statement: *Compared with other people your age, how intelligent are you?* Response options ranged from "1- Moderately below average" to "6- Extremely above average'. We dichotomized this variable, with participants expressing high perceived intelligence (5 or 6) being coded as 1, and all others coded as 0.	0.326	W4 SURVEY
W4 Number Recall Test	Test where participants receive the following instructions*: I am going to say some strings of numbers, and when I am done I would like you to repeat them backwards, in the reverse order from which I said them. So if I said "3, 8," you would say "8, 3." Do you understand? The sets will get larger as we go.* Scores Range from 0 to 7. We dichotomized this variable, with participants with scores of 6 or 7) being coded as 1, and all others coded as 0.	0.225	W4 SURVEY

W4 Word Recall Test	Test where participants receive the following instructions*: I am going to read a list of 15 words. Listen carefully. When I am finished, you are to repeat as many of the words as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can. I will say each word only one time, and I cannot repeat any words. Do you have any questions? Are you ready? (The list of 15 words is displayed on the screen at 1 second intervals. After the last word is displayed the following text appears below the word list for the interviewer: "Now tell me as many words as you can remember." The computer counts down 90 seconds during which the respondent recalls the words.* Scores range from 0 to 15. We dichotomized this variable, with participants with scores of 8 or higher) being coded as 1, and all others coded as 0.	0.123	W4 SURVEY
W4 Arrogance	Constructed variable where 1 indicates participants ranked themselves as highly intelligent in the Perceived Relative Intelligence question above, but did not score as highly intelligent in the Number Test above.	0.226	W4 SURVEY
W4 Perceived Relative Success	Question asking participants: *Think of this ladder as representing where people stand in the United States. At the top of the ladder (step 10) are the people who have the most money and education, and the most respected jobs. At the bottom of the ladder (step 1) are the people who have the least money and education, and the least respected jobs or no job. Where would you place yourself on this ladder? Pick the number for the step that shows where you think you stand at this time in your life, relative to other people in the United States.* We dichotomized this variable, with participants with ranking themselves as 7 or higher) being coded as 1, and all others coded as 0.	0.185	W4 SURVEY

Appendix 10. Alternative Specifications for Main Estimations

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.146***	0.210*	0.831***	0.646***
	(0.056)	(0.108)	(0.322)	(0.048)
Total Students in Cohort	-0.001***	-0.001*	-0.003***	-0.002***
	(0.0002)	(0.0003)	(0.001)	(0.0002)
Observations	9,306	9,306	9,306	9,306

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 11. Alternative Specifications for Estimation, Interactions with Race

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.161***	0.207*	0.907***	0.671***
	(0.057)	(0.111)	(0.330)	(0.084)
Hispanic* Immigrants in Cohort	-0.017	0.0005	-0.089	-0.055
	(0.020)	(0.038)	(0.112)	(0.095)
Asian* Immigrants in Cohort	-0.070**	-0.048	-0.673**	-0.198
	(0.033)	(0.065)	(0.305)	(0.154)
Black* Immigrants in Cohort	-0.007	0.034	-0.055	0.043
	(0.018)	(0.035)	(0.102)	(0.089)
Other race* Immigrants in Cohort	-0.072**	-0.185***	-0.521*	-0.461***
	(0.036)	(0.069)	(0.278)	(0.162)
Hispanic	-0.012	-0.032	-0.069	-0.055
	(0.020)	(0.038)	(0.121)	(0.095)
Asian	0.006	0.053	0.158	0.079
	(0.053)	(0.103)	(0.333)	(0.253)
Black	0.043**	0.082**	0.244**	0.224***
	(0.017)	(0.032)	(0.098)	(0.079)
Other race	0.018	0.001	0.134	0.054
	(0.026)	(0.050)	(0.160)	(0.125)
Total Students in Cohort	-0.001***	-0.001*	-0.003***	-0.002***
	(0.0002)	(0.0003)	(0.001)	(0.0002)
Observations	9,306	9,306	9,306	9,306

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 12. Alternative Specifications for Estimation, Interaction with Close Immigrant Friend Variable

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.220***	0.296**	1.223***	0.666***
	(0.066)	(0.127)	(0.383)	(0.071)
Total Students in Cohort	-0.001***	-0.001	-0.003***	-0.002***
	(0.0002)	(0.0003)	(0.001)	(0.0002)
Immigrants in Cohort * Close Immigrant Friend	0.008	0.010	0.047	0.024
	(0.016)	(0.030)	(0.092)	(0.075)
Close Immigrant Friend	-0.020	-0.014	-0.124	-0.042
	(0.021)	(0.041)	(0.131)	(0.103)
Observations	6,359	6,359	6,359	6,359

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 13. List of Creative Occupations

17-1011 Architects, Except Landscape and Naval
17-1012 Landscape Architects
25-1120 Arts, Communications, and Humanities Teachers, Postsecondary
25-1121 Art, Drama, and Music Teachers, Postsecondary
25-1122 Communications Teachers, Postsecondary
25-1123 English Language and Literature Teachers, Postsecondary
27-1000 Art and Design Workers
27-1010 Artists and Related Workers
27-1011 Art Directors
27-1012 Craft Artists
27-1013 Fine Artists, Including Painters, Sculptors, and Illustrators
27-1014 Multi-Media Artists and Animators
27-1019 Artists and Related Workers, All Other
27-1020 Designers
27-1021 Commercial and Industrial Designers
27-1022 Fashion Designers
27-1023 Floral Designers
27-1024 Graphic Designers
27-1025 Interior Designers
27-1026 Merchandise Displayers and Window Trimmers
27-1027 Set and Exhibit Designers
27-1029 Designers, All Other
27-2000 Entertainers and Performers, Sports and Related Workers
27-2010 Actors, Producers, and Directors
27-2011 Actors
27-2012 Producers and Directors
27-2030 Dancers and Choreographers
27-2031 Dancers
27-2032 Choreographers
27-2040 Musicians, Singers, and Related Workers
27-2041 Music Directors and Composers
27-2042 Musicians and Singers
27-2090 Miscellaneous Entertainers and Performers, Sports and Related Workers
27-2099 Entertainers and Performers, Sports and Related Workers, All Other
27-3000 Media and Communication Workers
27-3040 Writers and Editors
27-3041 Editors
27-3042 Technical Writers
27-3043 Writers and Authors
27-3090 Miscellaneous Media and Communication Workers
27-3099 Media and Communication Workers, All Other
27-4020 Photographers
27-4021 Photographers
27-4032 Film and Video Editors
51-9071 Jewelers and Precious Stone and Metal Workers

9.4. Chapter 5 Appendices

Appendix 14. Description of Variables Used in Chapter 5 Estimations

Variable	Construction	Categories	Mean	Source
		Dependent variables		
W1 Educational Expectations	Question from the W1 Survey in which participants were asked, "On a scale on 1 to 5 where 1 is low and 5 is high, how likely is it that you will go to college?"	5 – High 4 3 2 1 – Low	0.540 0.212 0.142 0.050 0.056	W1 SURVEY
W1 Educational Expectations Binary	Constructed binary variable where 1 represents participants who responded "5 – High" to the question "On a scale on 1 to 5 where 1 is low and 5 is high, how likely is it that you will go to college?"	1	0.540	W1 SURVEY
W1 Educational Aspirations	Question from the W1 Survey in which participants were asked, "On a scale on 1 to 5 where 1 is low and 5 is high, how much do you want to go to college?"	5 – High 4 3 2 1 – Low	0.691 0.135 0.105 0.030 0.039	W1 SURVEY
W1 Educational Aspirations Binary	Constructed binary variable where 1 represents participants who responded "5 – High" to the question, "On a scale on 1 to 5 where 1 is low and 5 is high, how much do you want to go to college?"	1	0.691	W1 SURVEY

W4 University Completion	Question from the W4 Survey in which participants were asked, "What is the highest level of education that you have achieved to date?" We assigned respondents who indicated having completed college or higher to one category (= 1), and all others to another (= 0) Options to this question included: 8th grade or less; some high school; high school graduate; some vocational/technical training (after high school); completed vocational/technical training (after high school); some college; completed college (bachelor's degree); some graduate school; completed a master's degree; some graduate training beyond a master's degree; completed a doctoral degree; some post baccalaureate professional education (e.g., law school, med school, nurse); and completed post baccalaureate professional education (e.g., law school, med school, nurse).	1	0.310	W4 SURVEY
W4 Educational Satisfaction	Question from the W4 Survey in which participants were asked, "Which of the following best describes your desired level of education? Please listen to all of the options before responding."	1 - I have achieved my desired level of education. 2 - I have not achieved my desired level of education but believe that I will. 3 - I have not achieved my desired level of education and do not believe that I will	0.236 0.671 0.093	W4 SURVEY
W4 Educational Satisfaction Binary	Constructed binary variable where 1 represents participants who responded "1 – I have achieved my desired level of education" to the question, "Which of the following best describes your desired level of education?"	1	0.236	W4 SURVEY

Independent variables				
Total Students in Cohort	Number of children (both immigrant and native) in School X, Grade Y.		69	W1 SURVEY
Immigrants in Cohort	Number of children with at least one foreign-born parent, in School X, Grade Y.		19	W1 SURVEY
Hispanic Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of Hispanic ethnicity, in School X, Grade Y.		9	W1 SURVEY
White Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially White, in School X, Grade Y		5	W1 SURVEY
Asian Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Asian, in School X, Grade Y		8	W1 SURVEY
Black Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Black, in School X, Grade Y.		1	W1 SURVEY
Other-race Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of a race other than Hispanic, White, Asian, or Black, in School X, Grade Y		5	W1 SURVEY
Close Immigrant Friend	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Close Immigrant Friend variable is a binary variable where 1 represents a child who nominated at least one immigrant peer amongst their top-10 friends.	1	0.055	W1 SURVEY

	Note that 26% of respondents did not nominate any friends.			
Share of Friends who are Immigrant	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Percent of Close Friends Who are Immigrant variable is a continuous variable which shows the share of an individual's top-10 friends who are immigrants. Note that 26% of respondents did not nominate any friends.		0.006	W1 SURVEY
Other control variables				
Sex – Male	Self-identified sex, in response to the question "What sex are you?"	Male	0.493	W1 SURVEY
Race	Variable constructed from participant answers to two W1 Survey questions: (1) Are you of Hispanic or Spanish origin? (2) What is your race? (Options included: White/Black/Asian/Native American/ Other) We categorise all participants who identified as Hispanic as being of Hispanic race. We categorise the remaining participants as White non-Hispanic, Black non-Hispanic, Asian non-Hispanic or Other non-Hispanic.	White (non-Hispanic) Hispanic Black (non-Hispanic) Asian (non-Hispanic) Other (non-Hispanic)	0.639 0.079 0.256 0.013 0.013	W1 SURVEY
Age	Age at the time of the W1 Survey	12 13 14 15 16 17 18 19	0.003 0.082 0.134 0.168 0.188 0.193 0.172 0.054	W1 SURVEY

		20	0.005	
		21	0.001	
High Achiever	Binary variable where 1 represents participants who received an A in all four subjects (English, Math, History, and Science) during the last grading period before the W1 Survey.		0.061	W1 SURVEY
Mother's Educational Attainment	Constructed variable from W1 question with the following options: 1- eighth grade or less 2- more than eighth grade, but did not graduate from high school 3- high school graduate 4- completed a GED 5- went to a business, trade, or vocational school after high school 6- went to college but did not graduate 7- graduated from college 8- professional training beyond a four-year college	High school or less	0.552	W1 SURVEY
		Some college	0.195	
		College or more	0.253	
Mother's Educational Expectations of Their Child	On a scale of 1 to 5, where 1 is low and 5 is high, how disappointed would your mother be if you did not graduate from college?	5 - Very Disappointed	0.489	W1 SURVEY
		4	0.186	
		3	0.188	
		2	0.062	
		1 - Not at all Disappointed	0.075	
On Benefits	Variable constructed from participant answers to two W1 Survey questions: (1) Which description comes closest to describing your mother's job? (2) Which description comes closest to describing your father's job?	1	0.107	W1 SURVEY

	A binary variable was then created where 1 represents participants who responded "19 – He/she receives Public Assistance, such as welfare" for either one of their parents.			
Family Code	Add Health-assigned household code. Some households have more than 1 pair of adolescents. This number is the same for all the pairs within a single household. Range 1001 to 3785.	2 Siblings 3+ Siblings	0.927 0.071	SIBLING PAIRS
School Code	Add Health-assigned school code. Range 001 to 371, with a total of 172 schools in the original dataset. 28 schools (and participants from these schools) were excluded because school administrators indicated that students at their school did not complete the In-School W1 questionnaire. In addition, schools with cohorts smaller than 20 students were excluded, resulting in 128 schools considered for analysis.			W1 SURVEY

The following variable was not used in the regressions examining the effects of immigrant students on native peers, but for comparisons between the levels of effort invested into schoolwork by native and immigrant students. Nonetheless, we include it in this Appendix for easy reference.

Variable	Description	Native	Immigrant	Source
W1 Effort	Binary variable, constructed from the W1 Survey Question: "*In general, how hard do you try to do your school work well?"* Response options ranged from "1 – I try very hard to do my best" to "4 – I never try at all." Responses were dichotomized and all participants who responded with 1 were grouped into	0.361	0.400	W1 SURVEY

	one category (high effort = 1), and all others into another (not high effort = 0).

Appendix 15. Alternative Specifications for Main Estimations (Effect of Immigrants on W1 Educational Expectations)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.273***	0.415**	1.334***	0.983**
	(0.091)	(0.210)	(0.443)	(0.420)
Total Students in Cohort	-0.002***	-0.004***	-0.010***	-0.008***
	(0.0004)	(0.001)	(0.002)	(0.002)
Observations	11,662	11,662	11,662	11,662

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 16. Alternative Specifications for Main Estimations (Effect of Immigrants on W1 Educational Expectations, with Race Interactions)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.226**	0.268	1.091**	0.772*
	(0.093)	(0.214)	(0.452)	(0.421)
Hispanic* Immigrants in Cohort	0.059**	0.130**	0.301**	0.228**
	(0.024)	(0.056)	(0.124)	(0.096)
Asian* Immigrants in Cohort	-0.035	0.057	-0.222	0.034
	(0.041)	(0.093)	(0.236)	(0.153)
Black* Immigrants in Cohort	0.063***	0.205***	0.307***	0.316***
	(0.022)	(0.050)	(0.112)	(0.085)
Other race* Immigrants in Cohort	-0.035	0.055	-0.130	0.007
	(0.085)	(0.194)	(0.415)	(0.318)
Hispanic	-0.048**	-0.089*	-0.230**	-0.160*
	(0.021)	(0.048)	(0.099)	(0.088)
Asian	0.064	0.106	0.319	0.239
	(0.054)	(0.124)	(0.265)	(0.246)
Black	0.016	0.069**	0.073	0.098
	(0.015)	(0.034)	(0.071)	(0.065)
Other race	0.065	-0.018	0.270	0.050
	(0.069)	(0.159)	(0.335)	(0.310)
Total Students in Cohort	-0.002***	-0.003***	-0.010***	-0.008***
	(0.0004)	(0.001)	(0.002)	(0.002)
Observations	11,662	11,662	11,662	11,662

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 17. Alternative Specifications for Main Estimations (Effect of Immigrants on W1 Educational Expectations, Interaction with Close Immigrant Friend)

Specification	OLS	OLS	Logit	POLR
Dependent variable	Binary	Ordinal (full range)	Binary	Ordinal (full range)
Immigrants in Cohort	0.273***	0.425**	1.328***	0.985**
	(0.091)	(0.210)	(0.444)	(0.420)
Total Students in Cohort	-0.002***	-0.004***	-0.010***	-0.008***
	(0.0004)	(0.001)	(0.002)	(0.002)
Immigrants in Cohort * Close Immigrant Friend	-0.001	-0.052	-0.003	-0.053
	(0.017)	(0.040)	(0.081)	(0.073)
Close Immigrant Friend	0.023	0.121*	0.120	0.173
	(0.027)	(0.062)	(0.135)	(0.126)
Observations	8,675	8,675	8,675	8,675

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 18. Race Interactions for W4 Educational Satisfaction, W4 Work Satisfaction, and W4 Perceived Relative Success

	(1)	(2)	(3)
Immigrants in Cohort	0.132	0.216**	0.206**
	(0.090)	(0.090)	(0.096)
Hispanic* Immigrants in Cohort	0.020	0.026	0.034
	(0.021)	(0.024)	(0.025)
Asian* Immigrants in Cohort	0.039	0.050	-0.015
	(0.036)	(0.039)	(0.042)
Black* Immigrants in Cohort	0.005	0.037*	0.016
	(0.019)	(0.021)	(0.022)
Other race* Immigrants in Cohort	-0.057	-0.117	0.069
	(0.078)	(0.082)	(0.087)
Hispanic	-0.048**	-0.031	-0.024
	(0.019)	(0.020)	(0.021)
Asian	-0.021	0.002	0.011
	(0.059)	(0.052)	(0.055)
Black	-0.097***	-0.073***	-0.061***
	(0.014)	(0.014)	(0.015)
Other race	0.027	0.038	-0.074
	(0.062)	(0.067)	(0.071)
Total Students in Cohort	-0.001	-0.001***	-0.002***
	(0.0004)	(0.0004)	(0.0004)
Observations	8,584	11,662	11,662

Note: These are the coefficients from three regressions in which the dependent variables are W4 Educational Satisfaction amongst college non-completers (Column 1), W4 Work Satisfaction (Column 2), and W4 Perceived Relative Success (Column 3). We interact the number of immigrant classmates with native race. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 19. Effect of Different Races of Immigrant Students on W4 Educational Satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.141*					
	(0.085)					
Hispanic Immigrants		0.110				
		(0.098)				
White Immigrants			0.220			
			(0.184)			
Asian Immigrants				0.049		
				(0.105)		
Black Immigrants					0.545	
					(0.533)	
Other-race Immigrants						0.093
						(0.140)
Total Students in Cohort	0.647***	0.645***	0.646***	0.646***	0.647***	0.645***
	(0.103)	(0.103)	(0.103)	(0.103)	(0.103)	(0.103)
Observations	8,584	8,584	8,584	8,584	8,584	8,584

Note: These are the coefficients from six regressions in which the dependent variable is a dummy for W4 Educational Satisfaction. This sample is limited to college non-completers. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 20. Effect of Different Races of Immigrant Students on W4 Work Satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.205**					
	(0.086)					
Hispanic Immigrants		0.211**				
		(0.104)				
White Immigrants			0.094			
			(0.199)			
Asian Immigrants				0.181*		
				(0.109)		
Black Immigrants					0.121	
					(0.525)	
Other-race Immigrants						0.240
						(0.149)
Total Students in Cohort	-0.001**	-0.001*	-0.0003	-0.0005	-0.0002	-0.0005
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Observations	11,662	11,662	11,662	11,662	11,662	11,662

Note: These are the coefficients from six regressions in which the dependent variable is a dummy for W4 Work Satisfaction. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 21. Effect of Different Races of Immigrant Students on W4 Perceived Relative Success

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.227**					
	(0.091)					
Hispanic Immigrants		0.288***				
		(0.111)				
White Immigrants			0.400*			
			(0.212)			
Asian Immigrants				0.056		
				(0.116)		
Black Immigrants					0.514	
					(0.556)	
Other-race Immigrants						0.254
						(0.158)
Total Students in Cohort	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Observations	11,662	11,662	11,662	11,662	11,662	11,662

Note: These are the coefficients from six regressions in which the dependent variable is a dummy for W4 Perceived Relative Success. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 22. Interaction Effects of Friendship with W4 Educational Satisfaction, W4 Work Satisfaction, and W4 Perceived Relative Success

	(1)	(2)	(3)
Immigrants in Cohort	0.093	0.029	0.197
	(0.167)	(0.127)	(0.135)
Close Immigrant Friend	-0.006	-0.014	0.020
	(0.031)	(0.026)	(0.028)
Immigrants in Cohort * Close Immigrant Friend	0.017	0.019	-0.013
	(0.018)	(0.018)	(0.019)
Total Students in Cohort	-0.0001	-0.001**	-0.001**
	(0.0005)	(0.0005)	(0.0005)
Observations	5,684	8,584	8,584

Note: These are the coefficients from three regressions in which the dependent variables are W4 Educational Satisfaction amongst college non-completers, W4 Work Satisfaction, and W4 Perceived Relative Success. The independent variable is the number of immigrants in a cohort, and the interaction term is a binary variable where 1 represent a respondent who nominated at least 1 immigrant friend amongst their top-10 friends. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

9.5. Chapter 6 Appendices

Appendix 23. Description of Variables Used in Chapter 6 Estimations

Variable	Construction	Categories	Natives	Immigrants	Source
Dependent variables					
W3 Traditional Gender Roles	It is much better for everyone if the man earns the money and the woman takes care of the home and family.	1 – Strongly Agree	0.102	0.105	W3 SURVEY
		2	0.111	0.136	
		3	0.265	0.265	
		4	0.180	0.170	
		5 – Strongly Disagree	0.342	0.323	
W3 Traditional Gender Roles Binary	Constructed variable in which responses of 1 - 3 to the Traditional Family Roles variable are coded as 1, and all others are coded as 0.	1	0.478	0.506	W3 SURVEY
W3 Prioritizing Marriage Over Education	Suppose that in the next few years you were going to school full time and met someone you really wanted to marry, but the only way for you to get married was to drop out of school completely. Would you get married then or wait until you finished your education?	1 – Drop out and get married	0.065	0.058	W3 SURVEY
Parent variables					
Traditional Gender Roles (Parent)	Variable constructed from two different questions in the Add Health Wave I Parental Questionnaire. *"Of the following, which do you think is the most important thing for a boy to learn?" (*Where response options were: (1) to be well behaved, (2) to be popular, (3) to think for himself, (4) to work hard, and (5) to help others)				

	*"Of the following, which do you think is the most important thing for a girl to learn?" (*Where response options were: (1) to be well behaved, (2) to be popular, (3) to think for herself, (4) to work hard, and (5) to help others) Parents who selected option 3 (to think for himself) or 4 (to work hard) for boys, while simultaneously selecting option 1 (to be well behaved) or 5 (to help others) for girls, were identified as having Traditional Gender Roles and coded as 1, with all others coded as 0.				
	Of the following, which do you think is the most important thing for a boy to learn?	To be well-behaved	0.205	0.394	PARENT SURVEY
		To be popular	0.001	0.006	
		To think for himself	0.627	0.380	
		To work hard	0.091	0.136	
		To help others	0.076	0.084	
	Of the following, which do you think is the most important thing for a girl to learn?	To be well-behaved	0.205	0.425	PARENT SURVEY
		To be popular	0.002	0.003	
		To think for herself	0.669	0.410	
		To work hard	0.058	0.081	
		To help others	0.065	0.081	
	Traditional Gender Roles (Parent)	0	0.976	0.921	PARENT SURVEY
		1	0.024	0.079	
Conservative Attitudes Score (Parent)	Robustness check variable constructed from three different questions in the Add Health Wave I Parental Questionnaire. *"Do you work outside the home?" (*Where being a stay-at-home mother awards the respondent one point.) *"How often have you gone to religious services in the past year?" (*Where attending services at least once per week awards the respondent one point.) *"How much do you agree or disagree with each of the following statements? Talking about birth control with {CHILD} would only encourage (him/ her) to have sex"* (Where responses of 1 – 4 award the respondent one point.)				

	The sum of points was then calculated for each respondent. Highly-conservative parents received a score of 3, and highly-liberal parents a score of 0.				
	"Do you work outside the home?"	YES	0.747	0.690	PARENT SURVEY
	"How often have you gone to religious services in the past year?"	Once a week or more	0.408	0.483	PARENT SURVEY
		Less than once a week, but at least once a month	0.195	0.233	
		Less than once a month	0.259	0.194	
		Never	0.139	0.090	
	Talking about birth control with {CHILD} would only encourage (him/ her) to have sex.	1 – Strongly Agree	0.011	0.028	PARENT SURVEY
		2	0.021	0.084	
		3	0.050	0.079	
		4	0.370	0.478	
		5 – Strongly Disagree	0.548	0.331	
	Conservative Attitudes Score (Parent)	0	0.400	0.283	PARENT SURVEY
		1	0.442	0.406	
		2	0.139	0.245	
		3	0.018	0.060	
		4	0.001	0.006	
Social Score (Parent)	Mechanisms variable constructed from five different questions in the Add Health Wave I Parental Questionnaire. *Please think about all of {CHILD'S} friends. How many parents of {CHILD'S} friends have you talked to in the last four weeks.* (Where more than 6 awards the respondent one point.) *"The next questions are about {NAME}'s best (male/ female) friend. Have you met this friend in person?"* (Where yes awards the respondent one point).				

Have you met this friend's parents? (Where yes awards the respondent one point)

During this school year, have you participated in school fund-raising or done volunteer work for {NAME}'s school-such as supervising lunch, chaperoning a field trip, etc.? (Where yes awards the respondent one point).

The sum of points was then calculated for each respondent. Highly-social parents received a score of 4, and non-social parents a score of 0.

Please think about all of {CHILD'S} friends. How many parents of {CHILD'S} friends have you talked to in the last four weeks	0	0.219	0.355	PARENT SURVEY
	1	0.198	0.240	
	2	0.205	0.191	
	3	0.130	0.088	
	4	0.091	0.054	
	5	0.040	0.022	
	6	0.117	0.050	
The next questions are about {NAME}'s best (male/ female) friend. Have you met this friend in person?	YES	0.945	0.891	PARENT SURVEY
Have you met this friends' parents?	YES	0.827	0.707	PARENT SURVEY
During this school year, have you participated in school fund-raising or done volunteer work for {NAME}'s school-such as supervising lunch, chaperoning a field trip, etc.?	YES	0.364	0.208	
Social Parent Score	0	0.045	0.097	PARENT SURVEY
	1	0.107	0.180	
	2	0.485	0.532	
	3	0.288	0.165	
	4	0.076	0.026	

Being Immigrant (Parent)	Binary variable where 1 identifies the parent as foreign-born (immigrant), and 0 identifies the parent as native-born (native)	1	0.169	PARENT SURVEY
		Independent variables		
Total Students in Cohort	Number of children (both immigrant and native) in School X, Grade Y.		71	W1 SURVEY
Immigrants in Cohort	Number of children with at least one foreign-born parent, in School X, Grade Y.		19	W1 SURVEY
Hispanic Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of Hispanic ethnicity, in School X, Grade Y.		9	W1 SURVEY
White Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially White, in School X, Grade Y		5	W1 SURVEY
Asian Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Asian, in School X, Grade Y		9	W1 SURVEY
Black Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being racially Black, in School X, Grade Y.		1	W1 SURVEY
Other-race Immigrants	Number of children with at least one foreign-born parent, who also self-identify as being of a race other than Hispanic, White, Asian, or Black, in School X, Grade Y		5	W1 SURVEY

Social Parent Immigrants in Cohort	Number of children with at least one foreign-born and social (scores of 3 or 4 in the Social Parent Score described above) parent, in School X, Grade Y.		1	W1 SURVEY
Close Immigrant Friend	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Close Immigrant Friend variable is a binary variable where 1 represents a child who nominated at least one immigrant peer amongst their top-10 friends.	1	0.039	W1 SURVEY
Share of Friends who are Immigrant	During the W1 Survey, participants were asked to nominate their five best male friends and five best female friends, for a top 10 friends list. Our Percent of Close Friends Who are Immigrant variable is a continuous variable which shows the share of an individual's top-10 friends who are immigrants.		0.005	W1 SURVEY
Other control variables				
Sex – Male	Self-identified sex, in response to the question "What sex are you?"	Male	0.466	W1 SURVEY
Race	Variable constructed from participant answers to two Wave I Survey questions: (1) Are you of Hispanic or Spanish origin? (2) What is your race? (Options included: White/Black/Asian/Native American/ Other) We categorise all participants who identified as Hispanic as being of Hispanic race. We categorise the remaining participants as	White (non-Hispanic) Hispanic Black (non-Hispanic) Asian (non-Hispanic) Other (non-Hispanic)	0.650 0.014 0.249 0.075 0.012	W1 SURVEY

	White non-Hispanic, Black non-Hispanic, Asian non-Hispanic or Other non-Hispanic.			
Age	Age at the time of the Wave I Survey	12	0.003	W1 SURVEY
		13	0.088	
		14	0.141	
		15	0.170	
		16	0.186	
		17	0.192	
		18	0.163	
		19	0.052	
		20	0.004	
		21	<0.000	
Mother's Educational Attainment	Constructed variable from Wave I question with the following options: 1- eighth grade or less 2- more than eighth grade, but did not graduate from high school 3- high school graduate 4- completed a GED 5- went to a business, trade, or vocational school after high school 6- went to college but did not graduate 7- graduated from college 8- professional training beyond a four-year college	High school or less	0.540	W1 SURVEY
		Some college	0.197	
		College or more	0.263	
Mother's Educational Expectations of Their Child	On a scale of 1 to 5, where 1 is low and 5 is high, how disappointed would your mother be if you did not graduate from college?	1 – Not at all	0.067	
		2	0.061	
		3	0.181	
		4	0.190	
		5 – Very disappointed	0.501	

On Benefits	Variable constructed from participant answers to two Wave I Survey questions: (1) Which description comes closest to describing your mother's job? (2) Which description comes closest to describing your father's job? A binary variable was then created where 1 represents participants who responded "19 – He/she receives Public Assistance, such as welfare" for either one of their parents.	1	0.100	W1 SURVEY
School Code	Add Health-assigned school code. Range 001 to 371, with a total of 172 schools in the original dataset. 28 schools (and participants from these schools) were excluded because school administrators indicated that students at their school did not complete the In-School Wave I questionnaire, or did not complete the questions used in our analysis. In addition, schools with cohorts smaller than 20 students were excluded, resulting in 128 schools considered for analysis.			W1 SURVEY
Parent sample control variables				
Sex – Male	Self-identified sex, in response to the question "What sex are you?"	Male	0.064	PARENT SURVEY
Race	Variable constructed from participant answers to two Parent Survey questions: (1) Are you of Hispanic or Spanish origin? (2) What is your race? (Options included: White/Black/Asian/Native American/ Other) We categorise all participants who identified as Hispanic as being of Hispanic race. We categorise the remaining participants as	White (non-Hispanic) Hispanic Black (non-Hispanic) Asian (non-Hispanic) Other (non-Hispanic)	0.568 0.164 0.205 0.047 0.016	PARENT SURVEY

	White non-Hispanic, Black non-Hispanic, Asian non-Hispanic or Other non-Hispanic.			
Age	From the Parent Survey Question "How old are you?" with answers ranging from 18 to 89.		45	PARENT SURVEY
On Benefits	Variable constructed from participant answers to two Parent Survey questions: (1) Which description comes closest to describing your mother's job? (2) Which description comes closest to describing your father's job? A binary variable was then created where 1 represents participants who responded "19 – He/she receives Public Assistance, such as welfare" for either one of their parents.	1	0.091	PARENT SURVEY
Mother's Educational Attainment	Constructed variable from Parent Survey question with the following options: 1- eighth grade or less 2- more than eighth grade, but did not graduate from high school 3- high school graduate 4- completed a GED 5- went to a business, trade, or vocational school after high school 6- went to college but did not graduate 7- graduated from college 8- professional training beyond a four-year college	High school or less Some college College or more	0.555 0.190 0.255	PARENT SURVEY

Appendix 24. Effect of Immigrant Classmates on W3 Traditional Gender Roles – Effect of Different Races of Immigrants

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.020					
	(0.168)					
Hispanic Immigrants		0.186				
		(0.221)				
White Immigrants			0.543			
			(0.411)			
Asian Immigrants				-0.152		
				(0.232)		
Black Immigrants					0.386	
					(1.238)	
Other Immigrants						0.063
						(0.338)
Traditional Gender Roles (Parent)	0.217***	0.217***	0.216***	0.217***	0.217***	0.217***
	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)
Observations	2,821	2,821	2,821	2,821	2,821	2,821

Note: These are the coefficients from six different regression in which the dependent is a native's W3 Traditional Gender Roles variable. In Column 1, the independent variable is the total number of immigrant students in a cohort; Columns 2 – 6 consider the number of immigrant students of different racial groups within a cohort as the independent variable. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 25. Effect of Immigrants in a Cohort on W3 Traditional Gender Roles – Interactions with Friendship Variables and Native Race

	(1)	(2)	(3)	(4)
Immigrants in Cohort	0.020	0.030	0.031	-0.002
	(0.168)	(0.168)	(0.168)	(0.175)
Traditional Gender Roles (Parent)	0.217***	0.220***	0.218***	0.218***
	(0.065)	(0.065)	(0.065)	(0.065)
Share of Friends who are Immigrant		-0.066		
		(0.050)		
Close Immigrant Friend			-0.088	
			(0.065)	
Immigrants in Cohort * Share of Friends who are Immigrant		0.003		
		(0.021)		
Immigrants in Cohort * Close Immigrant Friend			-0.013	
			(0.040)	
Hispanic				-0.033
				(0.046)
Asian				0.061
				(0.098)
Black				-0.052
				(0.033)
Other-race				-0.063
				(0.168)
Hispanic* Immigrants in Cohort				-0.009
				(0.059)
Asian* Immigrants in Cohort				-0.054
				(0.096)
Black* Immigrants in Cohort				0.046
				(0.055)
Other race* Immigrants in Cohort				0.211
				(0.157)
Observations	2,367	2,367	2,367	2,821

Note: These are the coefficients from four different regression in which the dependent is a native's W3 Traditional Gender Roles, and the independent variable is the total number of immigrant students in a cohort. Column 2 includes a variable which measures the share of immigrant peers amongst a native's top-10 friends, and an interaction of this variable with the total number of immigrant students in a cohort. Column 3 includes a binary variable indicates a native nominated at least one immigrant peer amongst their top-10 friends, and an interaction of this variable with the total number of immigrant students in a cohort. Column 4 includes an interaction with native race. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

Appendix 26. Effect of Immigrant Classmates on W3 Traditional Gender Roles – Alternative Models and Sibling Dataset

	OLS Binary (1)	OLS Ordinal (2)	Log (Binary) (3)	POLR Ordinal (4)	Siblings (5)	Siblings (6)
Immigrants in Cohort	0.020	-0.006	0.073	-0.034	0.011	0.015
	(0.168)	(0.441)	(0.752)	(0.617)	(0.753)	(0.754)
Traditional Gender Roles (Parent)	0.217***	-0.361**	1.023***	-0.578		
	(0.065)	(0.171)	(0.310)	(0.243)		
Sex – Male	0.208***	-0.560***	0.923***	-0.835	0.400***	0.380***
	(0.019)	(0.050)	(0.085)	(0.073)	(0.117)	(0.120)
Immigrants in Cohort *Sex – Male						0.149
						(0.177)
Observations	2,821	2,821	2,821	2,821	786	786

Note: These are the coefficients from six different regression in which the dependent is a native's W3 Traditional Gender Roles, and the independent variable is the total number of immigrant students in a cohort. Columns 1 – 4 explore different regression models (OLS with a binary dependent variable, OLS with an ordinal dependent variable, logarithmic regression with a binary dependent variable, and ordinal regression with an ordinal dependent variable). Column 5 carries out our main regression on a Sibling Sample, and Column 6 adds a sex interaction to the regression in Column 5. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

9.6. Conclusion Appendices

Appendix 27. Alternative Regressions for Main Results; with Definition of "Immigrant" Reduced to Only Foreign-Born Individuals

Chapter 3: Self-Belief

Regressions where the dependent variables are: (1) W1 Self-Efficacy; (2) W1 LOC; (3) W1 Self-Belief; (4) W4 Self-Efficacy; (5) W4 LOC; and (6) W4 Self-Belief. The independent variable across all regressions is the number of immigrant students in a cohort.

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.565**	0.464**	1.035***	0.596**	0.192	0.777**
	(0.245)	(0.220)	(0.336)	(0.235)	(0.238)	(0.359)
Total Students in Cohort	-0.002***	-0.001***	-0.004***	-0.001**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	13,939	13,939	13,939	13,939	13,939	13,939
Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.						

Chapter 4: Imagination

Regressions where the dependent variable is W4 Imagination. The effect of different races of immigrant peers is explored in each column, including the effect of: (1) all immigrants; (2) Hispanic immigrants; (3) White immigrants; (4) Asian immigrants; (5) Black immigrants; and (6) Other-race immigrants.

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrants in Cohort	0.095	0.164*	-0.084	0.085	0.285*	0.580***
	(0.074)	(0.099)	(0.110)	(0.374)	(0.147)	(0.176)
Total Students in Cohort	-0.0003**	-0.0003**	-0.0002	-0.0002*	-0.0003**	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Observations	10,233	10,233	10,233	10,233	10,233	10,233
Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.						

Chapter 5: Educational Expectations

Regressions where the dependent variables are: (1) W1 Educational Expectations; (2) W4 University Completion; (3) W4 Educational Satisfaction (amongst university non-completers); (4) W4 Work Satisfaction; and (5) W4 Perceived Relative Success. The independent variable across all regressions is the number of immigrant classmates in a cohort.

	(1)	(2)	(3)	(4)	(5)
Immigrants in Cohort	0.479***	0.209**	0.120	0.222*	0.293**
	(0.118)	(0.105)	(0.106)	(0.114)	(0.121)
Total Students in Cohort	-0.002***	-0.001**	-0.0003	-0.0004	-0.001***
	(0.0003)	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Observations	13,365	13,365	9,640	13,365	13,365
Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.					

Chapter 6: Gender Attitudes

Regressions in which the dependent variable is respondents' W3 Traditional Gender Roles, and the independent variable their parent's Traditional Gender Roles (Parent). Column 2 includes an interaction with a binary variable indicating whether or not the respondent is an immigrant. Column 3 includes an interaction with sex.

	(1)	(2)	(3)
Traditional Gender Roles (Parent)	0.127***	0.131**	0.145**
	(0.049)	(0.054)	(0.063)
Being Immigrant	0.018	0.019	0.018
	(0.039)	(0.040)	(0.039)

Sex – Male	0.210***	0.210***	0.211***
	(0.017)	(0.017)	(0.017)
Traditional Gender Roles (Parent)*Being Immigrant		-0.019	
		(0.120)	
Traditional Gender Roles (Parent)*Sex – Male			-0.044
			(0.097)
Observations	3,433	3,433	3,433

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.

These are the coefficients from six different regressions in which the dependent is a native's W3 Traditional Gender Roles. In Column 1, the independent variable is the total number of immigrant students in a cohort; Columns 2 – 6 consider the number of immigrant students of different racial groups within a cohort as the independent variable.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Immigrants in Cohort	-0.116					
	(0.248)					
Hispanic Immigrants		0.186				
		(0.283)				
White Immigrants			0.230			
			(0.328)			
Asian Immigrants				-0.270		
				(0.269)		
Black Immigrants					1.424	
					(1.221)	
Other race Immigrants						-0.021
						(0.787)
Traditional Gender Roles (Parent)	0.137**	0.136**	0.136**	0.136**	0.139**	0.137**
	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)

Observations	3,193	3,193	3,193	3,193	3,193	3,193
Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis.						

9.7. General Appendices

Appendix 28. Authorship Declaration

January 2024

To Whom it May Concern:

As Ana is submitting her doctoral research in the format of an integrated thesis, the core chapters of her dissertation (Chapters 3 – 6) are intended to be stand-alone papers for potential submission to academic journals. At the time of thesis submission, Chapters 4 and 5 have been submitted to journals, with shared authorship between myself and Ana.

I can nonetheless confirm that:

- Ana conducted the majority of drafting/writing, and the entirety of data analysis. She took responsibility for submitting the two collaborative papers to journals, as well as responding to reviewer feedback (as the corresponding author). My contribution was along the lines of the traditional mentor/mentee relationship, with Ana being the lead contributor.

- I give permission for Ana to include all collaborative work in the doctoral thesis.

Best regards,



Carlos Vargas-Silva

Appendix 29. Add Health Data Availability Statement

This research uses data from Add Health, a program project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining Data Files from Add Health should contact Add Health, The University of North Carolina at Chapel Hill, Carolina Population Center, Carolina Square, Suite 210, 123 W. Franklin Street, Chapel Hill, NC 27516 (addhealth_contracts@unc.edu). No direct support was received from grant P01-HD31921 for this analysis.