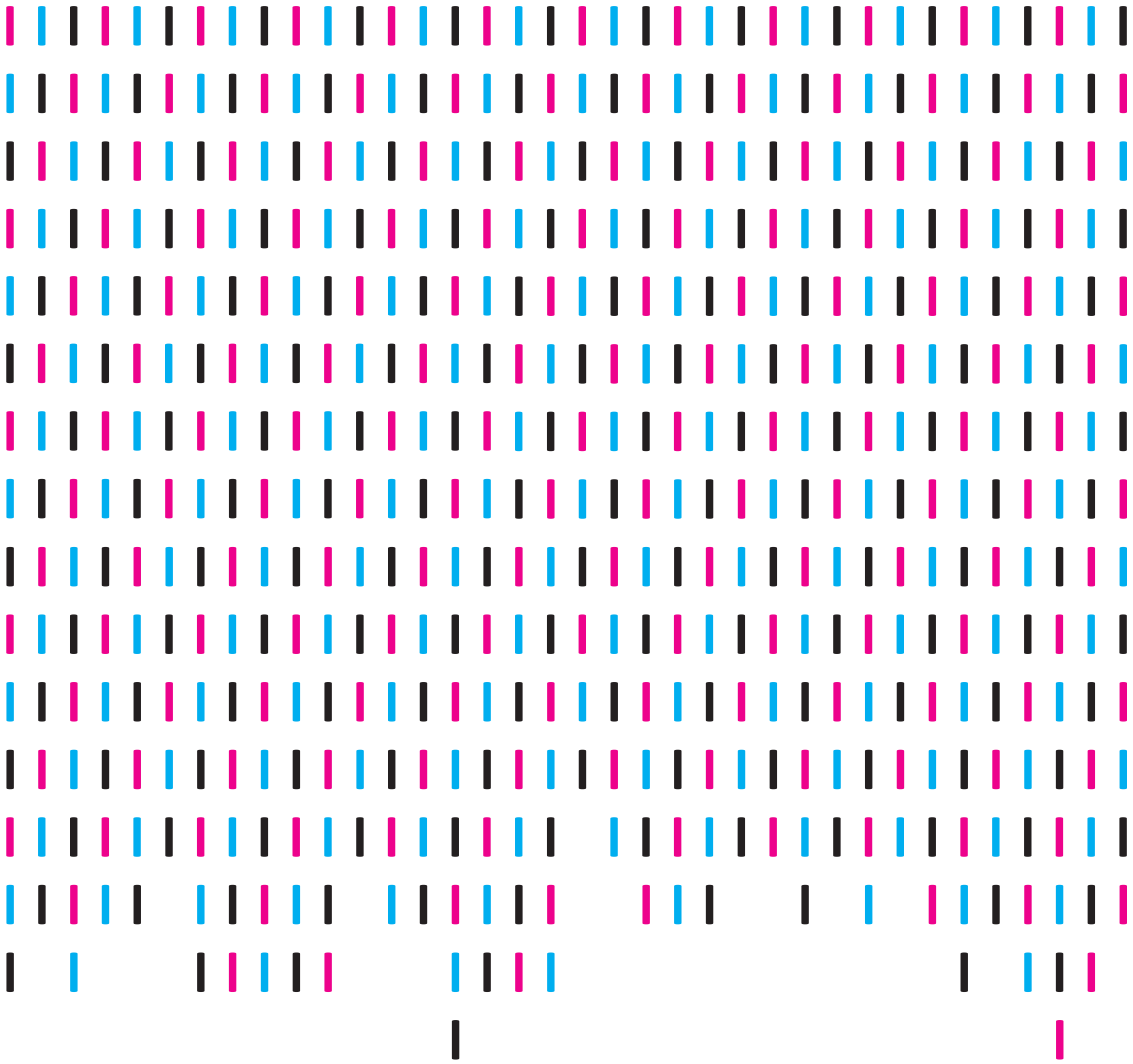

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SOCIODEMOGRAPHIC INEQUALITIES IN EDUCATION OVER THE LIFE COURSE: AN INTERDISCIPLINARY REVIEW

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Sociodemographic Inequalities in Education over the Life Course: An Interdisciplinary Review

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Sociodemographic Inequalities in Education over the Life Course: An Interdisciplinary Review

Abstract

This paper provides an interdisciplinary and international review of the empirical literature on educational inequalities throughout the life course based on demographic, socio-economic, and geographic characteristics, together called sociodemographic characteristics. We propose a theoretical framework that illustrates why these sociodemographic characteristics contribute to educational inequality. For each sociodemographic characteristic, we briefly summarize the empirical literature from multiple disciplines and countries, describing how it contributes to educational inequality at each stage in the life course. Finally, we close with some remarks about the remaining gaps in the field of educational inequality and a discussion of the data challenges that accompany this field of research. Our primary purpose is to provide a theoretical and empirical grounding for the measurement of educational inequality in the German National Education Panel Study (NEPS).

Keywords

Demographic characteristics, socio-economic characteristics, educational inequality, NEPS

In nearly every industrialized Western country, there are large and significant gaps between educational outcomes of individuals from different demographic, socio-economic, and geographic backgrounds (OECD, 2017). Because educational inequality is fundamentally linked to a wide range of social and economic problems, the drive to better understand its causes has given rise to an immense and diverse body of research across academic disciplines, topic areas, and even countries. Each discipline has approached this research in unique ways and has studied different aspects of educational inequality. Psychologists have typically considered inequalities in the development of skills and academic performance, while sociologists have primarily focused on educational transitions and credentials, economists have considered long-term educational attainment, and neuroscientists have investigated brain development and functioning. Researchers across disciplines have examined inequalities throughout the whole life course, starting with the first year of life, to the school years, and into adulthood. Researchers have also considered a wide variety of demographic, socio-economic, and geographic factors that contribute to unequal educational outcomes and a few have investigated the effects of more than one factor at a time. Yet, despite the size and diversity of the field of educational inequality research, the findings from each discipline, each topic area, and even, to some extent, each country, are rarely brought together to form a comprehensive understanding of what we currently know and do not know about educational inequality.

This paper provides such an overview of the empirical literature by summarizing empirical evidence of educational inequalities from multiple disciplines, fields, and countries. Our primary goal in doing so is to provide a theoretical and empirical grounding for the measurement of educational inequality in the German National Education Panel Study (NEPS). The NEPS is unique in its endeavor to assess the process of skill development and the acquisition of education over the entire life course, from infancy to old age. To achieve this aim, the NEPS consists of six longitudinal cohort studies that provide information on early cognitive development, home learning environments, aspirations and expectations, school transitions, and labor market participation, among other topics. As such, the NEPS allows researchers from many disciplines to pose a wide range of research questions related to educational inequality. However, because of this broad aim, the NEPS is also challenged to adequately document all relevant factors that could contribute to unequal educational outcomes. This paper summarizes why each of the demographic, socio-economic, and geographic factors measured in the NEPS is relevant for the study of educational inequality.

This paper specifically focuses on twelve demographic, socio-economic, and geographic factors that together determine an individual's relative position in society (see Figure 1). The demographic factors are age and cohort membership, gender, family and household structure, and immigration background and ethnicity. The socio-economic factors are religious affiliation, disability status, household income, wealth, education, employment and working hours, and occupational prestige. Finally, the geographic factor is the place of residence. These factors, which we will together refer to as *sociodemographic characteristics*, are each associated with differential educational outcomes.

We begin by proposing a theoretical framework that illustrates why these sociodemographic characteristics contribute to educational inequality. For each sociodemographic characteristic, we then briefly summarize the empirical literature from multiple disciplines and countries, describing how it contributes to educational inequality at each stage in the life

course. Finally, we close with some remarks about the remaining gaps in the field of educational inequality and a discussion of the data challenges that accompany this field of research.

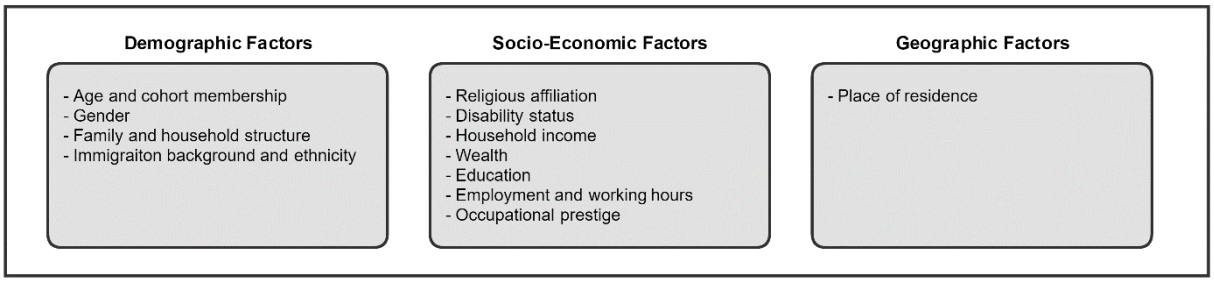

Figure 1. Sociodemographic Factors

While we attempt to provide a comprehensive review of the literature in this paper, an exhaustive review would not be possible. Therefore, we have set a number of limitations on our literature search criteria. First, we limit this paper to only those sociodemographic characteristics that are measured in the NEPS and other national longitudinal cohort studies. We consider educational outcomes throughout the life course, with exception of old age, where the focus of research is primarily on cognitive decline. The specific stages on which we focus our review are: (1) infancy and early childhood (defined here as ages 0 to 5), (2) middle childhood (ages 6 to 12), (3) adolescence (ages 13 to 17), (4) early adulthood (ages 18 to 24), and (5) adulthood (age 25 to 64).

We also limit our focus to a core set of educational outcomes, which are the focus of most research studies and which necessarily differ according to each stage of the life course. In early childhood, we consider early cognitive and language skills and early child care and education attendance (ECCE). We also briefly note neurocognitive outcomes, when these are directly related to cognitive and language development. In middle childhood and adolescence, we focus on skills, grades, and test scores in relevant learning domains (i.e. reading, math, science, and social science), as well as grade retention or repetition and completion of secondary degrees. In the case of stratified school systems, such as Germany and Sweden, we also review evidence on attendance of vocational or academic secondary school tracks and placement in employer-based vocational training. In young adulthood, we consider enrollment and completion of post-secondary education and post-baccalaureate graduate or professional education. In adulthood, we focus on further career-related education.

We provide evidence for the role of each sociodemographic characteristic in shaping educational inequalities, but we do not discuss the mediating mechanisms that explain why these factors lead to educational inequalities, such as differential home learning environments, time investments, access to educational opportunities, educational aspirations, or labor market expectations. Our review of the literature also focuses on each characteristic in isolation and does not consider the potential interactions between these characteristics. Though many of these sociodemographic characteristics can also be considered outcomes or returns to education (e.g. income, employment, and occupation status), we exclusively focus on their roles as predictors of educational inequality. Finally, while we consider studies from multiple countries, we focus almost exclusively on studies using samples in North America and Europe, particularly Germany, and do not consider

educational inequality in low- and middle-income countries or educational inequalities between countries.

Theoretical Framework

To understand why an individual's sociodemographic characteristics can shape his or her educational trajectory, it is first necessary to understand how skill development and educational decisions, as the fundamental building stones of educational outcomes, occur. These two types of educational outcomes are often framed in the sociological literature on educational inequality as the primary and secondary effects of social origin (Boudon, 1974). Primary effects are differences in skills and performance, while secondary effects are those additional differences in educational decisions that cannot be explained by differences in skills and performance. Theories from different disciplines propose a number of mechanisms that drive skills development and educational decisions.

Psychological theories posit that skills, the first aspect of educational outcomes, are developed through interactions, including both interpersonal interactions, such as those between a parent and child, between siblings, or between a student and teacher, and interactions with physical environments and objects, such as with a daycare environment or with books. For example, Bandura's social cognitive theory and Vygotsky's social constructivist model both posit that development is a socially mediated process, while Gibson's theory of perceptual learning focuses on the opportunities that environments offer for learning and development (Bandura, 1977; Gibson, 1969; Vygotsky, 1978). Meanwhile, sociological and economic theories posit that educational decisions, the second aspect of educational outcomes, are products of expectations and capital. For example, Becker's human capital theory and sociological rational choice theory both suggest that educational decisions are a function of an individual's expectations of a return or benefit relative to expected costs (G. S. Becker & Tomes, 1994; Breen & Goldthorpe, 1997; Erikson & Jonsson, 1996), while cultural capital theory argues that an individual's decisions are influenced by his or her cultural, economic, and social capital, which determine access to various educational decisions (Bourdieu, 1986).

Both psychological and sociological theories acknowledge that skill development and educational decisions occur within the contexts in which individuals are embedded. Bronfenbrenner's bioecological model of human development, a psychological theory, suggests that an individual is embedded within a microsystem, which refers to those contexts with which the individual interacts directly (e.g. family, peer groups, workplaces, or neighborhoods) (Bronfenbrenner & Morris, 2006). These microsystem contexts are also called fields in Bourdieu's cultural capital theory (Bourdieu, 1986). Microsystem contexts or fields shape an individual's skill development and educational decisions by directly and indirectly affecting interactions, expectations, and capital. For example, a toddler develops new language skills by speaking with his parents. Here the family is the microsystem context that determines the interactions that shape the skills development. Similarly, an adolescent goes to a mixed-income school where she builds cultural and social capital through her diverse peer group. This increased capital shapes her decision to attend post-secondary education. Here the school and peer group are microsystem contexts that determine the capital that shape educational decisions.

Figure 2 proposes a conceptual framework for how sociodemographic characteristics influence educational outcomes by influencing the mechanisms that drive skills development and educational decisions. First, sociodemographic characteristics directly influence the mechanisms driving skills development and educational decisions (pathway *a* in Figure 2). That is, an individual's sociodemographic characteristics, such as age, gender, or income, can prompt, sustain, or even hinder these mechanisms. For example, age limits the choice set of educational opportunities, while household income influences the number of books and educational materials with which a child can interact, as well as the cost-benefit ratio of a specific educational pathway. In addition to this direct influence on these mechanisms, sociodemographic characteristics can also place individuals in different microsystem contexts or fields, which, in turn, influence the mechanisms (pathways *b* and *c*). For example, a child's place of residence at least partly determines which school he attends and, thus, also determines the type of learning opportunities and peer groups that child has access to.

However, it is not only an individual's own sociodemographic characteristics that directly or indirectly influence educational outcomes through these mechanisms. The characteristics of key people in an individual's microsystems can also affect these mechanisms. The most important microsystem or field at any stage in the life course is the family or household and, to the degree that they differ from the individual's own characteristics, the sociodemographic characteristics of parents, siblings, and partners can each significantly influence an individual's educational outcomes. This influence can be direct on interactions, expectations, or capital (pathway d) or indirect by placing individuals in different microsystem contexts, which then shape these mechanisms driving skills development and educational decisions (pathway e and c). Other microsystem contexts and key people outside of the family and household system, such as peers or teachers, also shape educational outcomes, but the influence of their sociodemographic characteristics lies outside of the scope for this review.

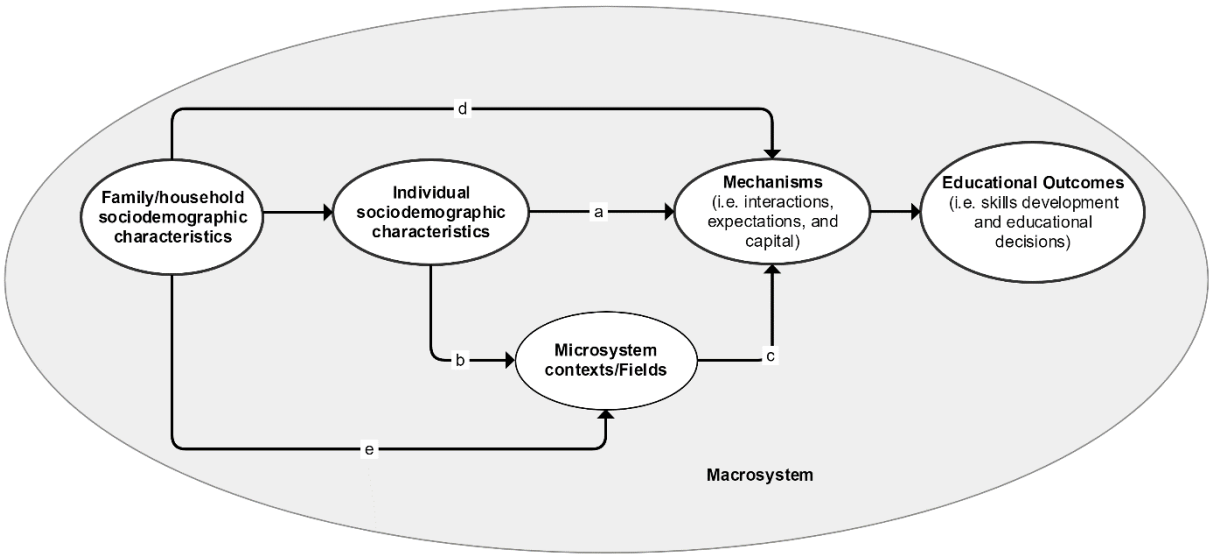

Figure 2. Conceptual framework of how sociodemographic characteristics educational outcomes

Finally, it is important to note that the macrosystem context, which includes the social, political, cultural, and economic context in which microsystems are embedded, can also indirectly shape how sociodemographic characteristics affect educational outcomes. One

important example of this is the national policy context within which an individual lives, as the design of policies determines which sociodemographic characteristics influence educational outcomes. For example, in a context with universal day care, family income is less predictive of access to early care and education services and, thus, less strongly influences early education and development than in contexts without universal care policies (Waldfogel & Washbrook, 2011). Similarly, more generous maternity leave policies increase the probability that women pursue further career training, thus influencing how gender and family structure impact an individual's educational trajectory (Puhani & Sonderhof, 2008). The structure of the educational system, another macrosystem context, also moderates how sociodemographic factors influence educational outcomes. For example, Germany's highly stratified school system, which sorts children into specific educational tracks upon entry into secondary school, can cement inequalities due to childhood sociodemographic factors and perpetuate them into adulthood (Schindler, 2017). Therefore, it is important to consider the role of macrosystem contexts when examining sociodemographic inequalities in educational outcomes, as the effects of such characteristics can be heterogeneous.

Review of the Empirical Literature

Age and Cohort

An individual's age and the age of his or her parents' at birth are predictive of educational outcomes, as is an individual's cohort membership, as defined by the year of birth. Specifically, though skills development and educational decisions generally unfold in predictable age-graded stages throughout the life course, an individual's biological age relative to his or her peers in a given context is associated with inequalities in educational outcomes. In early childhood, children who are younger than their peers at kindergarten entrance perform worse on math and reading tests (Elder & Lubotsky, 2009). Similarly, in middle childhood, the youngest children in a given academic grade have worse cognitive ability (Crawford, Dearden, Greaves, & Joyce, 2011) and perform worse on math, reading, and science tests (Bedard & Dhuey, 2006; Dearden, Crawford, & Meghir, 2010) than the oldest children in that grade. The size of this age advantage decreases as children get older, but, nevertheless, a significant age gap in both grades and achievement test scores is evident even among adolescents (Crawford et al., 2011; Dearden et al., 2010; Cobley, McKenna, Baker, & Wattie, 2009).

While younger students are clearly at a disadvantage in primary and secondary school, evidence of age effects in post-secondary education is mixed. Several studies have found that relatively younger students are more likely to choose a vocational rather than an academic post-secondary track (Bedard & Dhuey, 2006; Crawford et al., 2011; Dearden et al., 2010; Matta, Ribas, Sampaio, & Sampaio, 2016). Even when relatively younger students attend academic post-secondary education, they are more likely to go to lower quality institutions (Crawford et al., 2011). In contrast, two studies found that the academic performance of relatively younger post-secondary students is significantly better than that of their older peers (Pellizzari & Billari, 2012; Roberts & Stott, 2015). Finally, among adults, younger adults (ages 19 to 45) are much more likely to participate in further education than older adults (Bilger & Rosenbladt, 2008; Elsholz, Gillen, & Meyer, 2012; Kruppe & Trepesch, 2017).

A small body of literature also suggests that parents' age at the time a child is born may contribute to educational inequalities. On average, older maternal age is associated with

better teacher-reported cognitive and language skills in early childhood, higher achievement test scores in middle childhood and adolescence, and with a higher probability of attending academic post-secondary education in young adulthood (Barclay & Myrskylä, 2016; Falster et al., 2018; Fergusson & Woodward, 1999; Kalmijn & Kraaykamp, 2005). Children born to teenage mothers have the worst educational outcomes (Fergusson & Woodward, 1999), but children born to mothers of advanced maternal age (i.e., older than 35) also have worse educational outcomes than children born to mothers between the ages of 30 and 34 (Barclay & Myrskylä, 2016; Falster et al., 2018). Similarly, adolescents born to fathers of advanced paternal age (i.e., older than 45) have worse grades and lower overall educational attainment than adolescents born to younger fathers (D'Onofrio et al., 2009). While it is probable that the generally positive association between parental age and offspring's educational outcomes can be explained by the higher income, education, and employment levels of older parents, at least one study found that older parental age is associated with better educational outcomes net of SES (Kalmijn & Kraaykamp, 2005).

An individual's cohort membership is also predictive of educational inequalities. Long-term trends in education have been positive, with more recent cohorts being more likely to participate in academic secondary education and in post-secondary education than earlier cohorts (R. Becker, 2003; Schindler, 2017), but more recent cohorts are less likely to participate in further education as adults than earlier cohorts (R. Becker, 2018). Yet, despite this educational expansion, it is not clear whether there has been a reduction in educational inequality. While some consider the expansion progress toward more equal access to secondary education (Breen, Luijkx, Müller, & Pollak, 2010; Tolsma, Coenders, & Lubbers, 2007), others argue that educational inequality persists, but has shifted toward other dimensions of education, such as secondary school track choice and post-secondary education (Shavit & Blossfeld, 1993). Moreover, there is some evidence that income inequality and inequality related to ethnicity or immigration background have actually increased in more recent cohorts (Blanden & Machin, 2004; Machin & Vignoles, 2004; Tolsma et al., 2007).

Gender

Educational outcomes differ significantly by gender throughout the life course. First gender-based differences in educational outcomes emerge in early childhood. While there appear to be few differences in the early cognitive and language development of girls and boys (Galsworthy, Dionne, Dale, & Plomin, 2000; Spelke, 2005), there is some evidence that girls develop language and speech skills more rapidly than boys and can communicate more precisely at an earlier age (Barbu et al., 2015; Eriksson et al., 2012). This more rapid language development may be the reason that girls benefit more from ECCE than boys, though evidence for this differential effect is also mixed (Berlinski, Galiani, & Gertler, 2009; Havnes & Mogstad, 2011).

Evidence for gender differences in educational outcomes is more consistent in middle childhood and adolescence. Across countries, girls perform significantly better than boys on language and reading assessments at all grade levels (Hedges & Nowell, 1995; Ogle et al., 2003; Strand, Deary, & Smith, 2006; T. Wei, Liu, & Barnard-Brak, 2015; Willingham & Cole, 1997). However, there is more variability in language and reading performance among boys than girls, which tempers conclusions about categorical skill differences by gender (Strand et al., 2006). Evidence on gender differences in math skills is inconclusive. While some studies

find that boys in middle childhood and adolescence perform better on math assessments than girls (Ogle et al., 2003; Stoet & Geary, 2013; T. Wei et al., 2015), other studies find that girls perform better on math assessments and achieve better grades in math classes than boys (Gonzales et al., 2004; Hyde, Fennema, & Lamon, 1990; Willingham & Cole, 1997).

Regardless of any skill differences, girls tend to significantly outperform boys in primary and secondary school achievement, as well as in post-secondary educational attainment. In stratified school systems, adolescent boys are more likely to attend vocational secondary school tracks, while girls are more likely to attend academic secondary school tracks (Breen, Luijkx, Müller, & Pollak, 2012; Helbig, 2012). Adolescent boys are also more likely to drop out of secondary school than girls (Pekkarinen, 2012; Snyder & Dillow, 2010; Stearns & Glennie, 2006). As young adults, women are more likely to enroll in and complete post-secondary education (Buchmann & DiPrete, 2006; Buchmann, DiPrete, & McDaniel, 2008; Pekkarinen, 2012; Quenzel & Hurrelmann, 2010). Among young adults who enroll in post-secondary education, women are also less likely than men to delay this enrollment after completing their secondary education (Bozick & DeLuca, 2005). However, the documented educational advantage of women does not extend to further education in adulthood. As adults, men are significantly more likely to pursue further career-related education than women (Posselt & Grodsky, 2017), especially further education that leads to a promotion or raise (Elsholz et al., 2012; Kruppe & Trepesch, 2017).

Finally, a small number of studies has investigated the influence of a sibling's gender on an individual's educational outcomes. Some of these studies found no association between a sibling´s gender and an individual's educational outcomes (Bauer & Gang, 2000; Hauser & Kuo, 1998; Jaeger, 2009). However, there is some evidence that individuals with an older female sibling have higher educational achievement levels than individuals with an older male sibling (Jacob, 2011; Kaestner, 1997; Powell & Steelman, 1990)

Place of Residence

An individual's place of residence, defined by the state, city, or region in which a person lives, determines a person's access to educational opportunities and, therefore, is associated with unequal educational outcomes. While a large body of literature has examined the effects of neighborhoods on educational outcomes, we exclude this body of literature from our review, because the focus of these studies is on the sociodemographic characteristics at the neighborhood-level, rather than the individual- or household-level. That said, this body of literature does not conclusively support the hypothesis that neighborhood characteristics influence educational outcomes (Zangger, 2016).

At the individual level, an important aspect of geographic inequality in education is the urbanicity or rurality of an individual's place of residence. No studies to our knowledge have investigated rural-urban inequalities in early childhood cognitive and language development. However, young children from rural areas are less likely to be placed in ECCE than their urban peers (Atkinson, 1994; Swenson, 2008) and rural ECCE options tend to be of lower quality than urban options (Maher, Frestedt, & Grace, 2008). In adolescence, living in urban or rural areas, rather than in suburban areas, is associated with lower math, science, and reading test scores across countries (Reeves, 2012; Roscigno & Crowley, 2001; Roscigno, Tomaskovic-Devey, & Crowley, 2006; Webster & Fisher, 2000; Williams, 2005). Internationally, adolescents living in

urban or rural areas are also more likely to drop out of secondary school than adolescents in suburban areas (Roscigno et al., 2006).

Young adults tend to choose post-secondary education opportunities that are closer to their family's place of residence (Turley, 2009). Consequently, young adults from rural areas have access to fewer and less prestigious post-secondary education institutions (Clausen, 2006; Hillman, 2016; D. Kim & Rury, 2011). Therefore, it is not surprising that young adults from rural areas are more likely to delay their post-secondary education and are less likely to enroll in prestigious post-secondary education institutions than their suburban and urban counterparts (Byun, Irvin, & Meece, 2015; Gibbs, Swaim, & Teixeira, 1998; Griffith & Rothstein, 2009). However, several studies suggest that these rural-non-rural differences in academic attainment may be explained by differences in other socioeconomic factors (Byun et al., 2015; Byun, Meece, & Irvin, 2012; Reeves, 2012). Finally, adults living in rural areas are also less likely to pursue further career-related education, most likely due to a lack of access (Schemmann & Seitter, 2014; Weishaupt & Böhm-Kasper, 2010).

In some cases, within-country regional differences in policy and cultural context can also shape educational outcomes. A prominent example of this are differences in educational outcomes between former East and West Germany. In eastern Germany, families historically have greater access to ECCE for young children than in western Germany (Kemper & Weishaupt, 2011; Rosenfeld, Trappe, & Gornick, 2004) and young children in eastern Germany are more likely to be placed in ECCE than children in western Germany (Stahl & Schober, 2018). There are also inequalities in later educational outcomes between western and eastern Germany. For example, adolescent in eastern Germany are more likely to drop out of secondary school than adolescents in western Germany (Anger, Plünnecke, & Schüler, 2018).

Family and Household Structure

Multiple aspects of family and household structure can influence educational outcomes, including household size and crowded housing, family structure and marital status, and sibship size and composition. Research on the effects of household size and crowded housing conditions has focused primarily on effects on physical health, but there is also some evidence of effects on educational outcomes. Even accounting for other socioeconomic factors that are associated with living in crowded housing, young children living in crowded housing lag behind their peers on general cognitive and language development (Donohue, Bornman, & Granlund, 2015; Evans et al., 2010). Similarly, school-aged children and adolescents living in crowded housing have lower reading and math test scores than children living in non-crowded housing (Essen, Fogelman, & Head, 1978; Evans, Lepore, Shejwal, & Palsane, 1998; Solari & Mare, 2012). Crowded housing conditions are also associated with repeating a grade in primary and secondary school (Goux & Maurin, 2005) and with fewer years of completed schooling in early adulthood (Conley, 2001a).

Family structure and, in particular, parents' marital status has received a lot of attention with regard to educational inequality. Traditional two-parent married family structures are becoming increasingly rare (Stoye, 2016; Woessmann, 2015) and researchers are finding that non-traditional family structures, such as single-parent or step-parent families, are associated with worse educational outcomes at all ages (Stoye, 2016; Sandefur, McLanahan, & Wojtkiewicz, 1992). Very young children in single-parent households have worse language

development than children in traditional two-parent households (D. Lee & McLanahan, 2015). Young children in single-parent households are also less likely attend ECCE (Schober & Stahl, 2014). In middle childhood, children who grow up in single-parent households tend to have lower language, reading, and math grades and test scores (Amato & Anthony, 2014; Gennetian, 2005; Grätz, 2015; Magnuson & Berger, 2009), as well as lower cognitive ability (Gennetian, 2005; H. S. Kim, 2011) than their peers who grow up in traditional households. This pattern continues in adolescence, when living in a single-parent household is associated with worse language and math grades and test scores (Woessmann, 2015) and a greater likelihood of dropping out of secondary education (McLanahan, Tach, & Schneider, 2013). Young adults from single-parent households are also less likely to enroll in (Wu, Schimmele, & Hou, 2015) and complete an academic post-secondary degree than young adults from traditional households (Bernardi & Radl, 2014; Wojtkiewicz & Holtzman, 2011; Wu et al., 2015).

While most of the research has focused on the effects of growing up in a single-parent household, a few studies have also investigated educational outcomes of students living in cohabiting or step-parent family structures. These studies find that adolescents who grow up in a household with two cohabiting, but unmarried parents have worse grades (Raley, Frisco, & Wildsmith, 2005) and worse school engagement (Brown, 2004) than adolescents in traditional households. In contrast, the academic performance of adolescents in households with step-parents is similar relative to their peers from traditional households (Ganong & Coleman, 2017; Sun & Li, 2011). However, young adults from step-parent households are less likely to enroll in and complete academic post-secondary education than young adults from traditional households (Wojtkiewicz & Holtzman, 2011). Finally, a new and growing sub-topic in this research area concerns the educational outcomes of children and youth growing up in households with same-sex parents. Though this body of research generally lacks quasi-experimental designs and adequate power, initial results suggest that growing up with same-sex parents is associated with lower math competence (Potter, 2012) and a lower likelihood of completing from secondary school (Allen, 2013).

It is important to note that, though evidence suggests that growing up in a non-traditional family structure is associated with poor educational outcomes, this association may be at least partly accounted for by family SES (Aughinbaugh, Pierret, & Rothstein, 2005; Francesconi, Jenkins, & Siedler, 2010; Ginther & Pollak, 2004; Sun & Li, 2011). In fact, two studies that used sibling fixed-effect or triple difference models to better account for possible confounding factors both found no significant effect of family structure on educational outcomes (Björklund, Ginther, & Sundström, 2007; Sanz-de-Galdeano & Vuri, 2007). Moreover, it is possible that children and youth growing up in single-parent households can actually benefit from the parental separation if it means that they are exposed to lower levels of family conflict (Musick & Meier, 2010; Stoye, 2016).

In addition to family structure, the number of and composition of sibling is also associated with unequal educational outcomes. Growing up with a larger number of siblings is associated with worse math and reading test scores (Schmid & Glaeser, 2017), lower cognitive ability (Jaeger, 2009) and a lower overall number of completed years of schooling (Bagger, Birchenall, Mansour, & Urzúa, 2013; Booth & Kee, 2009; Jaeger, 2009). Children in large families are also less likely to be placed in ECCE than children in families with fewer siblings (Geier & Riedel, 2009).

Birth order appears to be more important than the number of siblings (Black, Devereux, & Salvanes, 2005). Evidence on the effects of birth order on early childhood development is inconclusive. While some studies find that later-born children may develop language competence at a slightly faster rate than first-born children (Oshima-Takane, Goodz, & Derevensky, 1996; Pine, 1995), others find the opposite pattern (Jenkins & Astington, 1996; Zambrana, Ystrom, & Pons, 2012). That said, researchers consistently find that later-borns are at a disadvantage relative to their first-born siblings throughout middle childhood, adolescence, and young adulthood. Compared to their first-born siblings, later-born adolescents have lower cognitive ability, worse reading competence, and worse math test scores (Grätz, 2018; Hotz & Pantano, 2015; Schmid, 2015; Schmid & Glaeser, 2017), are less likely to take the academic secondary school track (Grätz, 2018; Härkönen, 2014), and complete fewer overall years of schooling (Bagger et al., 2013; Black et al., 2005; Fergusson, Horwood, & Boden, 2006; Härkönen, 2014; Kantarevic & Mechoulan, 2006). These associations are robust to the use of fixed-effects and instrumental variable designs, which address many possible confounding factors that could explain these associations (Bagger et al., 2013; Black et al., 2005; Härkönen, 2014; Hotz & Pantano, 2015; Kantarevic & Mechoulan, 2006). Moreover, these patterns in differential educational outcomes are evident even among fully adopted sibling groups (Barclay, 2015). However, a large age gap between sibling is associated with better educational outcomes even for later-born siblings (Stoye, 2016; Pettersson-Lidbom & Thoursie, 2009; Powell & Steelman, 1990).

Education

One of the most universal and well-studied contributing factors to educational inequality is the education level of parents. In early childhood, children of less educated parents have worse executive functioning (Blums, Belsky, Grimm, & Chen, 2017; Hackman, Gallop, Evans, & Farah, 2015) and delayed language development (Blums et al., 2017) relative to children of highly educated parents. Even one year of additional education for mothers can lead to significant increases in young children's language skills (Magnuson, Sexton, Davis-Kean, & Huston, 2009). Young children of less educated mothers are also less likely to be placed in ECCE (Geier & Riedel, 2009; Krapf, 2014; Laughlin, 2010; Stahl, Schober, & Spiess, 2018), though they benefit more from their ECCE experiences than children of highly educated parents (Havnes & Mogstad, 2011; Ready, 2010). Yet, this inequality in ECCE use is context-dependent. For example, in Sweden, where policies strongly support dual-earner families rather than more pluralistic or traditional models, no inequality in ECCE can be observed (Krapf, 2014).

In middle childhood, children of less educated parents enter primary school with notably worse math, language, and reading skills relative to children of highly educated parents, and these skills gaps remain constant or increase through middle childhood (Bradbury, Corak, Waldfogel, & Washbrook, 2015). Even accounting for other SES factors, low parental education is associated with lower math and reading competence test scores for children (Carolan & Wasserman, 2015; Davis-Kean, 2005; Jungbauer-Gans, 2016; Magnuson, 2007), as well as lower cognitive ability (Connelly & Gayle, 2017). Moreover, the association between low parental education and low math and reading skills in middle childhood is robust to the use of an instrumental variable design to address potential confounding factors (Carneiro, Meghir, & Parey, 2013). Fewer studies have examined education-based inequalities in the academic performance of adolescents and the findings are inconclusive. Some studies find

that adolescents of less educated parents have lower math and science achievement (Blums et al., 2017) and lower verbal intelligence (Neiss & Rowe, 2000) relative to adolescents of highly educated parents. Yet, at least one study found no significant difference in adolescents' academic performance based on parental education level (Schindler & Reimer, 2010). However, in countries with a stratified secondary school system, such as Germany, adolescents of less educated parents are more likely to attend the vocational secondary school track than the academic secondary school track relative to adolescents of highly educated parents (R. Becker & Lauterbach, 2016; Klieme et al., 2010; Relikowski, Schneider, & Blossfeld, 2010).

Across countries, young adults and adults who grew up in families with less educated parents complete overall fewer years of schooling than their peers from highly educated families (Azam & Bhatt, 2015; Bukodi & Goldthorpe, 2013; Chevalier, 2004; Davis-Kean, 2005; Dubow, Boxer, & Huesmann, 2009). This is in great part because young adults from families with less educated parents are significantly less likely to enroll in and complete post-secondary education (Bailey & Dynarski, 2011; Choy, 2001; Jerrim & Vignoles, 2015), as well as post-baccalaureate graduate or professional education (Posselt & Grodsky, 2017). Even when they do attend post-secondary education, young adults from less educated families are less likely to attend elite institutions than their peers from highly educated families (Jerrim, Chmielewski, & Parker, 2015).

Many studies that investigate educational inequalities based on parental education consider only mothers' education level (e.g., Carolan & Wasserman, 2015; Magnuson, Sexton, Davis-Kean, & Huston, 2009), but two studies have investigated whether mothers' and fathers' education levels have different effects. Chevalier (2004) found no difference in the associations between educational attainment and mothers' and fathers' education level in the United Kingdom. However, a German study found that low paternal education is associated with worse educational attainment, while, in contrast, high maternal education is associated with worse educational attainment (Stoye, 2016). This finding contrasts the findings of studies that report that low maternal education is associated with worse educational outcomes and may reflect the moderating role of the German context, in which the male breadwinner model is supported by other policies (Krapf, 2014).

An individual's own education level as an adult, and the education level of siblings and partners can also contribute to educational inequalities. Specifically, for adults who have completed their formal schooling and have entered the labor market, their own educational qualifications become salient predictors of their further educational trajectories. Adults with a higher initial educational degree are also more likely to pursue formal further education, as well as informal career and job-related training (R. Becker, 2018; Elsholz et al., 2012; Kruppe & Trepesch, 2017). Additionally, though parental education is more predictive of educational outcomes (Grgic & Bayer, 2015), children and adolescents whose older siblings performed well and entered the academic secondary track are more likely to also perform well and enter the academic secondary track holding constant all other family characteristics (Grgic & Bayer, 2015; Helbig, 2013; Stoye, 2016). Finally, there is some initial qualitative evidence that educationally discordant romantic partners (i.e. partners with higher education levels) may motivate young adults to increase their educational attainment (Manning, Giordano, Longmore, & Hocevar, 2009).

Employment Status and Working Hours

Parental employment status and an individual's own employment status are predictive of educational outcomes. Parental employment increases family income and, thus, the amount of resources to be invested in children's development and education, but it also decreases the amount of time that parents invest in their children (Fox, Han, Ruhm, & Waldfogel, 2012). Therefore, it is not surprising that the literature on the effects of parental employment on educational outcomes is mixed. Maternal employment during a child's first year of life is associated with lower cognitive test scores in early childhood (Bernal, 2008; Han, Waldfogel, & Brooks-Gunn, 2001; Waldfogel, Han, & Brooks-Gunn, 2002; Zick, Bryant, & Österbacka, 2001), as well as lower language and math test scores in primary school (Gregg, Washbrook, Propper, & Burgess, 2005; Ruhm, 2004). While much of this research is observational, this negative influence of early maternal employment on children's cognitive development has also been found in a study using propensity score matching, a quasi-experimental method to address endogeneity related to the association between parental employment and educational outcomes (Hill, Waldfogel, Brooks-Gunn, & Han, 2005). However, at least in policy contexts with early access to ECCE, maternal employment after a child's first year is not negatively associated with children's cognitive development (Waldfogel et al., 2002). This may partly be because children of employed parents are more likely to be placed in ECCE (Brooks-Gunn, Han, & Waldfogel, 2010; Wirth & Lichtenberger, 2012) and the ECCE used by employed parents tends to be higher quality than the ECCE used by non-employed parents (Brooks-Gunn et al., 2010).

Meta-analytic results synthesizing 68 studies on the effects of maternal employment in middle childhood suggest that maternal employment has a strong,negative effect on children's school performance and test scores (Goldberg, Prause, Lucas-Thompson, & Himsel, 2008). Yet, two studies using quasi-experimental methods that address potential issues of endogeneity found that maternal employment had no effect on children's test scores (Kalil & Ziol-Guest, 2008; Levine, 2011), but that paternal employment was associated with better performance in school (Kalil & Ziol-Guest, 2008). Finally, a smaller body of research has also investigated the effects of job loss, a non-endogenous proxy for unemployment, on educational outcomes. These studies consistently find that parental job loss is associated with lower test scores, lower grades, a higher likelihood of grade retention, and a lower likelihood of secondary school completion, post-secondary school attendance and degree completion (Ananat, Gassman-Pines, & Gibson-Davis, 2011; Brand & Simon Thomas, 2014; Coelli, 2011; Gregg, Macmillan, & Nasim, 2012; Kalil & Wightman, 2011; Rege, Telle, & Votruba, 2011; A. H. Stevens & Schaller, 2011).

An important aspect of parental employment that is associated with educational outcomes is the number of hours parents work. Research findings suggest that maternal part-time employment may be more beneficial for educational outcomes than both full-time employment and non-employment. Specifically, maternal full-time employment, but not part-time employment, is negatively associated with cognitive development in early childhood (Brooks-Gunn et al., 2010; Cooksey, Joshi, & Verropoulou, 2009). Similarly, in middle childhood and adolescence, only maternal full-time employment is associated with lower grades and the number of years of completed schooling (Boll & Hoffmann, 2017; Francesconi & Ermisch, 2000; Kalenkoski & Pabilonia, 2010). Maternal part-time employment during middle childhood and adolescence is actually associated with better performance in school

and better language test scores, even compared to maternal non-employment (Boll & Hoffmann, 2017; Dunifon, Hansen, Nicholson, & Nielsen, 2013; Nelen, Grip, Andries, & Fouarge, 2013).

Adolescents', young adults', and adults' own employment status can also contribute to educational inequality. Employment during secondary school is associated with small, but negative effects on adolescents' performance in school and on their risk of dropping out (Dustmann & van Soest, 2007; Singh, 1998). These effects on performance and dropout risk are particularly notable when adolescents work more than 15 hours per week (Montmarquette, Viennot-Briot, & Dagenais, 2007). Employment during secondary school is also associated with a lower likelihood of attending academic post-secondary education (Marsh & Kleitman, 2005), while employment during post-secondary education is associated with worse academic performance and a higher risk of non-completion (Bozick, 2007). This negative effect of employment on post-secondary academic performance and degree completion is robust to different quasi-experimental specifications (Beffy, Fougère, & Maurel, 2013; DeSimone, 2008). However, the negative effects on adolescents' secondary school performance is not robust to quasi-experimental specifications (Buscha, Maurel, Page, & Speckesser, 2012). Finally, employment in adulthood, especially full-time employment, is associated with a higher likelihood of pursuing further education (Bundesministerium für Bildung und Forschung, 2016).

Occupational Prestige

Parental occupational prestige is also associated with educational outcomes. Low parental occupational prestige is associated with lower cognitive ability in both early and middle childhood (Sullivan, Ketende, & Joshi, 2013), as well as worse performance on verbal, reading, math, and science assessments, even when controlling for other sociodemographic characteristic, such as income and parental education (Conley & Yeung, 2005; Sirin, 2005). Low parental occupational prestige is also associated with worse performance on cognitive tests and worse grades in adolescence (Boll & Hoffmann, 2017; Erikson & Rudolphi, 2010), as well as a higher risk of dropping out of secondary school (Boll & Hoffmann, 2017). In countries with a stratified secondary school system, adolescents of parents with low occupational prestige are also more likely to attend the vocational secondary school track than the academic secondary school track (Erikson & Rudolphi, 2010; Klein, Schindler, Pollak, & Müller, 2010; Müller & Pollak, 2004; Müller, Pollak, Reimer, & Schindler, 2009; Schimpl-Neimanns, 2000). Therefore, it is not surprising that adolescents and young adults from families with low parental occupational prestige are also less likely to enroll in post-secondary academic education (R. Becker, 2000; Klein et al., 2010; Schindler & Lörz, 2012). Even when they do attend post-secondary education, young adults from families with low parental occupational prestige perform worse (Walpole, 2003). Finally, an adults' own occupational prestige also predicts his or her likelihood of pursuing further education. Adults with low occupational prestige are much less likely to access further education than those with high occupational prestige (Elsholz et al., 2012; Schindler, Weiss, & Hubert, 2011).

Household Income

Educational outcomes at all stages in the life course are consistently linked to household income, which is defined as the combined income and earnings of all people living in a household, including parents, partners, siblings, and others. Household income experienced

in early childhood has the strongest impact on educational outcomes throughout the life course, including math and reading test scores, attendance of academic post-secondary track, secondary school completion, and overall completed years of schooling (Brooks-Gunn & Duncan, 1997; Duncan, Magnuson, & Votruba-Drzal, 2014; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Gebel, 2011; Piotrowska, Stride, Croft, & Rowe, 2015; Schneider, 2016). In early childhood, low household income is associated with worse language and memory development (Noble et al., 2015), worse executive function (Hackman et al., 2015), and worse cognitive control (Noble, Houston, Kan, & Sowell, 2012). Compared to their higher income peers, children from low-income families are also less likely to be place placed in ECCE, even in countries with universal care (Bainbridge, Meyers, Tanaka, & Waldfogel, 2005; Krapf, 2014; Lancker & Ghysels, 2012; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Stahl et al., 2018). Moreover, the low-income families tend to choose lower quality ECCE options with less emphasis on development and learning than higher income families (Hillemeier, Morgan, Farkas, & Maczuga, 2013; Vincent, Braun, & Ball, 2008).

In middle childhood, low household income is associated with lower math and reading test scores, lower school engagement, and worse overall school performance (Duncan, Magnuson, & Votruba-Drzal, 2017; Morris & Gennetian, 2003; Reardon, 2013). Moreover, these achievement gaps between low- and high-income children in middle childhood widen over time, as children continue to attend school (Bradbury et al., 2015; Ready, 2010). Household income in adolescence and early adulthood also predicts post-secondary educational achievement. Students from low-income families are less likely to enroll in and complete academic post-secondary education, as well as post-baccalaureate graduate education (Bailey & Dynarski, 2011; Michelmore, 2013; Posselt & Grodsky, 2017). Even when students from low-income backgrounds enroll in academic post-secondary education, they are more likely attend less prestigious institutions than students from high-income families (Jerrim et al., 2015; Kinsler & Pavan, 2011). Finally, in adulthood, a person's own earnings positively influences the likelihood of pursuing further career-related education (Bundesministerium für Bildung und Forschung, 2016; Tippelt & Barz, 2004).

While much of this research is correlational, several studies using quasi-experimental and experimental study designs provide evidence that increases in income have a plausibly causal, positive effect on achievement test scores, school attendance, school engagement, secondary school completion rates, and post-secondary education enrollment (Akee, Copeland, Keeler, Angold, & Costello, 2010; Dahl & Lochner, 2012; Duncan, Morris, & Rodrigues, 2011; Maynard & Murnane, 1979; Michelmore, 2013; Morris & Gennetian, 2003). However, short periods of low income are less strongly associated with differential educational outcomes than persistently low income (Dickerson & Popli, 2016; Gebel, 2011). Finally, while most of this research has been conducted in the U.S., strong effects of income on development, learning, and education have also been documented in countries with less income inequality and more generous income support policies, including Canada, the United Kingdom, Australia, and Germany (Bradbury et al., 2015; Büchel, Frick, Krause, & Wagner, 2001; Dickerson & Popli, 2016; Jerrim et al., 2015; Jerrim & Vignoles, 2015; Milligan & Stabile, 2008; Schneider, 2016).

Wealth

Family or household wealth, which refers to the value of all real and financial assets, also contributes to unequal educational outcomes. To our knowledge, no studies have examined

the effect of wealth on early childhood educational outcomes and only a small number of studies have investigated the effects of wealth on educational outcomes in middle childhood. These studies found that children from wealthier families have significantly higher math, language, and reading abilities than children from families with less wealth (Orr, 2003; Paxson & Schady, 2007; Shanks, 2007; Yeung & Conley, 2008). Moreover, the effects of wealth differ across developmental domains, with wealth having a stronger effect on math ability than on language or reading abilities (Orr, 2003; Shanks, 2007; Yeung & Conley, 2008).

Notably more studies have considered the effects of wealth on the educational performance and achievement of adolescents and young adults. For adolescents across countries, family wealth is a significant predictor of grades in secondary school (Hällsten & Pfeffer, 2017; Zhan & Sherraden, 2003), as well as their likelihood of graduating from or completing secondary school (Pfeffer, 2018; Torche & Costa-Ribeiro, 2012; Zhan & Sherraden, 2003). Young adults from families with greater levels of wealth are also more likely to enroll in academic post-secondary education (Belley & Lochner, 2007; Conley, 2001b; Haveman & Wilson, 2007; Morgan & Kim, 2006). When they attend post-secondary education, young adults from wealthy backgrounds also perform better (Elliott & Nam, 2012) and are more likely to complete their post-secondary degrees than their less wealthy peers (Conley, 2001b; Haveman & Wilson, 2007; Ozdagli & Trachter, 2011; Pfeffer, 2018). Across countries, wealth also predicts the overall number of years of completed schooling (Axinn, Duncan, & Thornton, 1997; Conley, 2001b; Filmer & Pritchett, 1998; Pfeffer, 2011; Pfeffer & Hällsten, 2012).

Immigration Background and Ethnicity

Interest in unequal educational outcomes for ethnic minority or immigrant children, youth, and adults has grown in recent years. Internationally, most studies have focused on educational inequalities related to immigration background, which is defined by first, second, and third generation immigrant status. Additionally, in countries with large ethnic minority groups that do not have a recent immigration history, such as African-Americans in the US, studies also investigate ethnic inequalities as distinct from inequalities related to immigration background. Given the strong correlation between ethnicity and immigration background and other sociodemographic characteristics (Karoly & Gonzalez, 2011), it is important to note that many studies reviewed below have found that differences in SES or wealth completely account for educational inequalities related to ethnicity or immigration background (Dummert, Endlich, Schneider, & Schwenck, 2014; Kristen & Granato, 2007; Orr, 2003; Schnell & Azzolini, 2015; Siegert & Olszenka, 2016). However, at least one study provides evidence that SES does not entirely explain educational inequalities based on ethnicity and immigration background (Crosnoe, 2005).

Even in the first years of life, young children with first or second generation immigration backgrounds have lower cognitive and language test scores than their native-born peers (C. Becker & Biedinger, 2016; Burchinal et al., 2011; De Feyter & Winsler, 2009; Dubowy, Ebert, von Maurice, & Weinert, 2008; Relikowski, Schneider, & Linberg, 2015). Young children with immigration backgrounds and ethnic minority children are also much less likely to be placed in ECCE (Böttcher, Krieger, & Kolvenbach, 2010; Brandon, 2004; Geier & Riedel, 2009; Laughlin, 2010; Magnuson, Lahaie, & Waldfogel, 2006; Stahl et al., 2018). When parents with immigration backgrounds do place their children in ECCE, they tend to choose lower quality institutions than native-born parents (C. Becker & Biedinger, 2016; Fram & Kim, 2008). In

middle childhood, children with first or second generation immigration backgrounds have lower grades and have lower reading and math test scores than native-born children on reading and math tests (Cortes, 2006; Crosnoe, 2005; Gresch, 2012; Reardon & Galindo, 2009; Schnell & Azzolini, 2015). They are also more likely to repeat a grade than native-born children (Gresch, 2016). Similarly, ethnic minority children have lower test scores than majority group children (Burchinal et al., 2011; Jencks & Phillips, 2011; Nesbitt, Baker-Ward, & Willoughby, 2013; Reardon & Galindo, 2009).

Relative to their native born and majority group peers, adolescents with first or second generation immigration backgrounds and ethnic minority adolescents have worse grades and worse math and reading test scores (Dustmann, Frattini, & Lanzara, 2012; Heath, Rothon, & Kilpi, 2008; Kao & Thompson, 2003; Schnepf, 2007; Siegert & Olszenka, 2016). Both ethnic minority adolescents and adolescents with an immigration background are also more likely to repeat a grade (Hanushek & Rivkin, 2006; Siegert & Olszenka, 2016) and are more likely to drop out of secondary school (Beicht & Walden, 2017, 2017; Colding, Husted, & Hummelgaard, 2009; Kao & Thompson, 2003; Kilpi-Jakonen, 2011). On the other hand, holding constant educational performance, adolescents with an immigration background are more likely to attend the academic rather than vocational track in stratified school systems than native-born youth (Dollmann, 2016; Hunkler & Tjaden, 2018), though this advantage is stronger for first generation immigrant students than for second or third generation students (Perreira, Harris, & Lee, 2006). Furthermore, adolescents with immigration backgrounds who attend the vocational rather than the academic secondary school track are less likely than their native peers to find apprenticeship positions to continue their vocational training (Beicht & Walden, 2017; Diehl, Friedrich, & Hall, 2016; Granato, 2003).

Young adults who are ethnic minorities or have an immigration background are, on average, less likely to attend post-secondary education than their native-born and majority peers (Heath et al., 2008; Kaba, 2017), but actually attend post-secondary education at higher rates than majority peers with similar test scores (Heath et al., 2008; Kao & Thompson, 2003; Kristen, 2016). Yet, when ethnic minority young adults and young adults with immigration backgrounds attend post-secondary education, they are more likely to drop out without completing a degree than their majority group and native-born peers (Brinbaum & Guégnard, 2013; Burkhart & Kercher, 2014). Finally, as adults, those with immigration backgrounds are also less likely than native-born adults to pursue post-baccaleaureate graduate or professional education (Posselt & Grodsky, 2017) or further career-related training (Bundesministerium für Bildung und Forschung, 2016; Elsholz et al., 2012).

There is significant heterogeneity in the educational outcomes among minority individuals and individuals with immigration backgrounds. For example, a younger age of immigration is associated with an overall higher number of completed years of schooling (Chiswick & DebBurman, 2004; Gonzalez, 2003), while second generation immigrants fare better the longer their parents have been in the country of residence (Glick, Ruf, White, & Goldscheider, 2006). Several studies have also found that educational outcomes vary significantly by the country of origin, with some immigrant groups actually outperforming native-born students (Baum & Flores, 2011; Glick & Hohmann-Marriott, 2007; Heath et al., 2008; Reardon & Galindo, 2009). For example, in the United States, Asian immigrants perform better than native-born students, while and Mexican immigrants perform worse (Crosnoe & López Turley,

2011). Similarly, in Germany, Greek immigrants perform better than native-born students, while Turkish immigrants perform worse (Kristen & Granato, 2007).

Religious Affiliation

Several studies have found that religiosity impacts cognitive development and educational achievement over the life course (Bartkowski, Xu, & Levin, 2008; McFarland, Wright, & Weakliem, 2011; Mukhopadhyay, 2011), but only a small body of literature has examined inequalities in educational outcomes based on religious affiliation, a sociodemographic characteristic, alone. These studies suggest that there are some differences in educational attainment based on religious affiliation. On average, Jews complete an overall higher number of years of schooling relative to all other religious groups, while Muslims, Hindus, and fundamentalist Protestant Christians complete the lowest number of years of schooling (Hackett, McClendon, Potancokova, & Stonawski, 2016; Lehrer, 1999; Mukhopadhyay, 2011). It is possible, however, that these small differences by religious affiliation can actually be explained by related socioeconomic or structural differences (Helbig & Schneider, 2014; Mueller, 1980). For example, though Muslim adolescents are less likely to choose the academic secondary school track than Catholic or Lutheran adolescents in Germany, this difference is explained entirely by other socioeconomic factors, such as immigration background (Ohlendorf, Koenig, & Diehl, 2017).

Official Disability Status

Disabilities, including learning disabilities, vision or hearing impairments, and neurodevelopmental disorders (e.g., autism), are associated with significant differences in educational outcomes. Many such disabilities cannot be reliably diagnosed until children are older and few studies to our knowledge have examined the effects of disabilities on educational outcomes in early childhood. However, there is some evidence that preschool children with disabilities lag behind their non-disabled peers in language development (Lederberg, Schick, & Spencer, 2013; Rafferty, Piscitelli, & Boettcher, 2003). More research has been done on disability-related gaps in educational outcomes once children enter school. On average, disabled children, regardless of their disability diagnosis, perform significantly worse in reading comprehension, math, science, and social science compared to non-disabled children (Antia, Jones, Reed, & Kreimeyer, 2009; Marschark & Knoors, 2012; Schulte, Stevens, Elliott, Tindal, & Nese, 2016; J. J. Stevens, Schulte, Elliott, Nese, & Tindal, 2015; X. Wei, Christiano, Yu, Wagner, & Spiker, 2015).

These disability-related achievement gaps increase with age and as children progress through the educational system (Nelson, Benner, Lane, & Smith, 2004). In adolescence, disabled youth are less likely than their non-disabled peers to complete the academic requirements for college (Shifrer, Callahan, & Muller, 2013) and are more likely to drop out of secondary school (Cortellia & Horowitz, 2014; Shandra & Hogan, 2009). Disabled youth and young adults are also less likely to enroll in academic post-secondary education (I. H. Lee, Rojewski, Gregg, & Jeong, 2015) and are more likely to choose a vocational path (Nagle, Newman, Shaver, & Marschark, 2016). Moreover, if they choose the vocational training path, disabled students face greater challenges in finding an employer-based training position than non-disabled students (Häfeli, 2005; Menzel, Kaul, & Niehaus, 2013). If they choose the academic post-secondary path, disabled students take longer to finish their degrees and are less able to absorb the course material than non-disabled students (Autorengruppe

Bildungsberichterstattung, 2014; Marschark et al., 2009). Regardless of whether they choose an academic or vocational path, disabled students are less likely to complete their degree or certificate than non-disabled students (Autorengruppe Bildungsberichterstattung, 2014; Belch, 2004; I. H. Lee et al., 2015; Mamiseishvili & Koch, 2011, 2012).

These documented inequalities in development and academic achievement are not explained by disabilities alone. It is important to note that disabilities and low SES are highly correlated and it may be that the achievement gaps between disabled and non-disabled children and youth can at least partly be explained by the effects of low SES (Cortellia & Horowitz, 2014; J. J. Stevens et al., 2015). Unfortunately, no studies have yet employed quasi-experimental modeling techniques to identify to what degree disability-related achievement gaps reflect SES-based inequalities.

Discussion

This interdisciplinary and international review of the empirical literature provides a broad overview of inequalities in educational outcomes based on twelve major sociodemographic characteristics. While there is some evidence for educational inequalities based on each of the twelve sociodemographic characteristics, the amount and quality of evidence varies substantially across characteristics. Many studies have investigated inequalities in educational outcomes based on household income, parental education, parental employment, and ethnicity and immigration background, but other areas have received less attention. For example, while the educational effects of single-parent family structures have received a lot of attention, comparatively little is known about the impacts of growing up in step-parent, unmarried cohabitation, or same-sex family structures. No studies to our knowledge have investigated rural-urban inequalities in early childhood cognitive and language development. The effects of wealth on early childhood cognitive and language development are another area that has received little attention. Further research is also necessary to identify the effects of religious affiliation and parental disabilities on educational outcomes. Moreover, very few studies have considered the effects of partners' or siblings' sociodemographic characteristics on educational outcomes and, though most studies consider the effects of parental characteristics, not enough studies distinguish between the effects of maternal and paternal characteristics.

At the same time, the effects of some sociodemographic factors have been extensively researched, yet the evidence remains inconclusive. Specifically, there is contradictory evidence for the effects of gender, single parent family structures, urbanicity, maternal employment, and immigration background on educational outcomes. To some degree, this inconclusive evidence is due to heterogenous effects. For example, growing up in a single parent household can be detrimental for educational outcomes because of a lack of resources or capital, but may also be beneficial if the transition to a single parent family structure is associated with a reduction in family conflict (Musick & Meier, 2010; Stoye, 2016). There is also substantial heterogeneity in the outcomes of students with immigration backgrounds based on their country of origin, suggesting that immigration background itself may not be a predictor of educational inequalities (Baum & Flores, 2011; Glick & Hohmann-Marriott, 2007; Heath et al., 2008; Reardon & Galindo, 2009). However, in some cases the evidence is inconclusive because the predominantly observational and correlational studies are unable to address problems of endogeneity. For example, parental age at the child's birth, single parent

family structure, urbanicity, immigration background, and disability are all strongly correlated with other sociodemographic characteristics, such as income and education, and related inequalities in educational outcomes can often be accounted for by underlying differences in income or education (e.g., Björklund, Ginther, & Sundström, 2007; Cortellia & Horowitz, 2014; Kristen & Granato, 2007).

Though not addressed in our review of the empirical literature, another gap in research on sociodemographic inequalities in education is that few studies examine the interactions of multiple sociodemographic characteristics. Many of the sociodemographic characteristics examined here are strongly correlated with each other. For example, individuals with low education levels also tend to have lower incomes (Anger & Geis, 2017), while ethnic minority individuals and individuals with an immigration background also tend to have lower education levels and lower incomes (Karoly & Gonzalez, 2011). Therefore, it is necessary for researchers to study the effects of these characteristics as they "co-occur," rather than in isolation. One example of research that considers the interaction between multiple sociodemographic disadvantages is Helbig and Schneider's (2014) study of religious affiliation and educational outcomes in the 20th century, which finds that religion, gender, place of residence, and parental occupational prestige together predicted significant educational inequalities. Other studies that have considered the interactions between sociodemographic disadvantages have found that minority and income poor children living in single-parent family structures fare significantly worse than majority group children or high-income children living in single-parent households (Grätz, 2015; D. Lee & McLanahan, 2015).

Rather than consider the interaction between sociodemographic characteristics, some studies examine educational inequalities based on composite measures of social origin that combined parental education, income, and occupational prestige (e.g., Cheadle & Amato, 2011; Kieffer, 2012). The interplay of these three characteristics determines a person's position within a society, also called social origin. The choice to use a composite measure is often justified by the fact that these three characteristics are highly correlated with each other and, thus, it is challenging to identify independent effects (Kim et al., 2018). Moreover, social origin as a composite measure has a higher predictive power of educational inequalities than each of the independent characteristics (OECD, 2007b). However, though useful, composite social origin measures also present challenges. Some social origin composite measures are based on outdated classification systems that no longer mirror today's social structures (Duncan & Magnuson, 2003; Oakes & Rossi, 2003). Composite measures of social origin can also conflate the potentially differential effects of the different indicators. For example, Bukodi and Goldthorpe (2013) argue that the effects of parental occupational prestige and parental education should be interpreted differently. Namely, they suggest that parental education reflects both economic and educational resources, while occupational prestige more simply reflects economic resources. Yet, few studies have further empirically disentangled the differential effects of these sociodemographic characteristics on educational outcomes.

Many of these remaining gaps in the literature on educational inequality are explained by a lack of adequate data. To answer these remaining research questions, data on a wide range of sociodemographic characteristics are needed, including the sociodemographic characteristics of parents, siblings, and partners. Few studies include data on each of these characteristics for the focal individual or his or her parents and fewer studies still include data on even basic sociodemographic characteristics of siblings and partners. Another challenge

for research is that some data on sociodemographic characteristics, such as the place of residence, religious affiliation, or wealth, are not collected at all or are updated only infrequently. There are at least two possible reasons for such data gaps. First, many studies limit the scope of data collection in order to relieve the burden on respondents or due to financial costs. Second, good instruments to measure specific sociodemographic characteristics, such as wealth, do not exist or are infeasible to implement.

The NEPS was designed to address a number of these data limitations. The NEPS includes standard and often internationally comparable measures of the majority of these sociodemographic characteristics in each of the age-group cohort studies and most of these characteristics are measured longitudinally in order to capture status changes. While the NEPS does not measure all sociodemographic information about partners and siblings, it is one of few longitudinal studies that consistently measures some sociodemographic characteristics of these key people in an individual's family or household microsystems. By employing a longitudinal design that follows respondents over time at regular intervals, the NEPS documents individual educational trajectories. This approach allows researchers to examine both inter- and intra-individual differences in educational outcomes over time. The longitudinal design of the NEPS also allows researchers to leverage quasi-experimental research designs that rely on repeated measures to address some the above-mentioned problems of endogeneity. Longitudinal data is also important because it allows researchers to disentangle educational inequalities related to differences in skill development and differences in educational decisions (Müller-Benedict, 2007; Neugebauer, 2010; Stocké, 2007). Finally, the longitudinal and multi-cohort design of the NEPS allows researchers to further examine the potentially heterogeneous effects of sociodemographic characteristics over the life course. As such, NEPS data provide an opportunity for education researchers to build on the extant literature on educational inequalities by answering several of the remaining research questions highlighted in this review of the literature.

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