Socio-economic and regional inequalities in early care and education: Consequences for mothers' work-family life and children's educational opportunities

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PREFACE

Many people have contributed to this dissertation in various ways. I wouldn't have been able to complete it without them, and I am deeply grateful for their support.

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1 INTRODUCTION

"Virtually every aspect of early human development, from the brain's evolving circuitry to the child's capacity for empathy, is affected by the environments and experiences that are encountered in a cumulative fashion, beginning early in the prenatal period and extending throughout the early childhood years"

(Shonkoff & Phillips, 2000, p. 6)

Western societies are facing tremendous challenges arising from relatively novel but profound developments including globalization, digitalization, and demographic change. Governments have been searching for sustainable solutions to counteract demographic ageing and to prepare for rising global competition, which requires different and higher skills than previously. In anticipation of significant relative increases in the elderly population and rising needs for high-qualified workers, the European Union has developed the *Europe 2020 strategy* to promote smart and inclusive growth. One core objective is to raise the employment rate of the population aged 20-64 to at least 75 percent. Promoting women's labor market participation constitutes an explicit pathway through which this goal is to be achieved (European Commission, 2010). Although women have caught up and even overtaken men in terms of tertiary education (European Commission, 2016b), employment rates of men continue to exceed those of women by far (75.0 vs. 63.4 percent among persons aged 20-64 in EU-28 in 2014). This gap even increases when considering full-time equivalent (FTE) employment rates (European Commission, 2016c), underscoring again that European countries are as yet far from realizing their full female labor potential. This applies especially to women with (young) children, as parenthood is associated with vast reductions in employment rates and working hours among women, while the opposite holds true for men (Miani & Hoorens, 2014; OECD, 2016b). Already in 2002, the Barcelona European Council therefore set member states the target of providing childcare to at least 90 percent of children between three years and the mandatory school age, and at least 33 percent of children below three years of age by 2010 (Council of the European Union, 2002).

Despite these declared objectives and international trends towards increased female employment as well as day-care attendance among young children, the precise changes each country has made with regard to family policy remain heterogeneous (OECD, 2016a). The present dissertation brings the case of Germany into focus, a country whose recent family policies can be regarded as highly dynamic in comparison to other countries. At the beginning of the 21st century Germany witnessed a paradigm shift in family policy primarily affecting families with very young children: A shift from 'supported/explicit familialism' characterized by high state-support for family care combined with low support for care services to 'optional familialism' occurred, meaning that the state supports both family care and care services (Hook, 2015; Leitner, 2003). This shift created greater freedom of choice for families, an explicit objective in current family policy (cf. Spiess, 2011).

Historically a country institutionally supporting the male-breadwinner model, Germany can be characterized by persistently low fertility (OECD, 2016c), high gender wage and pension gaps (European Commission, 2016a), as well as comparatively low employment rates of mothers with young children and a high share of female part-time work (Aisenbrey, Evertsson, & Grunow, 2009). Although shares of part-time employment and inactivity among mothers with children below school age have always been considerably lower in East Germany, they nevertheless increased after German reunification (Kreyenfeld & Geisler, 2006). In the mid-2000s, German policy makers set new incentives for mothers to increase labor supply. They initiated a massive expansion of the day-care system for children below three years of age and stipulated a right to a day-care place for children aged one year and older as of 1 August 2013 (Tagesbetreuungsausbaugesetz 2005, Kinderförderungsgesetz 2008). Further measures were implemented in order to improve parents' ability to reconcile work and family responsibilities and to make fathers become more involved in childcare by taking leave. These comprised demand-based provisions of *full-day* childcare slots for all children below school-age (§ 24 SGB VIII) as well as the 2007 parental leave benefit reform introducing shorter but overall more generous, income-based payments for all leave-taking parents, with two extra months of payments in case both parents take some leave (Bundeselterngeld- und Elternzeitgesetz 2006) (for a review of recent family policy reforms see also Spiess, 2011).

Next to large increases in day-care attendance rates among children below three, which more than doubled between 2007 (15.5 percent) and 2016 (32.7 percent) (Statistisches Bundesamt, 2016), research suggests that the day-care expansion resulted in higher fertility

(Bauernschuster, Hener, & Rainer, 2013; Haan & Wrohlich, 2011) and higher maternal satisfaction (Schober & Schmitt, 2013), while the 2007 parental leave benefit reform fostered paternal childcare involvement (Schober, 2014b); there is furthermore evidence that both reforms raised labor supply among mothers of young children mainly after a child's first birthday (e.g., Geyer, Haan, Spiess, & Wrohlich, 2013; Geyer, Haan, & Wrohlich, 2015; Haan & Wrohlich, 2011; Kluve & Schmitz, 2014; Müller et al., 2013; see also Huebener, Müller, Spiess, & Wrohlich, 2016). Hence, while it remains unknown whether the reforms will contribute to smaller gender wage gaps and higher old-age security for mothers in the long term, at the very least they proved effective in lowering gender inequalities in employment in the short term.

However, even though mothers may have profited from the reforms overall, some individuals and their families benefitted more than others (see Chapter 2). This is not surprising because, as will be elaborated further in Chapter 1.2, families and their members have varying individual- and household-level resources at their disposal. They also differ in the resources that are available to them in their living environment (e.g., local childcare supply) as well as in other contextual factors. All of these factors are likely to affect families' preferences, beliefs, needs and constraints/opportunities with respect to employment and use of state-subsidized childcare, and might interact with each other. For example, previous studies suggest that families – and in particular mothers – took advantage of the parental leave benefit reform to varying degrees depending on their socio-economic resources and residence in East versus West Germany (e.g., Geyer et al., 2013; Kluve & Tamm, 2013).

PART 1 of this dissertation thesis recognizes the possibility of effect heterogeneity and turns to two aspects that so far have remained unclear or neglected in both public debates and the scientific discourse on recent family policy reforms. First of all, it investigates time trends in employment take-up and childcare use by maternal education, or in other words, it examines how educational discrepancies in these behaviors have evolved *over time*, that is over the course of major policy reforms in both East and West Germany (Chapter 2). Focusing on mothers with children under three years of age, it pursues two research questions:

1) Did the period between 1997 and 2013 see an increase or decrease in educational discrepancies regarding maternal labor market participation and (in)formal childcare use?

2) Were changes in educational gaps in work-care arrangements more pronounced in East or West Germany?

Overall, Chapter 2 investigates whether the paradigm shift towards optional familialism occurring in German family policy was accompanied by convergence or divergence of work-care arrangements both between educational groups and between East and West Germany, respectively.

Next, PART 1 of the thesis turns to the impact of intensity of childcare provision and take-up on parents' (and especially mothers') ability to maintain or increase subjective well-being (Chapter 3). It also analyzes whether this impact varied across cultural contexts and across mothers with different family resources and working hours. More precisely, the following research questions will be addressed:

1) Did expanding full-day childcare contribute to parents' satisfaction with family life and life overall in Germany?

2) Did the association of increasing availability and use of full-day care with satisfaction differ between East and West Germany, between partnered and lone mothers and by employment status?

In essence, PART 1 aims at finding answers to the question *which socio-economic groups of mothers benefitted (most) from recent changes in the institutional context*, with the latter referring to aspects of childcare provision and parental leave benefits. Importantly, separate analyses are conducted for East and West Germany, which can be regarded as two culturally distinct contexts given their persistent and substantial variations in acceptance and use of childcare institutions as well as maternal employment (see Chapter 1.3). Also, people in West Germany continue to be significantly more satisfied with their life than their East German counterparts (Priem & Schupp, 2014). Running separate analyses for the two parts also allows shedding light on the similarities – or continued differences – between the two parts with respect to mothers' work-care arrangements and their subjective evaluations of changes in their own behavior or in their social environment.

A critical consequence of the different family policy reforms targeting the reconciliation of work and family responsibilities is that a child in Germany nowadays spends more time – both in terms of hours per day and in terms of years – in childcare institutions, and attendance starts on average earlier than previously (Statistisches Bundesamt, 2016). Childcare institutions represent the core component of early childhood education and care (ECEC) services in Germany and can be considered the first educational stage in children's life course, given that in 2015 94 percent of children between three years of age and school entry

attended ECEC institutions and less than one percent attended family day-care only (Statistisches Bundesamt, 2016). Over the past decades, several disciplines have generated an immense body of research highlighting the potentials of ECEC to promote positive child development (see e.g., Burger, 2010; Gorey, 2001; Nores & Barnett, 2010; Elango, Garcia, Heckman, & Hojman, 2015 for international reviews and meta-analyses). While traditionally a research area dominated by developmental psychologists and educational scientists, in recent times important contributions have been made by economists (e.g., Heckman, 2006), which support investments in the early years as well.

An often-replicated finding based on different datasets and methods is that the care and education provided to children must be of high quality in order for ECEC to generate these positive effects (Anders et al., 2012; Becker, 2010b; Camilli, Vargas, Ryan, & Barnett, 2010; Keys et al., 2013; see Anders, 2013 for a literature review). However, in Germany as well as other countries, the average quality of interactions and the learning environment is only low to medium (Anders et al., 2012; Kuger & Kluczniok, 2008; Tietze et al., 2013).

The importance of high-quality ECEC for child development has also been recognized by the European Union:

> "*Complementing the central role of the family, ECEC lays the essential foundations for language acquisition, successful lifelong learning, social integration, personal development and employability. If solid foundations are laid during a child's formative years, later learning becomes more effective and more likely to continue throughout life, increasing the equity of educational outcomes and lowering the costs for society in terms of lost talent and public spending on welfare, health and even justice*" (Council of the European Union, 2011, p. 1).

The Council of the European Union expects children from migrant or socio-economically disadvantaged families to benefit especially from ECEC, which might counteract early gaps in achievement and both cognitive and socio-emotional skills between children with varying social backgrounds ('compensatory function'). Although ECEC is unlikely to fully eliminate socio-economic gaps in child development, some research studies indeed provide evidence for this compensatory function (e.g., Burger, 2010; Tucker-Drob, 2012). Ultimately, ECEC might therefore help reaching two additional Europe 2020 objectives, namely reducing the share of early school leavers and the number of people at risk of poverty (European Commission, 2010).

The compensatory function of ECEC matters for Germany in particular, given that it is among the countries where socio-economic background appears to have a relatively large influence on students' secondary education achievement, even though there is evidence that class inequalities in educational attainment have weakened in younger cohorts (Breen, Luijkx, Müller, & Pollak, 2009; OECD, 2010). Still, social origin constitutes a major determinant of children's life chances in Germany. As part of the childcare expansion, the German government has also initiated improvements in the quality (e.g., regarding pedagogical concepts, evaluations, parent cooperation) of childcare provision (BMFSFJ, 2016). However, even though leading policy makers have understood the significance of ECEC quality, and have committed to the goal of providing equal educational opportunities to children independent of their social origin and place of residence (BMFSFJ, 2016), no nationwide quality standards have as yet been established. The German childcare system continues to be highly decentralized, resulting in large differences between Federal states regarding the legal regulations of ECEC quality.

PART 2 of this thesis sheds further light on the question *whether and to what extent there are socio-economic as well as regional inequalities in access to, and use of, ECEC institutions of varying quality*. On the one hand, it examines whether potentially disadvantaged families make use of ECEC centers of systematically lower quality (Chapter 4). In particular, Chapter 4 is supposed to answer one core question:

1) Do children with low educated parents, children with migration background, children from low-income families and from single-parent households attend ECEC settings with systematically lower-quality characteristics as compared to children from potentially more advantaged families?

Such patterns might originate from factors such as varying opportunities/constraints in terms of parental time, family budget, parental knowledge and preferences, or contextual factors. In order to learn more about whether family-level characteristics relate to parents' ECEC quality choices, a second research question is formulated:

2) Does the level of accessible information on ECEC quality moderate any associations between family socio-economic status (SES) and ECEC quality?

On the other hand, PART 2 considers qualitative characteristics of ECEC groups (i.e., classrooms) mainly serving four- and five-year-old children to assess the distribution of these characteristics across Germany. This is to find to what extent place of residence alters

families' choice sets in terms of structural ECEC quality (Chapter 5). The analysis explicitly distinguishes centers in East and West Germany, as care used to be structured very differently in the two parts prior to German reunification. The main research questions are as follows:

1) Do structural features of ECEC quality vary systematically across counties as well as neighborhoods of different socio-economic composition?

2) Are variations in care conditions associated with differences in federal state regulations?

Given the multi-dimensional nature of ECEC quality (Pianta, Howes, & Burchinal, 2005), I incorporate a broad range of different indicators of pedagogical quality, which can be divided into the components of structural quality, orientation quality and networking with families (Kluczniok & Roßbach, 2014). These indicators have been shown to be associated with children's development directly or indirectly via process quality, which captures the day-to-day interactions and experiences children make in ECEC institutions (NICHD Early Child Care Research Network, 2002b; see the corresponding chapters for further details on the different components of ECEC quality). This emphasis on aspects of pedagogical quality in PART 2 contrasts PART 1, which focuses on availability and use of childcare places per se as well as of *full-day* childcare, a non-pedagogical feature of ECEC quality. Both quality types seem to influence parental choices of ECEC centers for their children (see Chapter 1.3).

The next section will provide definitions of core terms and outline the contents of all subsequent chapters. It specifies the literature gap each analysis is going to address, including a brief outlook on the main findings. Section 1.2 will then elaborate on the main theoretical approaches and concepts my thesis builds upon. Chapter 1.3 directs attention to the institutional context. It starts out with presenting essential characteristics of the German context related to childcare provision and society as a whole, which render Germany a unique case to study. It provides first descriptive evidence to illustrate within-country variations in terms of gender role attitudes and childcare infrastructure, explicating salient features of the German ECEC system. It discusses different types of factors that may influence childcare choices, thereby laying the ground for the multivariate analyses[1] in subsequent chapters. Chapters 2 to 5 cover multiple research projects that have been conducted in order to answer the research questions introduced above. The sixth and final chapter summarizes and integrates the main results in order to arrive at more general conclusions. It also explicates significant limitations of the analyses and specifies needs for future research. Finally, it

[1] The reported analyses were for the most part performed using STATA (StataCorp, 2013).

revisits central policy aims as discussed in the introduction in light of the new findings, and attempts to derive policy implications as far as possible.

1.1 Terminology and structure of the thesis

Referring to a recent definition, *Early Childhood Education and Care* encompasses "any regulated arrangement that provides education and care for children from birth to compulsory primary school age – regardless of the setting, funding, opening hours or programme content – and includes centre and family day care" (Working Group on Early Childhood Education and Care, 2014, p. 69). In this thesis, 'ECEC' is the preferred term whenever pedagogical quality and children's development are the focus of investigation (Chapters 4 and 5). In Chapters 2 and 3, by contrast, I place emphasis on mothers' outcomes of employment and well-being. In these cases, I favor the terms *'day-care'* and *'(formal) childcare'*, which underline the aspect of care rather than education and are used interchangeably. All three terms include day-care centers ('Kindertageseinrichtungen') as well as family day-care ('Tagespflege'), unless specified otherwise (e.g., ECEC institutions, childcare centers). As already mentioned, however, in Germany the vast majority of children in day-care attend centers; in 2016 less than five percent of under-three year-olds and less than one percent of children between three and under six years of age attended family day-care only (Statistisches Bundesamt, 2016). Formal childcare can be distinguished from *parental* as well as *informal childcare*. The latter captures (paid or unpaid) childcare provided by relatives (e.g., grand-parents), neighbors, friends and acquaintances, or nannies, oftentimes in the child's home.

For a long time, policy makers and researchers have targeted insufficient *availability* of childcare places (e.g., Spiess & Wrohlich, 2005). As opposed to this, my work focuses on *accessibility* and availability of *quality*. Accessibility refers to explicit or implicit barriers to use of (high-quality) childcare experienced by diverse families which go beyond lacking availability of places (Lazzari & Vandenbroeck, 2012). Such barriers range from bureaucratic enrolment procedures, waiting lists, priority enrolment criteria to inadequate knowledge and language barriers among parents. Accessibility is a major concern in Chapters 2 and 4, whereas Chapters 3 and 5 concentrate on the availability of non-pedagogical and pedagogical quality aspects, respectively. The issue of childcare quality supply primarily relates to average quality levels and uneven distributions of quality across regions and neighborhoods. *Non-pedagogical quality* comprises characteristics such as proximity, costs, opening hours, flexibility and stability of care, which are likely to be crucial factors from the perspective of parents. Regarding *pedagogical quality*, several definitions in the literature refer to those

characteristics of childcare that promote optimal development and produce positive child outcomes (Marshall, 2004; Phillips & Lowenstein, 2011). Findings suggest that there is no single but rather a whole bundle of covarying factors collectively contributing to the overall quality of care children experience in their day-care settings (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999; Tietze et al., 2013).

As Chapters 2 to 5 build the core of this thesis, the next paragraphs point out the respective literature gaps each chapter contributes to. The chapters can be subdivided into two parts. PART 1 includes analyses on the accessibility of childcare (Chapter 2) and availability of non-pedagogical quality (Chapter 3), respectively, with a focus on mothers' outcomes. PART 2 (Chapters 4 and 5) pursues questions of accessibility and availability of pedagogical ECEC quality, with a focus on children's educational opportunities. From the beginning, I would like to draw the reader's attention to the strong thematic interrelations across the four chapters. As a consequence, they reveal significant repetitions especially in the motivation and literature sections. Furthermore, information on the institutional context is partially redundant.

PART 1: Increasing provisions of (full-day) childcare: Consequences for mothers' employment and subjective well-being

Chapter 2. The paradigm shift in German family policy was accompanied by significant increases in both maternal employment and childcare use (see Chapter 1). At the same time, a recurring finding from social science is that mothers with higher educational attainment are more likely to work and to re-enter the labor market sooner following childbirth (e.g., Drasch, 2013; Grunow, Aisenbrey, & Evertsson, 2011). Likewise, use of childcare services is more common among families with more educated women in the US as well as in European countries (e.g., Coley, Votruba-Drzal, Collins, & Miller, 2014; Crosnoe, Purtell, Davis-Kean, Ansari, & Benner, 2016; Lazzari & Vandenbroeck, 2012). This has been found for Germany as well (e.g., Fuchs, 2005; Krapf, 2014; Kreyenfeld & Krapf, 2010; Schober & Spiess, 2013). Also, children of mothers with tertiary degrees spend more years in childcare institutions (Büchner & Spiess, 2007), or put differently, these children enter institutions at earlier ages, even though it is specifically the group of children from low educated families who could benefit from early ECEC attendance as it lowers their risk of delayed school entry (Kratzmann & Schneider, 2009). Sociologists have observed a strengthening of the positive relationship between mothers' education and employment for the time period prior to the reforms of the mid-2000s, suspecting that educational polarization might continue rather than

reverse in the years to come (Drasch, 2013; Konietzka & Kreyenfeld, 2010). Strikingly, Kreyenfeld & Krapf (2010) also reported evidence for increasing discrepancies in childcare use by maternal education among children aged four and five years but not among younger children.

Chapter 2 sheds further light on the question as to whether the work-care arrangements chosen by mothers of varying educational levels became more similar or distinct after the policy reforms. However, as compared to previous studies, the chapter considers a longer time period after the reform, spanning the years 1997 to 2013. It also assesses mothers' work *and* childcare arrangements jointly, and analyzes average marginal effects in order to explore trends in the *absolute* educational gaps.

Chapter 3. Besides mere availability of childcare places for children below three years of age, provisions of full-day childcare for all children below school age have been expanded as well. Chapter 3 examines changes in maternal satisfaction going along with this expansion. This research focus deviates considerably from previous studies in sociology which have considered overall – rather than full-day – childcare availability. They have furthermore mainly focused on day-care supply for children below three and relied on cross-sectional, cross-national comparative datasets (e.g., Steiber, 2009; Stier, Lewin-Epstein, & Braun, 2012; Treas, Lippe, & ChloeTai, 2011). By applying panel analysis techniques to a longitudinal household study, the analyses in Chapter 3 are better able to account for the problem of unobserved heterogeneity. Especially against the backdrop of political efforts to raise women's working hours, finding *extended* services which assist in reconciling work and childcare responsibilities presumably constitutes a key pre-requisite if mothers are to return to the labor market permanently for longer hours. Correspondingly, maternal employment has been identified as an important predictor of greater use of full-time services, just as single parenthood (Schober & Spiess 2013). Chapter 3 examines if greater access to, and use of, full-day childcare during the expansion period enhanced maternal satisfaction primarily among single and full-time employed mothers in both East and West Germany. As compared with some economic panel studies from Australia and Canada (e.g., Brodeur & Connolly, 2012; Yamauchi, 2010), Chapter 3 provides empirical evidence combined with theoretical reasoning in order to make sense of heterogeneous effects across socio-economic groups of mothers and across culturally diverse contexts.

PART 2: Variations in pedagogical ECEC quality: Consequences for children's educational opportunities

Chapter 4. In comparison with the literature on socio-economic differences in childcare use, less evidence exists with respect to ECEC quality. Most of these findings have been generated using US-American or British data. They tend to indicate positive associations between parental SES and ECEC quality, as measured by structural and process quality indicators (e.g., Augustine, Cavanagh, & Crosnoe, 2009; Gambaro, Stewart, & Waldfogel, 2015; McCartney, Dearing, Taylor, & Bub, 2007). Mainly in case of household income, however, some studies point to U-shaped relationships (e.g., Dowsett, Huston, Imes, & Gennetian, 2008; NICHD Early Child Care Research Network, 1997). For Germany, new datasets have become available in recent years which allow researchers from sociology, psychology and educational science to generate evidence on this issue. The most consistent results point to processes of segregation, meaning that children from potentially less advantaged families are exposed to, on average, less favorable social compositions in their ECEC settings (Becker, 2010a; Biedinger, Becker, & Rohling, 2008). Second, children with a migration background experience somewhat lower quality than children without a migration background (e.g., Lehrl, Kuger, & Anders, 2014; Tietze et al., 2013), whereas findings on other characteristics of SES are more ambiguous. Most national and international analyses are based on data from specific regions rather than an entire country.

In response to this, Chapter 4 uses a nationally representative cross-sectional dataset of families with young children in Germany, which can be matched with detailed information on the quality of their chosen ECEC institutions. These data prove highly useful for analyzing as to whether children from potentially disadvantaged families experience systematically lower quality in the highly state-subsidized German ECEC system. The analysis incorporates a larger range of ECEC quality indicators than previous studies. Moreover, Chapter 4 offers on the one hand extended theoretical considerations regarding possible underlying mechanisms leading to the observed patterns. On the other hand, it tests several hypotheses on links between ECEC quality and various measures of SES simultaneously. This procedure allows for inferences about the relative importance of different family resources when parents make childcare quality choices.

Chapter 5. It is well-known that large heterogeneity continues to exist with respect to the quality of ECEC institutions in Germany (and other countries). This chapter sheds light on the question if ECEC quality is unevenly distributed across regions, and if so, whether federal state regulations might be underlying driving factors. Existing studies linking ECEC quality with between-state variations in legislation have predominantly been conducted in the US.

They suggest that better quality is available in states with more stringent legal regulations of care contexts (e.g., Hotz & Xiao, 2011; Phillips, Mekos, Scarr, McCartney, & Abbott–Shim, 2000; Rigby, Ryan, & Brooks-Gunn, 2007). Smaller-scale differences in supply of childcare quality have also been investigated. Social scientists found neighborhood advantage and safety to be positively linked with process quality in ECEC (e.g., Burchinal, Nelson, Carlson, & Brooks-Gunn, 2008; Marco & Vernon-Feagans, 2013), again indicating that in the largely marketized childcare system of the US, place of residence constrains parents' quality choices to different degrees.

Focusing on three widely recognized indicators of structural quality, Chapter 5 examines to what extent ECEC quality provision correlates with legal quality regulations and neighborhood affluence in Germany's strongly subsidized but decentralized childcare system. I pursue this issue by comparing ECEC groups of four- and five-year-old children from all over Germany and matching further data on centers' neighborhood as well as information drawn from content analyses of federal state legislation. By applying multilevel modeling techniques, I take account of the nesting of ECEC groups in ECEC centers, which are in turn clustered in numerous counties belonging to East and West Germany, respectively.

1.2 Theoretical framework

Inherent to research on childcare – the connecting element of all analyses in this thesis – is its location at the intersection of gender and class. Childcare plays a crucial role in supporting mothers' reconciliation of work and family responsibilities, but at the same time holds important consequences for children's development. It can thus be regarded as an important public resource whose allocation may affect gender and socio-economic, but also regional inequalities in life chances. The present thesis incorporates all of these dimensions by investigating mothers' employment and subjective well-being (PART 1) as well as children's educational opportunities (PART 2) as a function of socio-economic status and institutional context. Contextual features in the analyses are located at different levels (e.g., county, federal state), while socio-economic status measures refer to several attributes including education, migration background, income, employment and partnership status. Thereby, I address recent notions by sociologists who criticize researchers' tendency to restrict themselves to a single attribute of heterogeneity (e.g., gender *or* education), despite the multi-dimensional nature of social inequalities (Diewald & Faist, 2011). As will become evident, decreasing inequality on one attribute of heterogeneity (in the present case: gender) may be accompanied by increasing inequality on another attribute (here: education). Considering

several attributes of heterogeneity and incorporating perspectives of parents' *and* children's life chances allows for drawing a more complete picture of associations between SES, region and ECEC in Germany.

The present research is based on the framework of methodological individualism as advocated by Coleman (1986). Accordingly, social phenomena at the macro level can be explained by referring to a lower level, often the level of individual behavior, and using a theory of action. Rational choice (RC) theory serves to derive testable hypotheses about individual actions. As summarized by Opp (1999), the three core assumptions of RC are that individuals hold preferences (1) and face both constraints and opportunities that decrease respectively increase chances to satisfy these preferences (2). Based on these factors, individuals choose their actions in order to maximize utility (3). The present thesis starts from this perspective, assuming that culture shapes preferences among individuals for childcare and work-related behaviors, while diverse characteristics of the ECEC system including legislation and infrastructure constitute important opportunities/constraints for families with young children. Whereas formal childcare can serve as a 'boundary-spanning resource' that helps fulfilling demands originating from both the family and work domain (Voydanoff, 2005), it turns into a constraint if day-care is inadequate or missing altogether.

A frequently applied narrow version of RC claims that actors "are optimally informed rational egoists who care only for the tangible consequences of their actions and take into account the objective constraints" (Kroneberg & Kalter, 2012, p. 81). Empirical evidence however poses a threat to these strict assumptions (see Kroneberg & Kalter, 2012). It calls for a wide version of RC relaxing these claims by allowing for a diverse set of preferences and constraints which influence behavior. Also, the wide version substitutes the assumption of full information with that of bounded rationality, allowing for perceived constraints that govern human behavior *in addition to* objective ones (Opp, 1999). Some sociologists (e.g., Boudon, 2003) go even further by proposing to integrate other sociological concepts and mechanisms into RC (see Kroneberg & Kalter, 2012).

In line with these developments, this thesis adopts an approach that challenges some of the assumptions of the narrow version of RC and combines different social science approaches to arrive at a more realistic theoretical framework specifically tailored to the realm of childcare. Integrating economic models of individual consumption choice with models of socially constructed/situated patterns of action, the accommodation model by Meyers & Jordan (2006) assumes that childcare choices are made by rational actors. According to this

framework, childcare decisions can be regarded as contextualized patterns of action. In contrast to economic models and, for that matter, traditional applications of RC, childcare choices are not isolated decisions based on fixed preferences (cf. Chaudry, Henly, & Meyers, 2010). First of all, parents adapt their preferences in a dynamic process that is shaped by social networks, norms and supply-side factors. Second, given that parents must fulfill multiple roles at the same time these choices are often linked with other decisions, for instance regarding their employment. Overall, childcare choices should therefore be understood as accommodations to "family and employment demands, social and cultural expectations, available information, and financial, social, and other resources" (Meyers & Jordan, 2006, p. 64) which may involve cognitive shortcuts and habits, rather than completely individual, informed and reflective choices. On the one hand, families differ in their resources and demands, for instance regarding financial means and parental employment. On the other hand, families face varying contextual constraints in their (physical and social) environment. This aspect can relate to *actual* conditions, e.g., the local supply of childcare (quality); however, it can also refer to *perceived* opportunities and constraints: When assessing the childcare options available to them, parents may arrive at diverging conclusions even if facing comparable objective opportunities and constraints, thus underscoring the limited, socially constructed nature of information.[2] Both forms of contextual constraint may be socially stratified and reproduce other forms of economic and social stratification (Meyers & Jordan, 2006).

My research corresponds to this framework in many respects. In PART 1, I account for *interlinkages* between work and childcare choices of mothers, how they interact with each other and with mothers' socio-economic resources to affect maternal well-being. Moreover, in all analyses families' *context* plays a crucial role. In Chapters 2, 3 and 5, I consider temporal and regional variations regarding national family policies, federal states' legal quality regulations, and regarding availability of childcare (quality) at county- and youth welfare office district level. I examine differences between East and West Germany as well as between neighborhoods of varying socio-economic compositions. The multivariate models take into account these differences as far as possible. By contrast, the analyses in Chapter 4 assume *socio-economically stratified* preferences, information and networks, which cannot be modeled directly. Instead, various characteristics of family SES serve as proxies of these resources as well as of time and financial resources. In this chapter, the aim is to expose

[2] This perspective is more in line with relatively recent advancements in RC theorizing including cognitive rationality and framing theories (see Boudon 2003, Kroneberg & Kalter 2012).

differences in resources net of actual constraints in availability of ECEC quality at families' place of residence as far as possible, whereas Chapter 5 explicitly investigates these constraints. Hence, while the accommodation model has been referred to in several recent studies on parental choices primarily regarding ECEC use (e.g., Coley et al., 2014; Crosnoe et al., 2016), in this dissertation I extend its application to the quality of ECEC.

What is noteworthy about this theoretical approach is its significant overlap with life course sociology (see Chaudry, Henly, et al., 2010). Consequently, this dissertation is related to the life course perspective as well. For instance, it considers mothers - who continue to be the main caregivers in most families - and their children simultaneously. This is based on the assumption that children's intense need for care affects mothers' employment trajectories and experiences of work-family conflict, while parental care choices determine the environment in which children grow up, learn and become socialized. The underlying concept of 'linked lives' is a central feature of the life course perspective, as is the focus on multiple life domains and life stages which are embedded in a specific time and place (Elder, Johnson, & Crosnoe, 2003; Mayer, 2009). Precisely, this thesis concentrates on families with children under school-age in Germany at the beginning of the 21st century, and examines both the work and life domain. This is crucial because favorable working positions may go along with adverse conditions in terms of work-life balance, which can negatively impact subjective well-being and vice versa.

My dissertation thesis concludes that the German childcare system in its current form may increasingly serve as a vehicle for higher-SES mothers to preserve advantage in terms of economic activity and well-being as compared to their lower-SES counterparts, while at the same time the system is unable to assure equal opportunities for every child, thereby facilitating the social reproduction of inequality. The analyses demonstrate that increasing childcare availability may have increased educational gaps in mothers' employment and formal childcare use. Referring to Bourdieu's (1986) forms of capital, mothers with more cultural capital, both in the form of long-lasting dispositions ('embodied') and of educational degrees ('institutionalized')', have become much more likely to return to the labor market fairly soon after childbirth. In the short- and presumably longer-term, these mothers are better able to convert their cultural capital into economic capital, i.e., money (Bourdieu, 1986), as compared to previously (i.e., prior to the policy reforms) and as compared to mothers with lower cultural capital. At the same time, the analyses indicate that primarily mothers with strong labor market attachment may have experienced psychological relief as a consequence

of greater availability and use of full-day childcare. Hence, extensive employment ceases to be detrimental to maternal well-being.

In terms of the intergenerational transmission of (dis)advantage, it becomes evident that children from potentially disadvantaged families, especially those with low educated parents and with a migration background, attend ECEC centers with partially lower-quality characteristics. The results suggest that families' cultural and social capital (i.e., social connections) might be more important factors in childcare quality choices than economic capital (Bourdieu, 1986). Besides, socio-institutional constraints also seem to matter: Structural quality varies systematically, with regions exposed to stricter legal regulations and neighborhoods with higher average purchasing power providing access to better quality.

Based on a formalized model of cultural reproduction by Jæger & Breen (2016), at least part of the intergenerational transmission of cultural capital occurs due to parents' conscious, strategic investments in their children. Such investments may range from reading behavior to highbrow cultural participation to extracurricular activities (e.g., music lessons). The latter provides parents with the opportunity to inculcate in their child cultural capital they do not necessarily possess themselves (Jæger & Breen, 2016). Following a broad interpretation by Lareau & Weininger (2003), cultural capital includes technical abilities and academic skills, next to knowledge of or facility with "highbrow" aesthetic culture which has been the focus of many empirical studies. As a consequence, ECEC can contribute to transmitting cultural capital to children by promoting knowledge as well as cognitive and non-cognitive skills (in Bourdieu's words instruments of appropriation of the dominant culture) which the educational system (i.e., teachers and schools) values (Bourdieu, 1977). While these values are socially constructed, they are decisive for children's success in school and most likely beyond. Parents with higher cultural capital are more knowledgeable in terms of which skills matter at school, and might also be more aware that ECEC prepares children for the start of their educational career.

In sum, features of ECEC related to availability, accessibility and quality constrain parents' and children's life chances – as measured through well-being, employment and educational opportunities – to varying degrees. This has consequences for intra-generational mobility as well as for the inter-generational transmission of (dis)advantage. I argue that as yet, ECEC has often been overlooked by sociologists interested in social reproduction and social inequality. On the one hand, ECEC may serve as a channel through which women with higher cultural capital can maintain their advantage after giving birth as compared to women

with lower cultural capital, and through which parents can transmit cultural capital to their offspring, provided that the quality of care and education is adequate. On the other hand, however, high-quality ECEC could be used to supply children with cultural capital independent of their parents' endowments and thus to counteract processes of social reproduction. A vast amount of quantitative sociological research has investigated to what extent fertility, maternal employment and work-family conflict are linked with availability of public childcare (e.g., Keck & Saraceno, 2013; Kreyenfeld & Hank, 2000; Rindfuss, Guilkey, Morgan, & Kravdal, 2010; Stier, Lewin-Epstein, & Braun, 2012). As opposed to this, relatively few sociologists have as yet directed attention to children's access to early learning opportunities in ECEC and its potentials to affect both child development and socio-economic discrepancies therein: In the US-American context, works by Robert Crosnoe and Jennifer Augustine (Augustine et al., 2009; Crosnoe et al., 2016) as well as a research group from the University of Illinois (Abner, Gordon, Kaestner, & Korenman, 2013) should be mentioned. For Germany, research by Birgit Becker and colleagues (e.g., Becker, 2010a, 2010b; Klein, Biedinger, & Kolb, 2016), and by Thorsten Schneider and Jens Kratzmann (Kratzmann & Schneider, 2009) must be emphasized, as well as studies by Pia Schober (e.g., Schober & Spiess, 2013). Recent activities by the NEPS (National Educational Panel Study) team should be acknowledged as well (Blossfeld, Kulic, Skopek, & Triventi, 2017). My dissertation aims to contribute to this small but growing literature in sociology. More generally, it adds to the literature on social stratification that investigates mechanisms through which social inequalities are reproduced or reinforced both in early childhood (e.g., Augustine et al., 2009; Kaiser & Diewald, 2014) and in the phase of family formation (e.g., Drasch, 2013).

1.3 Institutional context: Childcare provision, work-care-cultures and parental choice

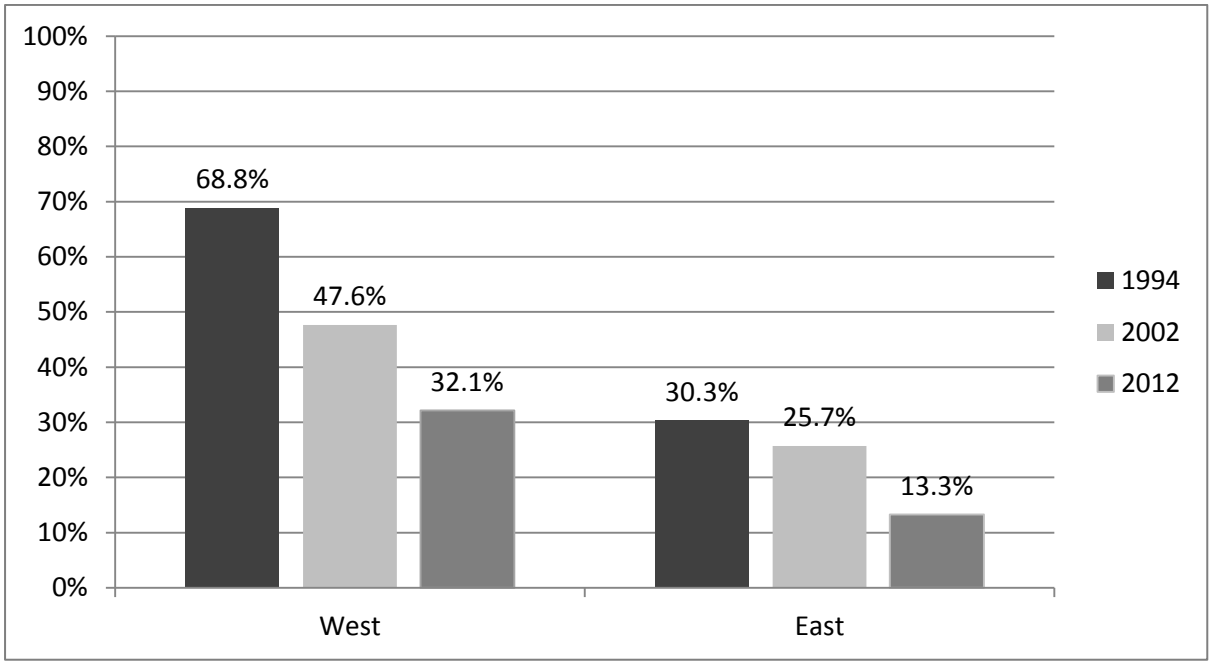
Germany represents a unique context for my research due to the special nature of its childcare system, but also due to its unique history, which led to persisting systematic within-country differences in culture and childcare infrastructure. In contrast to many other countries, in Germany the 16 federal states ('Bundesländer') are responsible for the areas of education and social services, and municipalities are granted significant autonomy in terms of childcare provision. In addition to the childcare system being highly decentralized, care is state-subsidized to a great extent. As a consequence, parental fees are fairly moderate, and substantially lower than in Switzerland, Ireland, the UK, the US and Canada; according to the

OECD, in 2008 the average cost of childcare in Germany amounted to 11 percent of the family's net income in dual-earner families with average wages, and to 13 percent of the family's net income if the male earned 100% and the female 50% of average wage. Both figures are slightly below the OECD30-average[3] (OECD, 2011). Moreover, Book Eight of the Social Code stipulates that parental fees are to be scaled. Especially criteria such as income, number of children eligible for child allowances in the family and the daily amount of care hours can be taken into account, if not specified differently in federal state legislation. Families for whom the financial burden is economically unreasonable can be partially or fully exempt from fees (§ 90 SGB VIII). Another feature of the German childcare system is that while it consists of a diverse set of public and non-profit providers, private providers represent only a very small share (e.g., Spiess, 2008).

Owing to the decades-long separation of East and West Germany which were reunified in 1990, great disparities have prevailed in individuals' norms and attitudes towards maternal employment and use of childcare institutions. To illustrate this, Figure 1.1 shows that while people's agreement with the statement "A pre-school child is likely to suffer if his or her mother works" has substantially decreased from 1994 to 2012 in both parts of the country, respondents in East Germany continue to hold substantially less traditional views as compared to those in West Germany. This is mirrored by persisting differences in the share of children below three years of age in day-care, which in 2015 was 52 percent in the East and about 28 percent in the West, respectively (Figure 1.2). As opposed to this, day-care attendance rates among children aged three to below six years have converged almost completely.

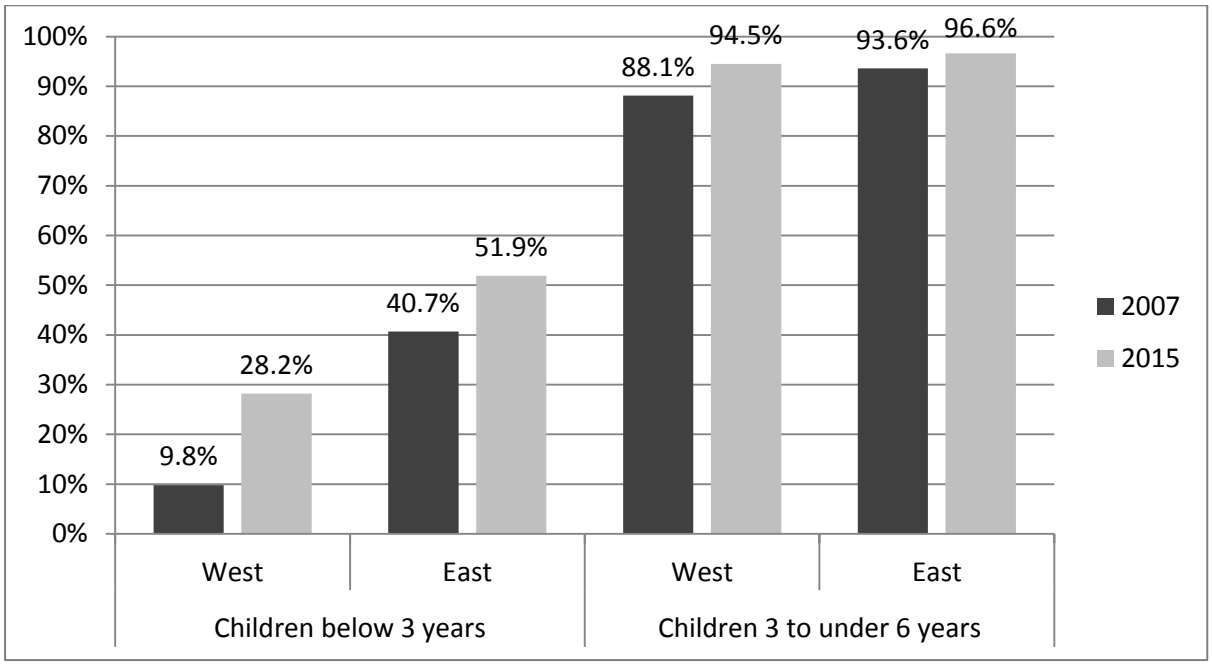
[3] Note that the figures for Germany refer to childcare costs in Hamburg.

Figure 1.1: Share of respondents agreeing with statement "A pre-school child is likely to suffer if his or her mother works"



Note: Case numbers range from 485 to 1126 (West) and from 210 to 569 (East) across years, respectively.
Source: International Social Survey Programme 1994, 2002, and 2012 (ISSP Research Group, 2014).

Figure 1.2: Day-care attendance rates by age group in East (including Berlin) and West Germany



Source: Statistisches Bundesamt (2016).

The following chapters will provide answers as to whether and how differences in cultural beliefs, legal regulations of childcare quality and childcare supply between East and West Germany, federal states and counties matter for parental outcomes of employment and well-

being as well as for children' early educational opportunities. Given the high degree of decentralization in the ECEC system, though, it is crucial to recognize that contextual differences, which may influence families' childcare choices, are not restricted to these rather broad regional entities. Important differences likely prevail at even lower levels, that is, within counties and municipalities. Possible constraining factors relate to the availability (or lack) of ECEC centers and slots in families' immediate environment, or the provided ECEC quality in the surrounding ECEC institutions with respect to both averages and variations. They may furthermore correlate with SES. In line with this, evidence from Brussels suggests a positive association between average family income and availability of funded childcare in a neighborhood. The authors claim that "the main reason for the under-representation of families with low SES and/or ethnic minority families is the unequal availability of provisions" (Vandenbroeck, De Visscher, Van Nuffel, & Ferla, 2008, p. 15). Also, ECEC quality has been found to be lower in disadvantaged neighborhoods in the US (Burchinal et al., 2008; Dupéré, Leventhal, Crosnoe, & Dion, 2010). For Germany, Schober and Spiess (2013) reported substantially higher shares among potentially disadvantaged mothers of under-three-year-old children who indicated lacking availability of spots as a reason for not using formal childcare. In families with migration background and those receiving social assistance, shares were as high as 22 and 31 percent, respectively, while the share was only 16 percent among 'other' families not characterized by any of the considered risk factors.[4]

Even though this latter finding could be the result of 'objective' contextual factors of availability alone, it is more plausible that they interact with parental preferences, information and behaviors (e.g., information seeking), together determining whether a family uses an ECEC center, and if so, which one. Taking Berlin as an example, attendance rates for children under age three in 2013 ranged between 33 (Neukölln) and 52 percent (Pankow) across the 12 districts (Autorengruppe Regionale Bildungsberichterstattung Berlin-Brandenburg, 2013). Attendance was lower in districts with higher values on an index capturing social and health burdens[5], with a strong correlation of above .58 (own calculations). Although in 2013 the entitlement to a day-care place for all children aged one year and older was in principle established, demand for places was and is not yet fully met (Autorengruppe Bildungsberichterstattung, 2016; BMFSJF, 2017), meaning that contextual constraints continue to play a role in parental childcare choices, next to parental preferences

[4] The distance to the next center per se did, however, not seem to be an essential reason.
[5] The index ('Sozialindex I') primarily includes indicators related to unemployment, social assistance, income and health (Senatsverwaltung für Gesundheit und Soziales, 2014).

and information. The example of Berlin is just meant as an illustration of the problem that observed childcare choices are the product of various factors at individual and household level as well as of local provisions and legal conditions.

The issue becomes even more complex with regard to ECEC quality, a multidimensional construct data on which is much scarcer as compared to measures of availability of places. What are contextual and family-level characteristics that matter for choices of ECEC centers of varying quality? As displayed in Table 1.1, in a recent survey in Germany (K^2ID-SOEP extension study; see K^2ID, 2015; Camehl, Schober, & Spiess, 2015) less than nine percent of parents with a child in formal childcare said they had no choice between different ECEC centers. Among those who had a choice, the center's proximity to a family's home was the single most important reason for choosing a center for over 40 percent of parents, while 78 percent considered it one of the five most important reasons. Other frequently mentioned criteria are the equipment with play and learning materials, the pedagogical concept and the center's daily opening hours.

Table 1.1: Parents' reported reasons for choice of ECEC center

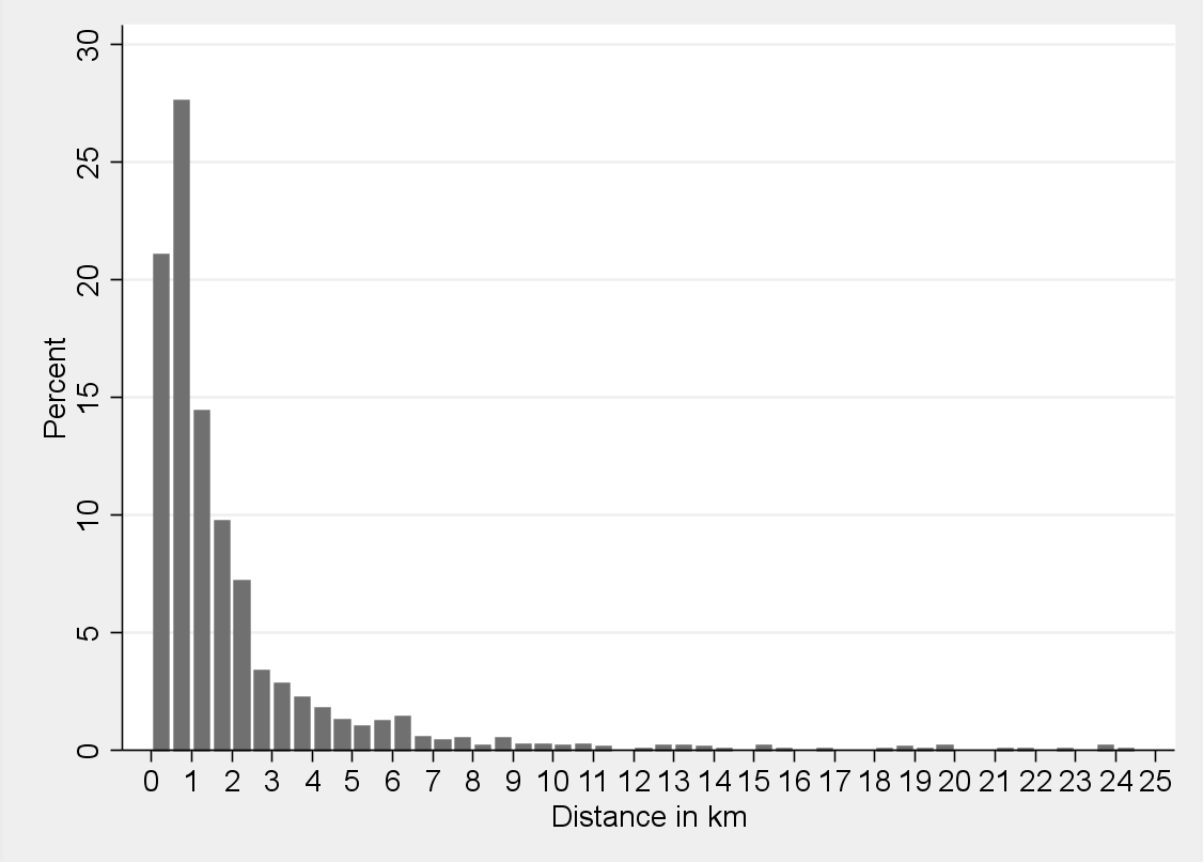
Criterion	**Category**	**Most important reason**		**Any of five reasons**	
		% criterion	**% category**	**% criterion**	**% category**
Proximity to home	Convenience	42.53	65.08	78.33	88.06
Daily opening hours		9.93		53.4	
Older sibling in same center		12.62		36.35	
Group size /child-teacher-ratio	Quality	4.57	23.71	41.16	79.17
Staff qualification		2.49		26.54	
Diversity of staff		0		2.55	
Facilities for play and learning		3.27		58.85	
Pedagogical concept		13.18		54.51	
Possibilities for participation		0.21		7.89	
Recommendation by others	Other	2.58	11.21	27.16	35.73
Did not have a choice		8.63		8.59	
Total		100.00	100.00		
N		795		799	

Note: Results are weighted. Source: 2013 K²ID-SOEP Parent Survey (own calculations).

The findings thus indicate that what is offered in families' close environment is likely to be chosen, which is in line with another study from the South-West of Germany, according to which 46 percent of parents use the center that is closest to their home (Klein et al., 2016). Furthermore, as shown in the histogram in Figure 1.3, most families in the K²ID-SOEP

dataset live within close distance to their ECEC settings.[6] The average distance is about 2.0 km, with a standard deviation of 2.8 km, whereas the median is only about 1.1 km.[7] 90 percent of the children in the sample attend centers that are at most 4.5 km from their home (Table 1.2). By contrast, the parents of less than 2.5 percent of children must travel more than 10 km to drop off their children (and to pick them up later on). These results are based on analyses of geocodes of the ECEC institutions included in the K²ID-SOEP study and of the respective households using these institutions. These households originate from the German Socio-Economic Panel Study (SOEP) (Wagner, Frick, & Schupp, 2007) and from the 'Families in Germany' study (FiD) (Schröder, Siegers, & Spiess, 2013). I calculated shortest distances between these geo-locations using the open source routing engine OSRM ('Open Source Routing Machine'; Luxen & Vetter, 2011), which draws on OpenStreetMap data (OpenStreetMap contributors, 2015).

Figure 1.3: Distribution of distances between households and their respective ECEC institutions in kilometers



Note: N=1627; Results unweighted. Source: SOEP v31 and K²ID-SOEP extension study (own calculations).

[6] Map data copyrighted OpenStreetMap contributors and available from http://www.openstreetmap.org.
[7] The results reported here are unweighted; however, the weighted results do not differ substantially.

Table 1.2: Descriptive statistics on the distance between households and ECEC institutions in kilometers

Mean	SD	Min	P1	P5	P10	P25	P50	P75	P90	P95	P99	Max
1.96	2.82	0	0.06	0.19	0.29	0.57	1.05	2.13	4.48	6.48	15.31	24.02

Note: N=1627; Results unweighted. Source: SOEP v31 and K²ID-SOEP extension study (own calculations).

Klein et al. (2016) have found that parents with low levels of education or German language skills are less likely to choose a (possibly higher-quality) ECEC center other than the one closest to their home as compared to parents with higher levels of education and German language competencies. This finding sorts well with correlations I found in the K²ID-SOEP data: Even after controlling for town size and the federal states families live in, children with medium or high educated main caregivers (as measured by the CASMIN (Comparative Analysis of Social Mobility in Industrial Nations) classification of education) attend centers that are about half a kilometer further away from their home than children with low educated parents (Model 1 in Table 1.3). Likewise, children with migration background and those from poor families use centers that are significantly closer to their home by about 0.5 and nearly 0.9 km, respectively, as compared to children without migration background and children from non-poor families (Models 2 and 3 in Table 1.3).[8] Especially the latter two results are fairly robust and remain statistically significant even after controlling for other socio-economic status characteristic simultaneously (Model 4 in Table 1.3). To what extent this pattern is an expression of higher-SES parents' greater need for ECEC (e.g., due to employment) which leads them to accept longer distances, or whether this is due to more resources (e.g., car ownership) or more pronounced preferences for good-quality ECEC which makes them consider a larger set of alternatives is unknown.

In support of subgroup differences in preferences, additional analyses revealed that even after controlling for a large set of background characteristics including mothers' employment status, parents with college education are about ten percentage points more likely to report aspects relating to pedagogic quality (e.g., child-teacher-ratios, pedagogical concept) as opposed to practical considerations (e.g., proximity, opening hours) as the most important criterion than those with lower levels of education (see Table A-8.1.1 in the general appendix). Klein et al. (2016) further documented that parents without migration background perceive quality as important more often than Turkish parents. In addition, they also found evidence for the former group visiting on average more centers during their search, and

[8] For more details on the operationalization of the socio-economic status variables see chapter 4.7.

knowing more about ECEC in Germany, while the average quality of their closest ECEC institution is significantly higher. Evidence from Belgium adds to this: Vandenbroeck et al. (2008) found highly educated parents to start their childcare search earlier and to make greater use of websites to gather information about care providers as compared to low educated parents. Moreover, families using the dominant languages are more inclined to proceed strategically by subscribing to multiple waiting lists than foreign language families according to their findings.

Table 1.3: Results from linear regressions of the distance to ECEC institution (in kilometers)

	M1	M2	M3	M4
Potentially disadvantaged groups				
Low caregiver educ. (reference) (CASMIN 0-1c)				
Medium caregiver education (CASMIN 2a-2c)	0.52** (0.20)			0.35+ (0.19)
High caregiver education (CASMIN 3a-3b)	0.50** (0.19)			0.25 (0.20)
Child migration background		-0.51** (0.16)		-0.41* (0.16)
Poor household			-0.86*** (0.17)	-0.70*** (0.18)
Constant	2.22	2.85	2.74	2.60
N	1551	1551	1551	1551
R^2	0.05	0.05	0.06	0.06

Note: Results are unweighted; SE clustered (household) / in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: federal state, town size. Source: SOEP v31 and K²ID-SOEP extension study (own calculations).

Now, while this section has as yet paid a great deal of attention to the extent of choice parents have, and how this might relate to characteristics of their residential area, the picture remains incomplete. After all, parents are not the only agents who make decisions for ECEC staff is in charge of admitting or rejecting children whose parents apply for a slot. In the 2014 K²ID-SOEP Institution Survey[9] (K²ID, 2015), directors could indicate criteria based on which they accepted children if the number of applications exceeded places. The most frequently mentioned criteria were that a child 1) had a sibling in the same institution (94 percent), 2) needed a place for social reasons or due to an emergency (78 percent), and 3) had employed parents (77 percent). Especially the third criterion may entail the risk of excluding potentially disadvantaged groups. Further criteria represent possible sources of discrimination that may help more advantaged groups to secure a place in their favored institution, although these criteria were rarely rated as the most important ones: About 55 percent of directors reported

[9] See http://www.k2id.de for details on the surveys the K²ID-SOEP extension study consists of.

using waiting lists, 34 percent mentioned taking into account families' belonging to the same association, company or church community as the institution, and 24 percent relied on conversations with parents and children (own calculations based on weighted data from 401 directors).[10]

In sum, the presented evidence points to socio-economic differences in the factors parents prioritize and which guide their childcare decisions, as well as in their information behavior. Such factors are complemented with admission procedures of childcare providers as well as with contextual aspects related to childcare supply, together determining to a large part the set of alternatives parents can choose from given their high preference for centers that are close to their home.

[10] As compared to the latter two criteria, deploying waiting lists can be regarded as a less overt, possibly unintentional mechanism of discrimination in light of evidence that socio-economic groups differ systematically with respect to using such opportunities (see above).

2 CONVERGENCE OR DIVERGENCE? EDUCATIONAL DISCREPANCIES IN WORK-CARE ARRANGEMENTS OF MOTHERS WITH YOUNG CHILDREN IN GERMANY

Juliane F. Stahl and Pia S. Schober

This study examines how educational differences in work-care patterns among mothers with young children in Germany changed between 1997 and 2013. Since the mid-2000s, Germany has undergone a paradigm shift in parental leave and childcare policies. Our comparative analysis of East and West Germany provides new evidence whether the long-standing gender regime differences interact with recent developments of social class inequalities in the changing family policy context. The analyses include pooled binary and multinomial logistic regressions based on 17,764 observations of 8,604 children below age three from the German Socio-Economic Panel Study. The findings point to growing educational divergence in work-care arrangements in East and West Germany: Employment and day-care use increased more strongly among families with medium and highly educated mothers compared to those with low education. This has critical implications for the latter's economic security. The decline in use of informal childcare options was, however, fairly homogenous.

2.1 Introduction

In Germany, as in other industrialized nations, the durations of women‘s employment breaks after childbirth act as important determinants of subsequent career prospects, short- and long-term returns to employment and their abilities to make provisions for old age (Aisenbrey et al., 2009; Boll, 2011; Ziefle, 2004). Higher educational attainment of mothers predicts earlier labor market returns and greater career continuity in terms of occupational prestige (Drasch, 2013; Grunow et al., 2011). Education has also been found to correlate positively with using both formal (Kreyenfeld & Krapf, 2010; Schober & Spiess, 2013) and informal childcare in Germany (Autorengruppe Bildungsberichterstattung, 2014). Social inequalities in childcare arrangements may in turn affect socio-economic gaps in children’s development, as early attendance of formal childcare has been shown to improve child outcomes and especially so for children from potentially disadvantaged families (Burger, 2010).

This study investigates whether the period between 1997 and 2013 saw an increase or decrease in educational discrepancies in terms of maternal labor market participation and formal and informal childcare arrangements among families with children below age three. Since the mid-2000s, Germany has undergone a paradigm shift in family policy by introducing parental leave and childcare reforms which promote earlier maternal labor market return and entry into formal care of children as well as greater paternal care involvement. While these policies should decrease gender inequality in labor market outcomes, the combination with some policies which support longer labor market interruptions of second earners also carries a risk of raising inequalities between women equipped with varying resources. We explore whether changes in work-care arrangements were more pronounced in West or East Germany, two contexts with persistent variations in cultural acceptance of early maternal employment and formal childcare use. This allows us to provide new evidence on how macro-level changes in family policies and work-care cultures may have influenced trends in educational discrepancies.

This research concentrates on differences in *maternal* employment, as despite recent increases in paternal leave take-up and childcare participation (Schober, 2014b) mothers on average still adjust their employment more than fathers. With respect to social inequalities, mothers’ education has been shown to be a major predictor of female employment, more so than their partner’s education, and in Germany this relationship has grown stronger over time (Vandecasteele & Esche, 2015). Also in terms of child development, mothers’ education is positively associated with providing higher-quality home learning environments (e.g.,

Magnuson, Sexton, Davis-Kean, & Huston, 2009), including greater use of non-formal education activities (e.g., Schober & Spiess, 2013).

2.2 Institutional context

Different work-care cultures in East and West Germany

Profound differences in family policies between East and West Germany before reunification in 1990 have shaped cultural ideals regarding maternal employment and use of formal childcare. In the German Democratic Republic, the strong focus on integrating females in the workforce through short parental leave and extensive provision of formal care for very young children turned early maternal employment into the normative pattern (Rosenfeld, Trappe, & Gornick, 2004). By contrast, the institutional setting in West Germany was characterized by joint taxation for couples, longer and low-paid parental leave entitlements and a lack of state-subsidized childcare services. As a result, the accepted norm was for the mother to take care of her child at home. Accordingly, early maternal employment and the use of formal childcare have constantly been more widely accepted and practiced in East Germany than West Germany. Despite these large regional differences in formal care take-up, informal childcare use has been very similar. In recent years approximately one-third of all children under age three were in regular informal childcare in both East and West Germany, of which by far the greatest share was provided by grandparents (Schober, 2014a).

Paradigm shift in parental leave and childcare policies

During the 1990s, following German reunification, family, tax and labor market policies kept favoring male breadwinner/female carer families. Parental leave periods used to be long but relatively low-paid. Since 1992, each parent in Germany has been entitled to take job-protected leave for the first three years of the child's life. For up to 24 months, parents could receive a means-tested childrearing benefit of up to €300 per month. Since the mid-2000s, the German government has continuously expanded the availability of state-subsidized childcare services for children below three and introduced a major parental leave reform. These reforms explicitly aimed at speeding up maternal labor market return after childbirth, increasing paternal involvement in childcare and stabilizing household income across the transition to parenthood, all of which were thought to also counteract low fertility. Furthermore, the expansion of public childcare aimed at providing formal education opportunities to all children from an early age.

The parental leave reform in 2007 was characterized by a shift to an income-related reimbursement between 65 and 100 percent of net earnings up to a maximum of €1,800 or a minimum of €300 Euros for 12 months. Furthermore, two months of individual leave entitlement were reserved for each parent and were lost if only one parent took the leave. The formal childcare expansion started with the Day-care Expansion Act (Tagesbetreuungsausbaugesetz) in 2005, according to which children under the age of three should be granted a place in childcare when both parents are in employment, education, or employment-integration programs or when the child's welfare otherwise cannot be guaranteed. The 2008 Child and Youth Welfare Act (Kinderförderungsgesetz) stipulated a legal right to a day-care place (including family day-care) for all children aged one year or over from August 1, 2013, irrespective of parental employment status, and expedited the expansion of childcare availability. From 2007 to 2013, day-care attendance rates among children below three increased from 10 to 24 percent in West Germany and from 41 to 52 percent in East Germany, respectively (Statistisches Bundesamt, 2016). Thus, many more slots became available at rather low cost, as the day-care system in Germany is highly subsidized. Parental fees are frequently adjusted to household income or waived altogether for low-income families, or for all children from a certain age.

In the past, the German family policy model has frequently been classified as supported familialism (Hook, 2015; Keck & Saraceno, 2013), which is considered to suppress employment of second earners and reinforce gender inequality. In the context of the new reforms, the German family policy model may however be better described as optional familialism. It combines familialistic support in the form of joint taxation and options of long job-protected leave with defamilialist policies of some shorter but relatively well-paid leave and an entitlement to early formal childcare. In line with Hook's argument (2015), we expect that optional familialism may trigger a widening of class inequalities because families' choices between these alternatives will depend on their resources and preferences. The comparative analysis of East and West Germany provides new evidence whether the long-standing differences in gender regimes and work-care cultures interact with recent developments of social class inequalities.

2.3 Previous research

Previous studies from different countries indicate great variation in the trends in educational differences in work-care patterns. In the UK, between the 1980s and 90s the rates of return to work within one year after childbirth of women from different occupational groups and with

varying qualification converged, possibly due to the greater availability of part-time jobs (Smeaton, 2006). In Austria, especially higher educated women with children below three reduced their labor market participation between 1980 and 2009 (Berghammer, 2014). Investigating the period from 1979 to 2006 in West Germany, Drasch (2013) reports that the positive association between mothers' levels of education and their likelihood of re-entry to the labor market became stronger in the 1990s and 2000s, suggesting further educational divergence. As opposed to this, Grunow et al. (2011) find no indication of increasing educational discrepancies in the timing of mothers' labor market re-entry following childbirth after 1991 up to 2005.

Two studies from Switzerland and West Germany which focus on mothers with dependent children in the household show some divergence in maternal employment. For Switzerland, Liechti (2014) observes increasing educational inequalities in maternal non-employment and part-time work since the 1970s, but finds that this trend has decelerated (medium vs. low education) or reversed slightly (high vs. low education) since the 1990s. Educational discrepancies in full-time employment have remained much smaller and stable, with slight increases only in the period after 2000 between high and low educated mothers. In West Germany, full-time employment of mothers declined least strongly among the highly educated between 1976 and 2004, thus pointing to growing educational differences (Konietzka & Kreyenfeld, 2010).

Turning to childcare, a study by Bainbridge, Meyers, Tanaka and Waldfogel (2005) suggests that for three-year-olds in the US, maternal education was similarly related to enrolment in the periods 1968–1970 and 1998–2000, with inequalities in access peaking between 1978 and 1980. Blanden, Del Bono, McNally and Rabe (2015) report the by far largest increase in formal childcare use among low-income families in the UK from 2001 to 2007. For Germany, however, Kreyenfeld & Krapf (2010) provide first evidence that between 1995 and 2008, educational discrepancies in day-care use grew for children aged four and five but not for children aged two to three years. Among the latter group, the odds of formal care use remained about three times higher for mothers with Abitur as compared to mothers with less schooling.

To-date there is no longitudinal evidence as to whether the relationship of maternal education with informal care use – or with a mixture of care types – has changed over time in Germany as well as other countries. In terms of general trends, studies from the UK show that the use of care by relatives or other informal caregivers by employed parents with a child

under age five rose across the 1990s and 2000s (Bryson, Brewer, Sibieta, & Butt, 2012; Gray, 2005). Also in the Netherlands, grandparental childcare provision grew from 1992 to 2006 (Geurts, Van Tilburg, Poortman, & Dykstra, 2015).

The present study extends the literature by exploring recent trends in educational gaps in maternal employment and care arrangements for children under three years. The analysis focuses on mothers with children below three, for whom reconciling work and family life is particularly challenging, and labor market participation and external childcare use is most controversial. Also, given their strong interrelatedness this study considers employment and childcare patterns jointly. Furthermore, it examines combinations of formal and informal care options, hence mirroring parental childcare decisions more closely than when focusing on a single childcare type.

A few recent studies explore whether the effects of family policies, in particular parental leave and childcare provision, on employment of mothers may vary by their educational qualifications and therefore facilitate convergence or divergence. Based on a cross-sectional comparative study of 24 EU countries, Keck & Saraceno (2013) find that childcare coverage for children under three years correlates somewhat more strongly with employment probabilities of low educated mothers with children aged three to twelve years compared to those with high education. Unexpectedly, they discover no evidence of very short or long parental leave entitlements correlating differently with employment of mothers with varying educational resources. Berghammer (2014) suggests that parental leave extensions may have contributed to the reduction in full-time employment rates of highly educated mothers with children below three years in Austria, resulting in convergence across educational groups. By contrast, after several extensions of low-paid parental leave in a context of worsening labor market conditions in West Germany low educated mothers slowed down their labor market re-entry and reduced their full-time employment more than highly educated mothers leading to divergence (Drasch, 2013; Konietzka & Kreyenfeld, 2010). We extend these studies by observing trends separately for East and West Germany and across the entire 2000s and part of the 2010s, a critical phase due to significant alterations in German family policy. In addition to family policy reforms, this Chapter discusses changes in labor market opportunities, in attitudes towards the articulation of work and family life and in mating patterns and partnership status to better understand how these factors may explain the growing educational divide in work-care arrangements observed.

2.4 Macro-level developments and possible consequences for work-care choices

Frequently economic rational choice perspectives (Becker, 2009; Mincer & Polachek, 1974) are applied to predict how contextual changes in labor market conditions, family policies and mating behavior may affect maternal employment choices. These focus on changes in financial costs and benefits of choosing different alternatives. With respect to choices of maternal work and care arrangements, a large branch of the sociological literature argues that economic explanations are insufficient and changes in how individual identities and social norms are constructed are crucial to consider. The present study therefore complements economic considerations with identity-related perspectives, which assume that as a result of past and present opportunities and institutional constraints, social groups may vary in their ideals or preferences with respect to different combinations of maternal employment and care types for young children.

Family policy reforms

The expansion of highly subsidized day-care with income-dependent fees should make it easier for parents to find affordable day-care places, independent of their resources. In line with this argument, some economic policy evaluation studies found the expansion to cause fairly homogenous short-term effects on mothers' labor supply across socio-economic subgroups (Geyer et al., 2015; Haan & Wrohlich, 2011). The parental leave benefit reform in 2007 made employment breaks for higher-income mothers with children below one year less costly. By contrast, payments were withdrawn in the second year after birth for mothers in low-income families who had been eligible for benefits prior to the reform. Accordingly, groups with higher educational levels and higher household income reduced employment in the first year after childbirth more strongly (Kluve & Schmitz, 2014), whereas especially mothers from lower-income households increased their labor supply in the second year after childbirth (Geyer et al., 2013, 2015). The increase in employment due to the 2007 reform seems to be mainly driven by women in East Germany (Geyer et al., 2013, 2015; Kluve & Tamm, 2013). These results may point to convergence of mothers' work-care choices due to the parental leave reform, especially among mothers in East Germany.

In stark contrast, it has long been argued that higher educational attainment increases mothers' utility of returning to the labor market quickly because of higher opportunity costs of staying at home. Due to their higher human capital, they face higher foregone earnings, greater human capital depreciation, and are more severely hindered from expediting their careers by missing out on job investments at work (Mincer & Polachek, 1974). Furthermore,

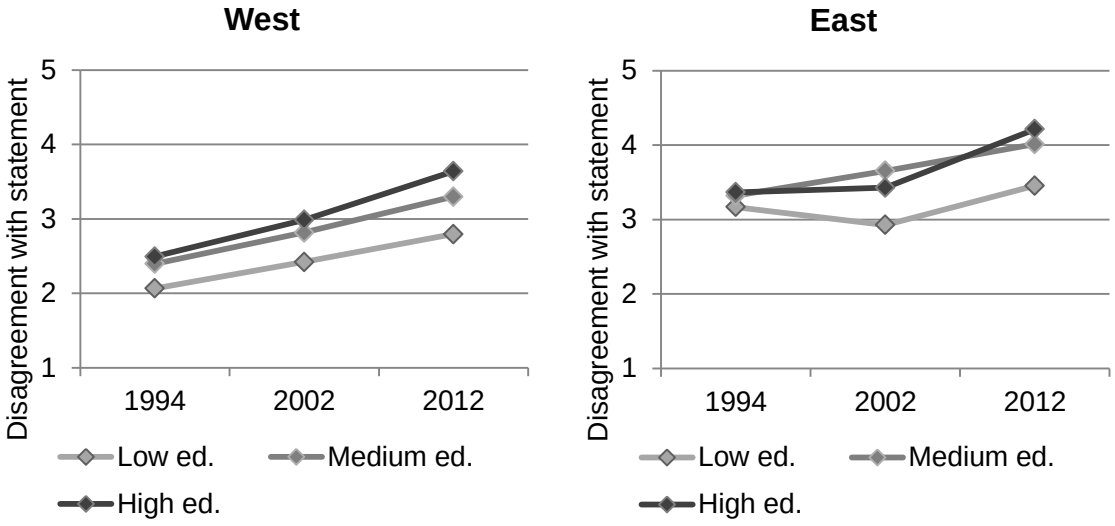
their less traditional identities should render early labor market returns psychologically less costly, and their jobs should entail higher psychological rewards on average (Sjöberg, 2004).

Following this argument, educational differences were previously less visible in behavior because options for childcare for children under three were severely limited in both East and West Germany. They may have unfolded, however, as the monetary and non-monetary costs for day-care use have decreased following the expansion. The fact that children of parents in employment, which positively correlates with education, enjoyed prioritized access to day-care further speaks for growing educational disparities over time. The extinction of now income-dependent parental leave benefits possibly made returning to work after one year appear financially more attractive for more educated, higher-earning women in order to smoothen the income stream. Furthermore, political attempts to shorten mothers' employment breaks were more compatible with higher educated women's orientations. Lastly, the finding that the 2007 reform raised longer term employment rates two to five years after childbirth (Kluve & Schmitz, 2014) mainly among more educated groups may signify diverging rather than converging trends.

Heterogeneous trends in work-care ideals

As preferences and behavior have been shown to reinforce each other (Himmelweit & Sigala, 2004; Schober & Scott, 2012), it seems relevant to examine whether the educational gradient in internalized work-care ideals changed over time. As identities and cultural ideals are complex constructs to measure, we explored education-specific trends in attitudes towards maternal employment in East and West Germany between 1994 and 2012. Figure 2.1 suggests that disagreement with the statement "A pre-school child is likely to suffer if his or her mother works" increased across all educational groups, but more so among more educated respondents. Thus, the educational disparities in disagreement were significantly greater in 2012 than in 1994 in both East (low vs. high: $p<0.01$) and West (low vs. high: $p<.001$; medium vs. high: $p<.05$) (own calculations based on the International Social Survey Program (ISSP Research Group, 2014)). However, no significant changes in educational gaps became apparent concerning the statement "A working mother can establish just as warm and secure a relationship with her children as a mother who does not work". In sum, these results may point to some increase in educational disparities in attitudes towards maternal employment. Some studies suggest that these attitudinal trends may have at least partly been triggered by recent policy reforms (Gangl & Ziefle, 2015; Schober & Zoch, 2015).

Figure 2.1: Mean level of disagreement with statement "A pre-school child is likely to suffer if his or her mother works“ by education, year, and region



Source: ISSP Germany (1994, 2002, 2012), authors' calculations (ISSP Research Group, 2014).

Labor market opportunities

Following German reunification, unemployment increased most drastically for the low educated, from around 15 percent in 1991 to above 25 percent in 1997 and 2005, but decreased thereafter to 20 percent in 2013; these developments were mainly driven by East Germany. In contrast, unemployment among highly educated people has remained rather stable since 1991 (Hausner, Söhnlein, Weber, & Weber, 2015). Thus, while educational gaps in employment probably persisted or increased throughout the 1990s, they lessened after 2005. This convergence in maternal employment, and thus day-care use, should have been greater in East than West Germany.

Mating patterns and single parenthood

Having a highly-educated partner with presumably larger financial resources lowers the incentives for mothers to participate in the labor market themselves (Konietzka & Kreyenfeld, 2010), which is why varying mating patterns could have impacted trends in maternal work-care arrangements. According to Spitzenpfeil and Andreß (2014), while levels of homogamy among West German households remained broadly constant between 1985 and 2011, the share of single households increased and the share of hypergamous households decreased. Changes in the distribution of household types were however mainly owing to the educational expansion leading to higher shares of homogamous households with highly educated partners. As opposed to this, alterations in mating preferences, e.g., the relative risk to be in a homogamous partnership, played a minor role (Spitzenpfeil & Andreß, 2014). This

relative stability renders assortative mating an improbable cause of changes in work-care patterns since the 90s. Moreover, partners' educational resources have been found to matter much less in recent years and in younger cohorts (Konietzka & Kreyenfeld, 2010; Vandecasteele & Esche, 2015). Therefore, this research does not account for fathers' educational level.[11] Rather, the substantial increase in single mothers should have raised educational disparities as single mothers of children under three who are highly educated are more often employed than partnered mothers, while those with less education have similar or lower employment rates (BMAS, 2013, p. 20). To rule out that any changes are merely due to alterations in demographic composition, all analyses control for single motherhood.

2.5 Hypotheses

While recent trends in unemployment point in the direction of convergence in maternal employment and hence formal care use, developments in education-specific gender role attitudes may speak for further divergence. As the consequences of the policy reforms in the 2000s are ambiguous, one can only derive two competing hypotheses. Hence, the period since the mid-2000s may have been characterized by convergence (Hypothesis 1a) or divergence (Hypothesis 1b) in maternal employment and formal care use across educational groups.

Given the highly salient cultural dissimilarities between East and West Germany that have persisted since reunification, we expect smaller divergence or greater convergence between education groups in employment and formal care use in East than West Germany (Hypothesis 2). This is because first, the decrease in unemployment among the low educated since the mid-2000s occurred primarily in East Germany. Second, the parental leave reform in 2007 fostered labor supply in the second year after childbirth especially among women in East Germany. One indication at odds with this hypothesis, however, is the finding of similar increases in educational gaps in attitudes regarding maternal employment in both regions.

Informal care, in particular by relatives, may be used to enable maternal labor market participation but also to promote relationships of grandparents with grandchildren. Accordingly, the data showed weaker correlations of maternal employment with informal care (West: r=.22, East: r=.20) than with formal care use (West: r=.33, East: r=.50). Although informal care use may have been partially substituted with more widely available formal care, variations are likely to be smaller than for maternal employment and day-care use. This is

[11] Note that the conclusions are virtually unchanged when controlling for the educational level of the partner.

especially true for West Germany, where formal care is frequently a half-day service, which may have led to increases in mixed childcare arrangements. Hence, this study predicts changes in educational disparities regarding informal care use to be less pronounced as compared to employment and day-care use (Hypothesis 3).

2.6 Data and method

Sample

The analyses were based on waves 1997 to 2013 of the German Socio-Economic Panel Study (Wagner et al., 2007). From 2010 onwards the sample additionally comprised households from 'Families in Germany', a supplementary study of the SOEP that specifically oversampled families with young children and large, low-income and single-parent families (Schröder et al., 2013). The final sample included 17,764 observations of 8,604 children below three with 6,282 mothers up to age 50. In order to account for nesting of children, the standard errors were clustered at the mother level. Cross-sectional person weights were applied to account for non-response and oversampling.

Method and operationalization of variables

To investigate trends in maternal employment, day-care use and informal care use, this study estimated logistic regression models and examined whether differences between education groups have changed across the observation period 1997 to 2013. Three of the dependent variables were binary, capturing maternal employment and children's formal and informal care use, respectively. Maternal employment comprised full-time and part-time employment. Vocational training was classified as non-working. The variable of formal care use indicated if the child attended center-based or family day-care ('Tagespflege'). Informal care referred to regular care by relatives, friends, neighbors, or paid caregivers in the child's home. Note that this information was only collected from 1997 onwards with gaps in 1998 and 2003. A fourth dependent variable captured all possible combinations of these two childcare types: 1) only parental care, i.e., neither formal nor informal care use; 2) only formal care; 3) only informal care; and 4) a mix of formal and informal care.

The independent variables of main interest were maternal education and period. We distinguished between i) college or university degree (high), ii) vocational training (medium) and iii) no professional education (low). To ensure large enough samples, the observation window was divided into four segments which entered the models in the form of period dummies. The first period (P1: 1997-2001) constituted the pre-reform phase and served as

reference category. The second phase (P2: 2002-2006) covered the initial starting point of the day-care expansion, whose legal basis was established on January 1, 2005 with the Day-care Expansion Act. The third period (P3: 2007-2010) was characterized by the 2007 parental leave reform and further expansions of day-care availability at elevated speed. The expansion continued throughout the fourth period (P4: 2011-2013), with 2013 marking the implementation of the legal entitlement, where the demand of day-care places roughly met the supply.

The multivariate analyses included a small number of control variables to account for compositional changes in family structure over time, linear cohort trends and regional economic development. Binary indicators captured whether the child lived only with the mother in the household (single mother), and if it had a direct or indirect migration background. The number of children up to 16 years in the household and a binary variable signifying if the mother is of median age or older (i.e., 31 years) were included as well. Further, the models controlled for the child's age in years and month decimals including a squared term, and for the mean-centered birth year of the mother. Likewise, we included the centered annual unemployment rate at the county ("Kreis") level drawn from Federal Employment Agency statistics (Regionaldatenbank Deutschland, 2014). Finally, a binary variable indicated if the child lived in East Germany (including Berlin) as opposed to West Germany. Descriptive statistics of all variables included in the analyses are provided in Table A-2.1 in the appendix.

Estimation method

The multivariate analyses consisted of three parts. First, we ran pooled logistic regression models estimating children's probability of a) having a working mother, b) attending day-care and c) receiving informal care separately for East and West Germany (see Table A-2.2 in the appendix). In a second step, we entered interactions between maternal education and period and applied chi²-tests as to whether the educational gaps in work-care arrangement in periods 2 to 4 were significantly different from the educational gap in period 1. Part 3 contained multinomial logistic regressions of different combinations of childcare types, pooling children from East and West Germany due to lower sample sizes.

The main results are displayed as average marginal effects (AMEs) because they provide easily interpretable information on the absolute educational gaps in the expected probability on an additive scale and, unlike odds ratios, do not control for differences between groups in

the baseline odds (Buis, 2010). Odds ratios and relative-risk ratios are, however, available in the appendix.

2.7 Results

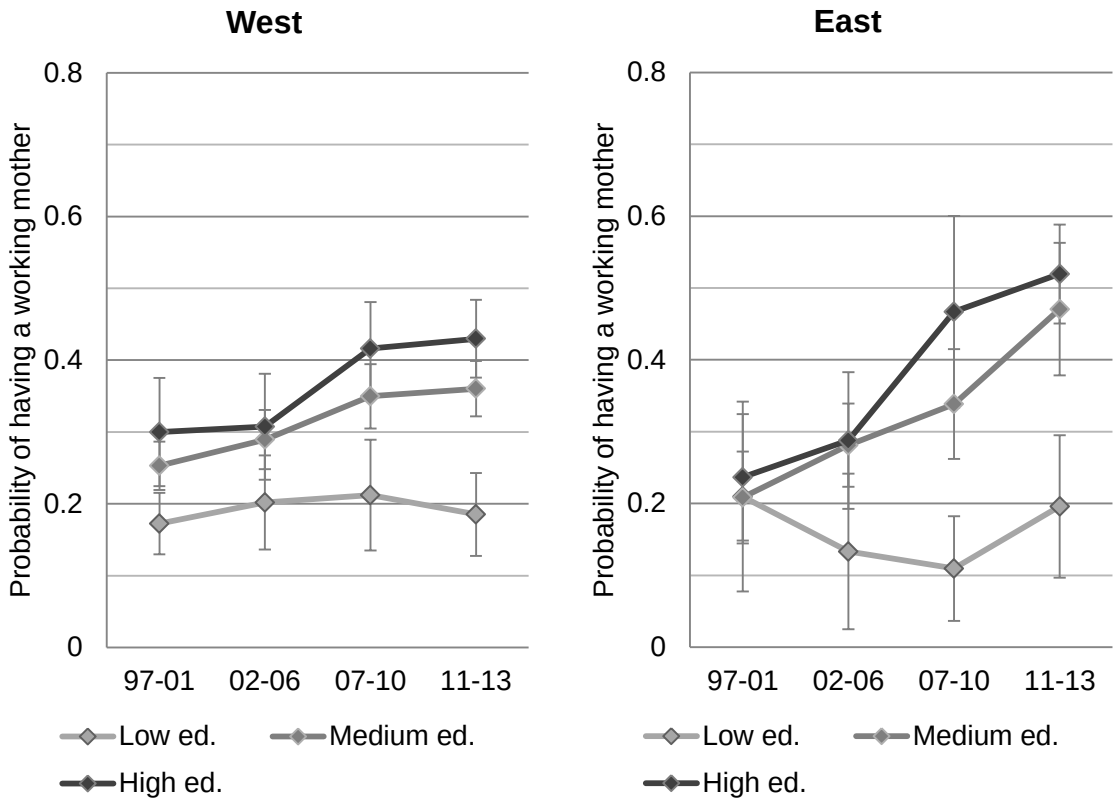
Figures 2.2 to 2.4 display the predicted probabilities of employment and childcare use based on logit models with Education x Period interactions (Table A-2.3 in the appendix). The graphs in Figures 2.2 and 2.3 suggest that among the low educated group labor market participation remained quite stable in the West and dipped temporarily in the East, whereas the probability of day-care use increased particularly in West Germany (P1: 2 percent; P4: 16 percent). Among children with medium and especially high educated mothers pronounced increases were observable for both regions and outcomes. For instance, comparing periods 1 and 4 the probabilities of using day-care changed from six to 21 percent among the medium educated and from 14 to 36 percent among the high educated group in West Germany. Especially from period 3, the educational gaps in employment and day-care use have grown in both regions. The educational differences in employment in East Germany, which were virtually non-existent in the first period, seemingly grew even wider than in West Germany. Given the smaller sample size, however, uncertainty is larger, as indicated by the 95% confidence intervals.

Period-specific average marginal effects of education, including chi²-tests as to whether the educational effect differed significantly in later periods compared to period 1, are shown in Tables 2.1 to 2.3. The difference in maternal employment probabilities between low and high education changed from 13 to 25 percentage points in West Germany (P1 vs. P4); this increase by 12 percentage points was statistically significant ($chi^2(1)= 3.92$, $p<.05$) (Table 2.1). An even stronger, highly significant divergence became visible for East Germany, where the gap changed from three to well above 30 percentage points in periods 3 and 4.

In Table 2.2 the chi²-tests revealed significant differences in the educational gradients in day-care attendance between periods 3 and 4 as opposed to period 1 for both regions. Only in West Germany the increase in educational differences narrowed slightly again in period 4 providing some indication of (re-)convergence. In sum, the results were in line with Hypothesis 1b predicting increasing divergence in maternal employment and day-care use.

We found, however, no evidence backing up Hypothesis 2, which assumed smaller divergence in East than West Germany.[12]

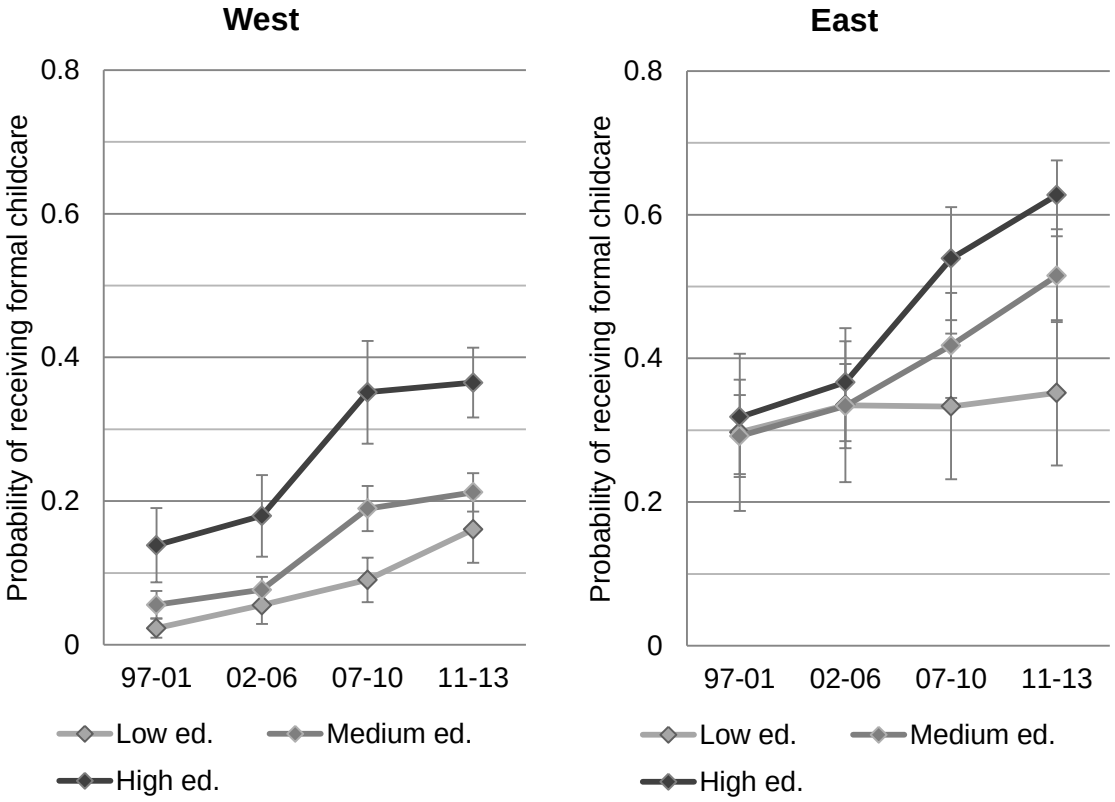
Figure 2.2: Predicted probabilities of mothers' employment by maternal education, period, and region (see Table 2.1)



Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

[12] See Table A-8.2.5 in the appendix for information on how the results in Table 2.2 change after maternal employment, which is substantially correlated with day-care use, is controlled for. Although some of the coefficients are considerably reduced in size, the increase in educational discrepancies remains partially significant.

Figure 2.3: Predicted probabilities of day-care use by maternal education, period, and region (see Table 2.2)



Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table 2.1: Average marginal effects (AMEs) of education on children's probability of having a working mother and chi²-tests of the difference in AMEs between period 1 and subsequent periods (Ref.: High ed.)

	West Germany			East Germany		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
P1 97-01	-0.127**	Ref.		-0.027	Ref.	
	(0.044)			(0.078)		
P2 02-06	-0.105*	0.13	0.72	-0.154*	1.84	0.17
	(0.050)			(0.074)		
P3 07-10	-0.204***	1.24	0.27	-0.357***	8.58	0.00
	(0.052)			(0.079)		
P4 11-13	-0.245***	3.92	0.05	-0.324***	8.34	0.00
	(0.041)			(0.062)		
Joint (df=3)		**6.49**	**0.09**		**10.74**	**0.01**
Med ed.						
P1 97-01	-0.047	Ref.		-0.028	Ref.	
	(0.042)			(0.051)		
P2 02-06	-0.018	0.28	0.60	-0.007	0.11	0.74
	(0.043)			(0.055)		
P3 07-10	-0.066+	0.12	0.73	-0.128+	1.29	0.26
	(0.040)			(0.072)		
P4 11-13	-0.069*	0.18	0.67	-0.049	0.08	0.78
	(0.033)			(0.055)		
Joint (df=3)		**1.17**	**0.76**		**2.01**	**0.57**
N		13679			4085	

Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

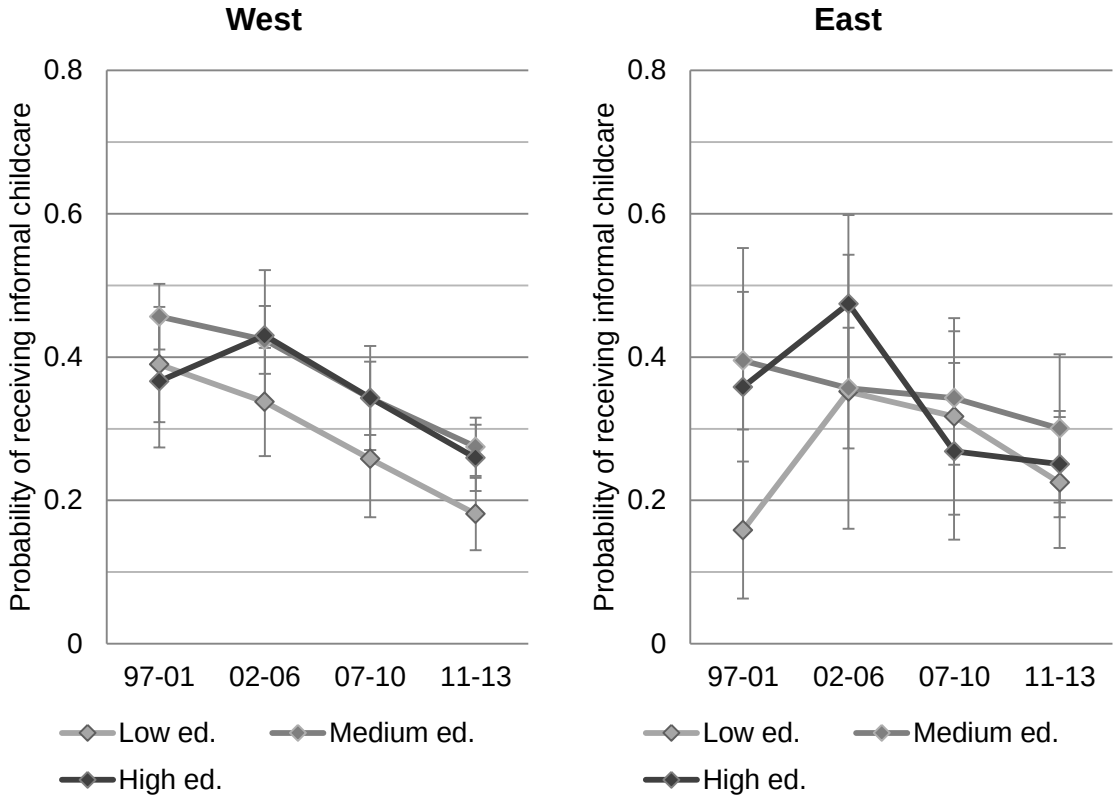
Table 2.2: Average marginal effects (AMEs) of education on children's probability of day-care use and chi²-tests of the difference in AMEs between period 1 and subsequent periods (Ref.: High ed.)

	West Germany			East Germany		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
P1 97-01	-0.115***	Ref.		-0.021	Ref.	
	(0.027)			(0.069)		
P2 02-06	-0.124***	0.05	0.83	-0.032	0.02	0.89
	(0.032)			(0.064)		
P3 07-10	-0.261***	9.44	0.00	-0.206**	4.37	0.04
	(0.040)			(0.066)		
P4 11-13	-0.204***	4.40	0.04	-0.275***	9.27	0.00
	(0.034)			(0.059)		
Joint (df=3)		**12.02**	**0.01**		**13.16**	**0.00**
Med ed.						
P1 97-01	-0.083**	Ref.		-0.027	Ref.	
	(0.028)			(0.047)		
P2 02-06	-0.103***	0.25	0.62	-0.033	0.01	0.91
	(0.031)			(0.045)		
P3 07-10	-0.162***	2.86	0.09	-0.121*	1.92	0.17
	(0.039)			(0.050)		
P4 11-13	-0.153***	3.26	0.07	-0.112**	1.96	0.16
	(0.028)			(0.040)		
Joint (df=3)		**4.69**	**0.20**		**3.43**	**0.33**
N		13610			4061	

Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Figure 2.4 illustrates a strikingly parallel decline of informal care use across education groups in West Germany from period 2 onwards. The probability of informal childcare use dropped from 34 to 18 (low education) and from roughly 42/43 to 27/26 (medium/high education), respectively. However, between periods 1 and 2 informal care use temporarily increased for some groups, peaking among mothers with university degree in both West and East Germany (43/47 percent) and among low educated mothers in the East (35 percent). Still, changes in the educational gaps were mostly not significant (Table 2.3). Overall, patterns of informal care use were more homogeneous across education groups as compared to the other two outcomes, particularly in West Germany, which provided some support for Hypothesis 3.

Figure 2.4: Predicted probabilities of informal childcare use by maternal education, period, and region (see Table 2.3)



Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table 2.3: Average marginal effects (AMEs) of education on children's probability of informal care use and chi²-tests of the difference in AMEs between period 1 and subsequent periods (Ref.: High ed.)

	West Germany			East Germany		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
P1 97-01	0.023	Ref.		-0.199^{+}	Ref.	
	(0.062)			(0.109)		
P2 02-06	-0.093	1.98	0.16	-0.123	0.24	0.62
	(0.061)			(0.117)		
P3 07-10	-0.085	1.76	0.18	0.049	2.92	0.09
	(0.055)			(0.095)		
P4 11-13	-0.078*	2.14	0.14	-0.026	1.97	0.16
	(0.035)			(0.062)		
Joint (df=3)		**2.63**	**0.45**		**3.59**	**0.31**
Med ed.						
P1 97-01	0.090^{+}	Ref.		0.037	Ref.	
	(0.052)			(0.110)		
P2 02-06	-0.006	1.78	0.18	-0.118	1.38	0.24
	(0.052)			(0.078)		
P3 07-10	-0.000	1.76	0.18	0.074	0.08	0.78
	(0.046)			(0.075)		
P4 11-13	0.015	1.55	0.21	0.050	0.01	0.92
	(0.031)			(0.069)		
Joint (df=3)		**2.27**	**0.52**		**4.16**	**0.24**
N		11690			3621	

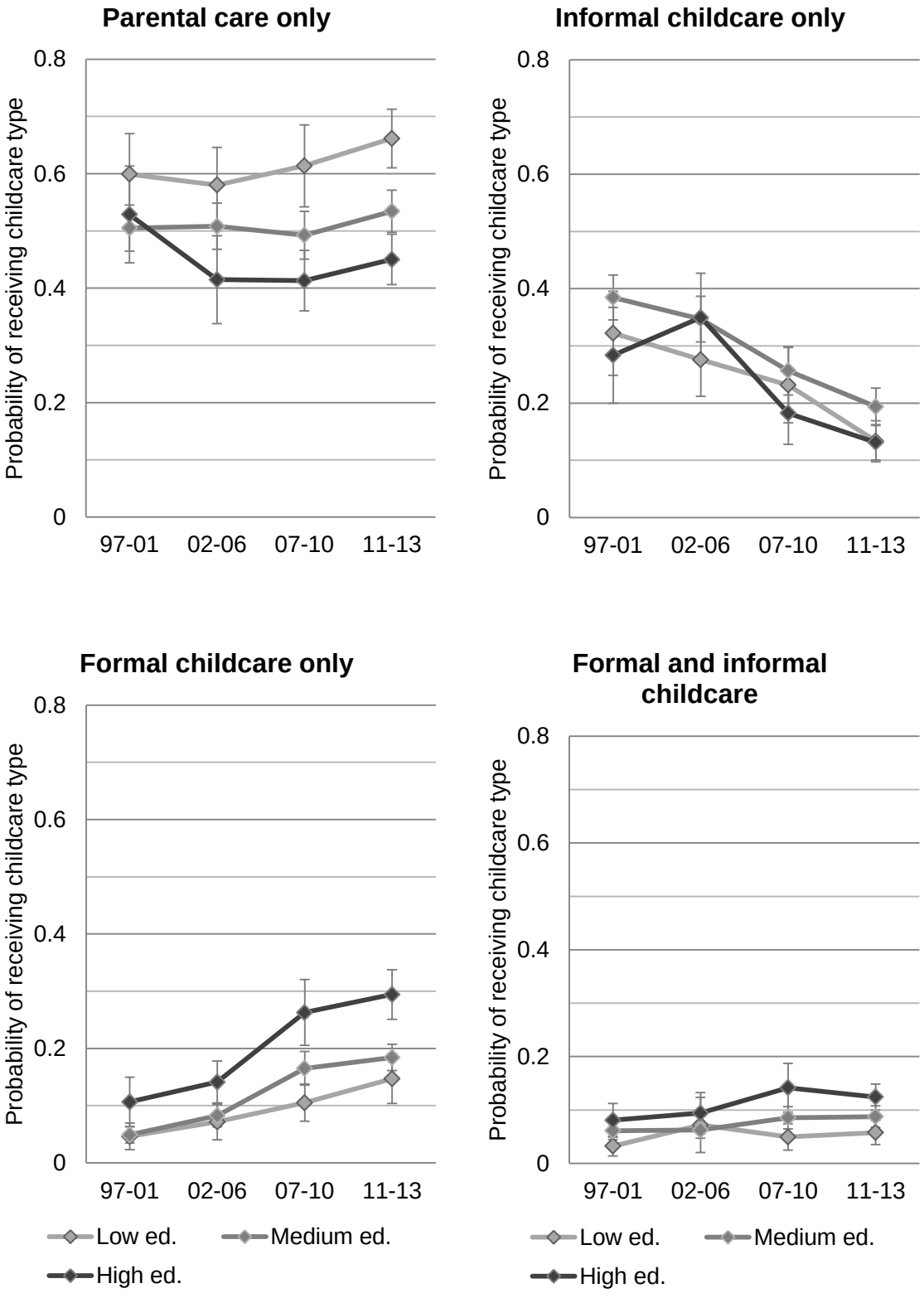
Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

In addition, we investigated trends in how families combined different childcare arrangements using multinomial logit models with Education x Period interactions (Table A-2.4 in the appendix). Figure 2.5 displays children's likelihood of experiencing different combinations of formal and informal childcare. Again, diverging patterns became evident in that use of exclusive parental care decreased for children with high educated mothers (P1: 53; P4: 45) but increased for children with low educated mothers (P1: 60; P4: 66). For children with medium educated mothers, the probability remained stable (P1: 51; P4: 53). Overall, this led to a (partly marginally) significant divergence in probabilities between the high and the low education group in periods 3 and 4, and between the high and medium education group in all subsequent periods compared to the initial phase (see Table 2.4).

The trajectories for exclusive use of informal care and day-care, respectively, resembled earlier findings from the logistic regression models. The share of children experiencing a mixture of childcare types was generally low and increased only slightly with largely

unchanged educational gaps (see Tables A-8.2.1 to A-8.2.4 in the general appendix for all calculated predicted probabilities underlying Figures 2.2 to 2.5).

Figure 2.5: Predicted probabilities of childcare type use by maternal education and period (see Table 2.4)



Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table 2.4: Average marginal effects (AMEs) of education on children's probability of childcare type use and chi²-tests of the difference in AMEs between period 1 and subsequent periods (Ref.: High ed.)

	Parental care only			Informal care only		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
97-01	0.070	Ref.		0.038	Ref.	
	(0.056)			(0.057)		
02-06	0.165**	1.76	0.18	-0.074	2.31	0.13
	(0.051)			(0.051)		
07-10	0.201***	3.47	0.06	0.049	0.02	0.88
	(0.045)			(0.044)		
11-13	0.211***	4.90	0.03	0.002	0.36	0.55
	(0.034)			(0.025)		
Joint (df=3)		**5.19**	**0.16**		**4.64**	**0.20**
Med ed.						
97-01	-0.024	Ref.		0.101*	Ref.	
	(0.047)			(0.047)		
02-06	0.093*	3.43	0.06	-0.003	2.61	0.11
	(0.044)			(0.045)		
07-10	0.079*	3.24	0.07	0.074*	0.21	0.65
	(0.034)			(0.035)		
11-13	0.084**	3.97	0.05	0.062**	0.55	0.46
	(0.027)			(0.023)		
Joint (df=3)		**4.65**	**0.20**		**3.09**	**0.38**
	Day-care only			Day-care and informal care		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
97-01	-0.060*	Ref.		-0.048**	Ref.	
	(0.025)			(0.019)		
02-06	-0.070**	0.07	0.79	-0.022	0.55	0.46
	(0.025)			(0.032)		
07-10	-0.158***	5.70	0.02	-0.092***	1.94	0.16
	(0.034)			(0.026)		
11-13	-0.147***	5.02	0.03	-0.066***	0.56	0.45
	(0.031)			(0.017)		
Joint (df=3)		**9.46**	**0.02**		**3.47**	**0.32**
Med ed.						
97-01	-0.058*	Ref.		-0.020	Ref.	
	(0.023)			(0.018)		
02-06	-0.059**	0.00	0.96	-0.032	0.20	0.65
	(0.020)			(0.021)		
07-10	-0.098**	1.06	0.30	-0.056*	1.44	0.23
	(0.032)			(0.025)		
11-13	-0.110***	2.50	0.11	-0.037*	0.53	0.46
	(0.025)			(0.016)		
Joint (df=3)		**3.62**	**0.30**		**1.48**	**0.69**

Note: N = 15279; Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted, whole sample included. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

2.8 Discussion

Focusing on families with children under three years of age, this study provides evidence that work-care arrangements of mothers with different levels of education diverged between 1997 and 2013, a phase spanning a major paradigm shift in family policy in Germany. Employment and day-care take-up increased most strongly among families with more educated mothers, leading to widening gaps in periods 3 and 4 (2007-2013). These results coincide with and extend previous studies which documented an increase in educational disparities regarding mothers' re-entry and employment behavior until 2006 (Drasch, 2013; Konietzka & Kreyenfeld, 2010), and regarding day-care use among children between four and five years of age (Kreyenfeld & Krapf, 2010).

What is striking about the observed developments in maternal work and day-care use is the growing similarity between East and West Germany. In East Germany, educational discrepancies in attitudes, maternal employment and day-care use had initially been negligible. They only unfolded in the course of the 2000s. Rising unemployment up to 2005 probably contributed to the stable and low or partly decreasing employment rates of less educated mothers. The limited convergence since the mid-2000s, however, conflicts with economic predictions of greater convergence in short-term employment behavior of mothers following the parental leave reform and recent improvements in labor market conditions for the low-skilled in East Germany. The constantly lower job prospects and labor market attachment before and after births may have kept low educated mothers from responding to the new policy incentives by (re-)entering the labor market and using day-care early. This may suggest that in East Germany after reunification diverging labor market opportunities have become more important in shaping preferred and practiced work-care arrangements than previously dominant cultural norms. In West Germany the new incentives of shorter but income-related parental leave benefits in combination with wider availability of formal childcare corresponded better with labor market opportunities and work orientations held by higher educated mothers and made returning to work about one year after childbirth normatively more acceptable. From a macro-structural point of view, the significant shift in the whole family policy package towards a model of optional familialism most likely facilitated the observed increase in educational divides in both East and West Germany despite long-standing cultural differences between the two regions. This finding provides an important contribution and extends previous longitudinal studies which focused just on one cultural context (e.g., Berghammer, 2014; Drasch, 2013; Liechti, 2014). It remains to be seen

whether in the longer term a new class division in work-care culture across the whole of Germany will become more important than the currently still persistent gender inequality in employment as well as East-West differences in the levels of day-care use.

Our and other studies' (Drasch, 2013; Konietzka & Kreyenfeld, 2010) findings on diverging educational trends in East and West Germany contrast with a study from Austria (Berghammer, 2014). To better understand why trends following parental leave extensions varied between the two countries, a promising route may be to investigate more in detail how the effects of the whole family policy packages interacted with labor market opportunities of different educational groups.

Our results show ample decline in informal childcare use, which was, however, fairly homogenous. This decline is at odds with increasing prevalence in the Netherlands and UK (Bryson et al., 2012; Geurts et al., 2015; Gray, 2005). This may be due to higher costs of formal childcare in these countries in comparison to Germany. Overall, the multinomial results indicate that informal childcare was increasingly substituted with exclusive parental care and day-care among the low educated; mainly day-care among the medium educated; and day-care, occasionally combined with informal care, among the high educated.

As a major limitation, the sample size constrained the analyses in several ways. It did not allow us to run separate multinomial logistic regressions for East Germany, to distinguish between full- and part-time employment and varying hours of formal and informal childcare use, and to run additional analyses for women with pre-birth employment. Moreover, the analyses excluded fathers as due to the short leave periods usually taken by fathers variation in paternal employment is barely detectable in the applied framework of analysis.

Despite these limitations, the present study makes an important contribution by showing that the move from a family policy model of supported familialism towards a model of optional familialism (Hook, 2015) in Germany went hand in hand with significant increases in educational inequality in multiple domains of work and family life. It is striking that we find similar trends in East Germany with its previous defamilialist legacy and in West Germany with its strongly familialist history. In both regions, families with medium and highly educated mothers took greater advantage of the new policies than low educated mothers. This trend entails risks of further social exclusion and continued economic insecurity of this latter group. Given that some studies have shown positive effects of early attendance of formal childcare on cognitive development especially for children from

potentially disadvantaged families (Burger, 2010), increasing social disparities in formal care attendance may also hold critical implications for children's social mobility.

2.9 Interim summary and transition

This chapter explored changes in the work-care arrangements chosen by mothers of very young children with varying qualifications across a period that was characterized by significant family policy reforms. Prior to these reforms, the severe lack of childcare places for children below age three constituted a primary constraint for maternal employment. Thanks to the childcare expansion implemented all over Germany starting in the mid-2000s in anticipation of the right to a day-care place for every child aged one year and older, however, this constraint was increasingly relaxed. As the results in Chapter 2 demonstrated, and in line with political goals, the paradigm shift in social policy led to rising labor market participation and formal childcare use among this group of mothers, as well as decreasing reliance on informal childcare options. A more controversial finding is that mothers' behaviors diverged as a function of educational levels, indicating that especially the most educated women benefitted from the reforms in terms of higher employment probabilities and formal childcare use.

Next to promoting female employment, policy makers also aimed at improving families' ability to reconcile work and family responsibilities and thus reducing work-family conflict. Considering all families with children under school age, the perceived level of conflict may not only depend on the availability of places per se; rather, the specific characteristics of the childcare service should matter as well. As shown above, important criteria based on which parents choose a setting include the centers' proximity and opening hours. Chapter 3 concentrates on provisions and use of full-day childcare services, which increased in recent years as well. Did these increases contribute to parents' satisfaction with family life and life overall as intended? Was this the case independent of employment intensity, family resources culturally dominant beliefs, or did certain groups of mothers profit in terms of subjective well-being more so than others? These questions lead the following analyses in Chapter 3. The results suggest that the rise in extended formal childcare was in part positively associated with mothers' – but not fathers' – self-reported satisfaction. However, the observed relationships differed between subgroups: Whereas in East Germany increasing full-day care rates related to higher satisfaction fairly similarly among partnered mothers with varying working hours, in West Germany more heterogeneous associations with provision and use became apparent for different employment groups. Moreover, using full-day care was more

positively linked with satisfaction among lone as compared to partnered mothers. Chapter 3 thus complements the focus on employment and formal childcare use in Chapter 2 with perspectives emphasizing subjective assessments of well-being, which are less often stressed in empirical studies on the association between childcare provision and parental outcomes.

2.10 Appendix

Table A-2.1: Description of sample, West and East Germany separately

Variable	West Germany				East Germany			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Dependent variables								
Maternal employment	0.29	0.45	0	1	0.29	0.46	0	1
Day-care use[1]	0.13	0.33	0	1	0.38	0.49	0	1
Informal care use[2]	0.37	0.48	0	1	0.33	0.47	0	1
Parental care only[3]	0.54	0.50	0	1	0.41	0.49	0	1
Informal care only[3]	0.31	0.46	0	1	0.17	0.37	0	1
Day-care only[3]	0.10	0.29	0	1	0.25	0.44	0	1
Day-care and informal care[3]	0.05	0.23	0	1	0.17	0.37	0	1
Independent variables								
P1: 1997-2001	0.35	0.48	0	1	0.30	0.46	0	1
P2: 2002-2006	0.29	0.45	0	1	0.30	0.46	0	1
P3: 2007-2010	0.21	0.41	0	1	0.23	0.42	0	1
P4: 2011-2013	0.15	0.36	0	1	0.16	0.37	0	1
Low education	0.20	0.40	0	1	0.19	0.39	0	1
Medium education	0.63	0.48	0	1	0.55	0.50	0	1
High education	0.17	0.38	0	1	0.27	0.44	0	1
Single mother	0.06	0.24	0	1	0.15	0.36	0	1
Migration background	0.32	0.47	0	1	0.13	0.34	0	1
Mother's age > median	0.57	0.50	0	1	0.41	0.49	0	1
Mother's birth cohort	1972	6.56	1952	1996	1974	6.74	1955	1995
Child age in years	1.54	0.84	0.00	2.92	1.48	0.85	0.00	2.92
No. children in household	1.81	0.89	1	11	1.79	0.96	1	9
County unemployment rate	8.62	3.18	1.4	25.2	17.06	3.75	4.9	31.4
N	13679				4085			

[1] N = 13610 / 4061; [2] N = 11690 / 3621; 3 N = 11667 / 3612. Note: Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-2.2: Average marginal effects (AMEs) based on logistic regression models without interactions

	Employment		Day-care		Informal care	
	West	East	West	East	West	East
P2: 02-06	0.039^{+}	0.031	0.026*	0.027	-0.054*	-0.019
	(0.021)	(0.036)	(0.010)	(0.032)	(0.027)	(0.062)
P3: 07-10	0.116***	0.091	0.143***	0.088*	-0.147***	-0.109
	(0.027)	(0.058)	(0.017)	(0.041)	(0.033)	(0.071)
P4: 11-13	0.144***	0.170*	0.189***	0.153**	-0.225***	-0.159^{+}
Ref. P1: 97-01	(0.032)	(0.073)	(0.023)	(0.051)	(0.035)	(0.086)
Low education	-0.158***	-0.203***	-0.161***	-0.118**	-0.061^{+}	-0.063
	(0.027)	(0.044)	(0.017)	(0.043)	(0.032)	(0.060)
Medium ed.	-0.050*	-0.051	-0.114***	-0.068*	0.018	0.010
Ref. high ed.	(0.023)	(0.034)	(0.016)	(0.027)	(0.026)	(0.046)
Single mother	-0.059^{+}	-0.058	0.049*	-0.075*	0.024	0.118*
	(0.032)	(0.039)	(0.020)	(0.030)	(0.037)	(0.050)
Migration	-0.037*	-0.057	-0.017	-0.070	-0.081***	-0.094
background	(0.019)	(0.051)	(0.011)	(0.048)	(0.023)	(0.058)
Mother's age	0.019	0.059	0.007	-0.016	0.038	0.052
> median	(0.022)	(0.040)	(0.014)	(0.032)	(0.027)	(0.051)
Mother's birth	-0.004^{+}	-0.000	-0.002	0.003	0.005*	0.008^{+}
cohort	(0.002)	(0.004)	(0.001)	(0.003)	(0.003)	(0.004)
Child age in	0.104***	0.152***	0.105***	0.251***	0.053***	0.066***
years	(0.006)	(0.012)	(0.006)	(0.015)	(0.007)	(0.014)
No. children in	-0.066***	-0.110***	-0.034***	-0.074***	-0.041***	-0.011
household	(0.010)	(0.017)	(0.006)	(0.013)	(0.010)	(0.023)
County unem-	-0.000	-0.003	0.000	0.001	0.001	0.003
ployment rate	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)	(0.006)
N	13679	4085	13610	4061	11690	3621

Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Child age² included; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-2.3: Logistic regressions of maternal employment and childcare types including interactions (odds ratios)

	Employment		Day-care		Informal care	
	West	East	West	East	West	East
P2: 02-06	1.102	1.215	1.438	1.272	1.159	1.251
	(0.283)	(0.409)	(0.498)	(0.455)	(0.337)	(0.644)
P3: 07-10	1.997**	2.926*	4.844***	3.547**	0.740	0.420
	(0.523)	(1.444)	(1.708)	(1.508)	(0.211)	(0.247)
P4: 11-13	2.372**	3.432**	5.946***	6.213***	0.474**	0.363+
Ref. P1: 97-01	(0.629)	(1.562)	(2.041)	(2.773)	(0.131)	(0.211)
Low education	0.462**	0.834	0.128***	0.857	1.108	0.326+
	(0.119)	(0.446)	(0.052)	(0.429)	(0.303)	(0.187)
Medium ed.	0.776	0.828	0.332***	0.824	1.471+	1.178
Ref. high ed.	(0.172)	(0.280)	(0.106)	(0.284)	(0.338)	(0.581)
P2*Low ed.	1.184	0.388	1.800	0.917	0.601	1.799
	(0.420)	(0.274)	(0.894)	(0.540)	(0.217)	(1.354)
P2*Medium ed.	1.175	1.161	1.012	0.944	0.662	0.509
	(0.336)	(0.471)	(0.403)	(0.428)	(0.206)	(0.298)
P3*Low ed.	0.751	0.118**	1.020	0.267*	0.594	3.916+
	(0.295)	(0.092)	(0.501)	(0.170)	(0.228)	(2.899)
P3*Medium ed.	0.945	0.616	1.044	0.499	0.679	1.222
	(0.269)	(0.312)	(0.403)	(0.249)	(0.207)	(0.761)
P4*Low ed.	0.589	0.195*	1.970	0.160**	0.564+	2.651
	(0.204)	(0.136)	(0.907)	(0.096)	(0.191)	(1.752)
P4*Medium ed.	0.934	0.940	1.146	0.501	0.737	1.100
	(0.251)	(0.406)	(0.407)	(0.229)	(0.205)	(0.646)
Single mother	0.716+	0.696	1.661**	0.585*	1.111	1.685*
	(0.138)	(0.184)	(0.310)	(0.128)	(0.185)	(0.363)
Migration	0.814*	0.662	0.820	0.570	0.689***	0.666
background	(0.084)	(0.215)	(0.111)	(0.195)	(0.074)	(0.197)
Mother's age	1.113	1.481	1.079	0.904	1.197	1.265
> median	(0.131)	(0.359)	(0.181)	(0.209)	(0.148)	(0.296)
Mother's birth	0.979+	0.998	0.981	1.020	1.027*	1.043*
cohort	(0.012)	(0.024)	(0.015)	(0.024)	(0.012)	(0.021)
Child age in	1.979***	2.976***	4.868***	11.953***	1.305***	1.396***
years	(0.082)	(0.276)	(0.360)	(1.355)	(0.051)	(0.106)
Child age²	0.740***	0.721***	0.709***	0.357***	0.796***	0.806*
	(0.038)	(0.065)	(0.054)	(0.052)	(0.042)	(0.074)
No. children in	0.700***	0.498***	0.674***	0.582***	0.829***	0.947
household	(0.040)	(0.058)	(0.050)	(0.060)	(0.040)	(0.097)
County unem-	0.999	0.988	1.003	1.010	1.006	1.012
ployment rate	(0.015)	(0.026)	(0.017)	(0.028)	(0.015)	(0.028)
Constant	0.822	1.259	0.209***	1.716	1.123	0.749
	(0.188)	(0.494)	(0.060)	(0.686)	(0.263)	(0.401)
N	13679	4085	13610	4061	11690	3621

Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-2.4: Multinomial logistic regression of childcare type including interactions (relative-risk ratios)

Ref.: Parental care only	Informal care only	Day-care only	Day-care and informal care
P2: 02-06	1.382	1.728	1.380
	(0.433)	(0.584)	(0.558)
P3: 07-10	0.669	4.773***	3.236**
	(0.208)	(1.743)	(1.272)
P4: 11-13	0.413**	5.831***	3.168**
Ref. P1: 97-01	(0.127)	(2.123)	(1.174)
Low education	0.979	0.293**	0.263**
	(0.284)	(0.119)	(0.113)
Medium education	1.414	0.409**	0.663
Ref. high ed.	(0.349)	(0.133)	(0.221)
P2*Low education	0.553	0.959	1.561
	(0.209)	(0.480)	(0.977)
P2*Medium education	0.557+	0.918	0.626
	(0.184)	(0.360)	(0.289)
P3*Low education	0.809	0.515	0.476
	(0.319)	(0.251)	(0.272)
P3*Medium education	0.799	0.914	0.527
	(0.263)	(0.361)	(0.229)
P4*Low education	0.655	0.703	0.700
	(0.236)	(0.330)	(0.346)
P4*Medium education	0.842	0.928	0.630
	(0.260)	(0.341)	(0.241)
Single mother	1.434*	1.081	1.096
	(0.222)	(0.214)	(0.227)
Migration background	0.673***	0.693**	0.486***
	(0.075)	(0.088)	(0.083)
Mother's age > median	1.275+	0.970	1.036
	(0.160)	(0.153)	(0.195)
Mother's birth cohort	1.033**	0.986	1.001
	(0.012)	(0.015)	(0.016)
Child age in years	1.294***	7.548***	9.293***
	(0.053)	(0.682)	(1.119)
Child age²	0.778***	0.468***	0.441***
	(0.042)	(0.039)	(0.054)
No. children in household	0.833***	0.623***	0.582***
	(0.040)	(0.043)	(0.055)
County unemployment rate	1.002	1.013	1.034+
	(0.014)	(0.017)	(0.020)
East Germany	0.655*	5.126***	4.579***
	(0.114)	(0.931)	(1.006)
Constant	1.141	0.301***	0.260***
	(0.287)	(0.093)	(0.086)

Note: N = 15279; Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

3 EXPANSION OF FULL-DAY CHILDCARE AND SUBJECTIVE WELL-BEING OF MOTHERS: INTERDEPENDENCIES WITH CULTURE AND RESOURCES

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This study investigates whether an expansion of state-subsidized full-day childcare may improve the subjective well-being of mothers of children under school age by acting as a boundary-spanning resource to facilitate the combination of employment and childcare responsibilities. It extends previous studies which showed contradictory results by demonstrating that the relationship with parental subjective well-being may vary by local work-care culture and family resources. To this effect, we compare mothers in East and West Germany and mothers with and without a partner in the household, respectively. The empirical analysis links individual-level data from the Socio-Economic Panel for 2007 to 2012 and from the 'Families in Germany'-Study for 2010 to 2012 with administrative records on day-care provision at the county level. We apply fixed-effects panel models to samples of 3,203 families with a youngest child under school age. Our results show that greater provision of full-day care is modestly positively associated with satisfaction with family life and with life overall among partnered mothers in East Germany but not in West Germany. The level of full-day care availability in a county and take-up of full-day childcare, however, moderate the relationship of maternal transitions to long part-time or full-time employment with satisfaction with family life in West Germany. In both East and West Germany, switching to full-day care for the youngest child is more positively associated with satisfaction with family life for lone mothers than for partnered mothers.

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3.1 Introduction

To support increasing aspirations and needs of mothers to pursue a career, maintain financial independence, or contribute to family income, many Western welfare states have introduced policies which facilitate combining formal employment with family care. Among them, state-subsidized day-care services for young children have been expanded massively. Several countries have been criticized for their subsidized provisions of relatively short hours of care, which make a combination with full-time or long part-time work hours difficult (Büchel & Spiess, 2002; Lewis, 2003). A significant gap between attendance rates and full-time equivalent attendance rates for under-three-year-olds can be noted in particular in Anglo-Saxon and German speaking countries, and in the Netherlands (OECD, 2014). For children aged three years to school age, data from West Germany and the US suggest that the discrepancies in some countries can be even greater for this age group, with only 40 and 61 percent of enrolled children, respectively, attending full-day care in 2012 (National Center for Education Statistics, 2013; Statistische Ämter des Bundes und der Länder, 2013).

Previous studies have assumed that day-care availability should promote parental well-being by providing greater choice between different combinations of formal employment and family care but empirical findings have been contradictory. In this paper, we investigate whether expanding hours of day-care provisions have improved German mothers' satisfaction by facilitating reconciliation of employment and family care. Germany provides an interesting case to study these relationships. Starting with two reforms in 2005 and 2008, the provision and use of day-care services - in terms of places as well as opening hours - for young children has expanded massively. We develop theoretical arguments and present empirical evidence that the effect on parental subjective well-being depends on local work-care cultures and family resources. We exploit variation in day-care provision at the county level between 2007 and 2012 and compare effects in different cultural contexts of East and West Germany and across family forms of partnered and lone mothers.

3.2 Previous studies

A number of cross-sectional international comparisons examined whether greater day-care availability may offset negative associations of longer work hours with subjective well-being of parents, either by providing greater time flexibility or by altering social norms. Empirical findings have been contradictory. Treas et al. (2011) showed that full-time employed married

women are less happy than those in part-time jobs or who are not employed, but this difference was smaller in countries with more extensive day-care provision. Some comparative studies also reported evidence that work hours-induced work-family conflict is smaller in countries with more widely available day-care (Stier et al., 2012; Strandh & Nordenmark, 2006), whereas others found no indication of this (Chung, 2011; Steiber, 2009; Van der Lippe, Jager, & Kops, 2006). All of these studies, however, considered only day-care availability for under-threes and few of them relied on large enough country samples to include measures of day-care provision alongside other institutional and cultural controls. Therefore, they are unable to disentangle the influence of policy changes in day-care provision from longer-term cultural influences regarding work and care. Furthermore, they have all been based on cross-sections which limit the possibilities to consider unobserved factors possibly affecting day-care provision and parental work-family conflict perceptions.

A recent Australian longitudinal study found that higher regional availability of center-based childcare correlated negatively with the perceived difficulty of obtaining a day-care place and of finding 'good quality' childcare, and positively with mothers' satisfaction with the amount of free time available (Yamauchi, 2010). This study, however, failed to control for other period influences. The most rigorous studies available consist of longitudinal evaluations of the introduction of universal day-care subsidies in Quebec in 1997. Interestingly, they found adverse effects on life satisfaction, paternal self-reported health, maternal depression, work-family conflict, and relationship satisfaction (Baker, Gruber, & Milligan, 2008; Brodeur & Connolly, 2012). Among low income and highly educated parents, the reform had positive effects on parental life satisfaction, whereas the relationship was negative among middle income families (Brodeur & Connolly, 2012). These studies however have not investigated possible explanations for how day-care availability may improve parental well-being, and why results may vary across contexts and population groups.

In this study, we extend the literature by investigating the impact of expansions of full-day care services on maternal subjective well-being. We consider the intensity of provision and take-up rather than mere attendance. We describe several theoretical mechanisms which may explain heterogeneous associations. In particular, we examine the relevance of cultures of maternal employment and using day-care for young children as moderating factors by comparing the effects across East and West Germany. Furthermore, we investigate whether the importance of day-care availability for maternal well-being may depend on family

resources, in particular the presence or absence of a partner. Adopting a life course perspective, we focus on parents with children under school age for whom work-family balance issues and recent reforms are directly relevant. By following and observing parents and their subjective well-being as day-care services expanded in East and West Germany over several years, we are able to overcome several methodological shortcomings of most previous studies.

3.3 Institutional and cultural context

Early childhood policies

Parental leave periods used to be long but relatively low-paid. Since 1992, each parent in Germany has been entitled to take job-protected leave for the first three years of the child's life. For up to 24 months, parents could receive a means-tested childrearing benefit of up to €300 per month. However, recent reforms in Germany indicate a paradigm shift in family policies which aimed at improving work-family balance, speeding up maternal labor market return, and increasing paternal childcare involvement. In 2007, the German government introduced an income-related parental leave benefit of twelve months and an individual 'use-it-or-lose-it' entitlement of two months of leave benefit for each parent (for more details see Deutscher Bundestag, 2008). Depending on previous income, the compensation rate varies between 65 and 100 percent and is capped at €1800. Since a reform in 2008, in principle all parents, also single parents, can be expected to be employed or looking for work once the youngest child turned three years (OECD, 2011).

Since 1996, all children aged three years to school age have been entitled to a half-day slot in day-care, whereas availability for children under three years has been traditionally very low, especially in West Germany (Spiess, 2008). Day-care services are understood to include all forms of state-subsidized and regulated forms of group care for children under school age, including mostly day-care centers and to a lesser extent family day-care. From age three, over 93 and 96 % of children attended day-care in West and East Germany, respectively, in 2012 (Statistisches Bundesamt, 2012). Day-care provision for children under three has been expanded since two federal laws in 2005 and 2008 provided extra funding, granted prioritized access for children with parents in employment or education, and stipulated a legal right to a day-care place for all children aged one year or over from August 2013. The attendance rates for children under three years subsequently increased from 8 to 24 percent in West Germany and from 40 to 50 percent in East Germany between 2006 and 2012 (Statistisches

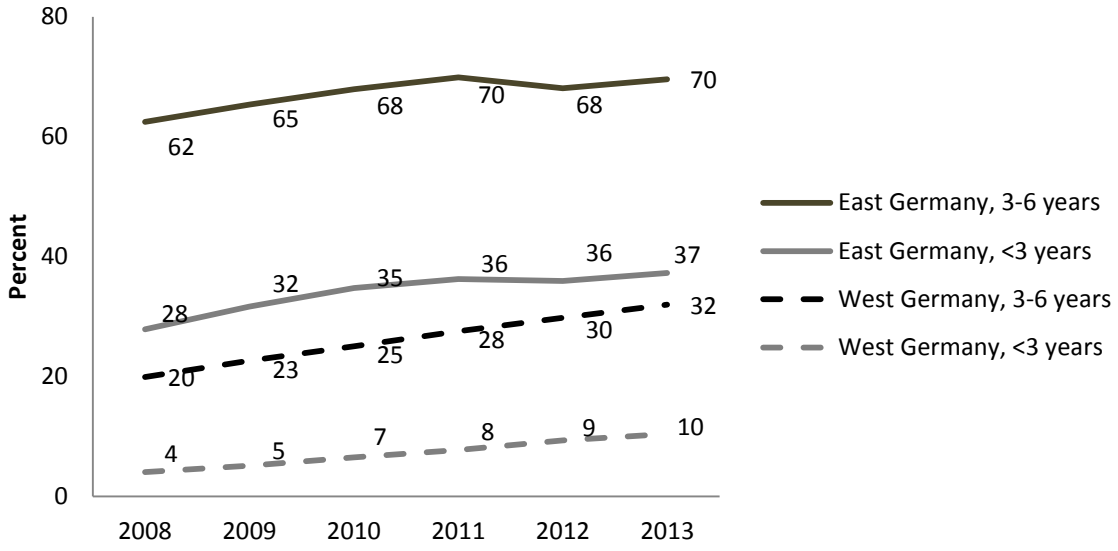
Bundesamt, 2012). Some federal states and municipalities stipulated that certain groups, such as lone parents, should be granted prioritized access (Spiess, Berger, & Groh-Samberg, 2008).

The 'Kinderförderungsgesetz' in 2008 mentioned that parental hours of employment or education, commuting times, labor market integration programs and other social reasons related to child or family welfare are to be taken into account in determining the hours of need for children under the age of three. This law also stipulated that youth welfare office districts should aim at providing a need-oriented supply of full-day places in day-care institutions for all children from the age of three. Between 2008 and 2013, the percentages of children who were granted a full-day care slot, defined as more than seven hours per weekday, rose continuously for children under and over three years and in East and West Germany. The increases were strongest, from 20 to 32 percent, for children aged three years to school age in West Germany, followed closely by rises of just under 10 percentage points among both age groups in East Germany[13] (see Figure 3.1). These averages mask great regional variation. For both age groups, the rate of full-day care rose by over 20 percent in many counties of Rhineland-Palatine and Hessia. By contrast, very low expansion rates of below 10 percent were observed in Thuringia and in parts of Lower-Saxony and Bavaria (Strunz, 2014, Maps 18 and 24). Reasons for the extension of hours of care probably included demand exceeding actual availability of full-day care slots for children over three in West Germany (Lotte, 2010), increased attention to parental desires for time flexibility, and to the importance of continuity and stability of care for children's welfare (Fuchs-Rechlin, 2011).

In Germany, most day-care services are provided by the non-profit sector or by municipalities (Spiess, 2008). Parents' fees are largely income-dependent and relatively low compared to most other OECD countries (Immervoll & Barber, 2005). On average, parental fees range between €61 and €161 per child and month depending on the child's age and hours of attendance (Müller et al., 2013). Some German states provide free day-care services for children from households with very low income and for all children from a certain age. Due to the low fee levels, costs have been found to be less influential for maternal work-care choices than the restricted availability of day-care (Wrohlich, 2011).

[13] Similar trends can be observed based on survey data from the Socio-Economic Panel.

Figure 3.1: Percentage of children aged under school age who attended state-subsidized day-care institutions in East and West Germany in full-day care (7 hours per day or more), 2008 to 2013



Source: Statistisches Bundesamt, 2013.

Work-care cultures

Before the German reunification in 1990, West German family, tax and labor market policies favored male breadwinner/female carer families. By contrast, policies in the German Democratic Republic encouraged a fast and full-time return to the labor market for mothers by providing shorter maternity leave and widely available state-subsidized day-care for young children (Rosenfeld et al., 2004). These historical differences are still reflected in more conservative attitudes of parents towards maternal employment and using formal day-care for young children in West Germany compared to East Germany. In 2012, almost half of women in West Germany considered family members rather than state or employer institutions as providing the best care for children under school age compared to just under one fifth of women in East Germany (Schober & Stahl, 2014). Over the past two decades, taking relatively long maternal leave followed by part-time return to the labor market has become the predominant arrangement in both parts of Germany. Mothers in East Germany, however, continue to return to their jobs faster and to work longer hours (Keller & Haustein, 2012). We exploit these cultural variations across regions within Germany to investigate whether they moderate the relationship between increasing full-day care availability and subjective well-being of mothers.

3.4 Theoretical framework

We draw on the demands and resources approach toward perceived work-family balance (e.g., Voydanoff, 2005), work-care culture perspectives (Kremer, 2007), and on social production function theory (Ormel, Lindenberg, Steverink, & Verbrugge, 1999) to consider how the expansion of full-day childcare may impact parental subjective well-being. We conceptualize subjective well-being broadly as including domain satisfaction and a global judgement of life satisfaction. Of the two domains work and family, which are expected to be most closely related to work-family reconciliation issues, in our data we can capture only changes over time in satisfaction with family life. Following the demands and resources approach toward perceived work-family balance (Voydanoff, 2005), state-subsidized day-care services can be understood as boundary-spanning resources, which may be used to meet structural or psychological demands in the work or family domain. According to social production function theory (Ormel et al., 1999), individual behavior is determined by the two ultimate goals to maximize one's physical and social well-being. The achievement of these goals relies on progress in a set of intermediate domains including comfort, stimulation, social status, behavioral confirmation, and affection.

The expansion of full-day care availability as a boundary-spanning resource may be expected to improve parental subjective well-being through several mechanisms:

Firstly, by improving the fit between current (or preferred future) work demands and family resources, the expansion of full-day care reduces work-family conflict and improves the ability to achieve well-being-related goals: To improve social well-being, social status can be derived primarily from employment including future career prospects, whereas affection is an important resource frequently gained from family life. Physical well-being relies on both the comfort derived from an intact family life as well as stimulation from employment. The greater availability and take-up of additional day-care resources is assumed to generally increase flexibility of day-care use and to facilitate the reconciliation with existing work demands, especially for mothers who work long part-time or full-time. It may also facilitate congruence of behavior with short-term preferences or longer-term goals by enabling mothers, who wish to do so, to extend their work hours now or make them anticipate this future possibility.

Secondly, the expansion aimed at granting easier access to full-day care for groups with particular need, such as lone parents. Especially this group may use day-care to reduce their

own childcare time in favor of leisure activities which benefit physical and social well-being. We would therefore expect a positive association with subjective well-being, irrespective of employment status.

Thirdly, through behavioral confirmation, comparisons with other mothers who adjust their employment and day-care take-up upwards may either increase mothers' satisfaction as the desirable state of (future) full-time employment/day-care take-up appears more feasible, or reduce it if these changes are at odds with individual preferences.

By influencing the desirability of full-time employment and of acceptance of full-day care, local work-care cultures (Kremer, 2007) are likely to moderate the relationship between availability and use of full-day care and parental subjective well-being. In West Germany where until recently the ideal of maternal care for young children has been a dominant social norm, we expect that greater availability and use of state-subsidized full-day care may increase satisfaction mainly for mothers who are full-time employed. By contrast, in a cultural context like East Germany, where long part-time or full-time work hours and using full-day care for young children are widely accepted, we might expect more generally positive effects of the day-care expansion on subjective well-being of partnered mothers. This may vary less strongly by employment status, as also non-employed mothers and those working short part-time hours may plan future full-time employment. Alternatively, one may expect greater increases in satisfaction as day-care availability expands in West Germany, where the level of provision has been much lower and excess demand has probably been greater than in East Germany.

Hypothesis 1a: Greater availability and use of full-day care services is positively related to changes in subjective well-being only for full-time employed mothers in West Germany, whereas the relationship is positive for all mothers in East Germany.

Hypothesis 1b: Greater availability and use of full-day care services is more positively related to subjective well-being in West than East Germany.

Furthermore, we expect that the absence or presence of a partner as an important resource in the family domain moderates the relationship between day-care availability and parental satisfaction. Extended day-care support may be particularly important for lone mothers to facilitate reconciliation with existing work demands but also to reduce the burden of childcare responsibilities irrespective of work demands. Lone parents have received special

attention in recent day-care legislations and their eligibility for day-care support has been less closely linked to their employment than for partnered mothers.

Hypothesis 2: In both parts of Germany the greater availability and use of full-day care is more positively related to changes in satisfaction of lone mothers compared to mothers with partners in the household.

3.5 Data and method

We draw on the German Socio-economic Panel Study, a longitudinal dataset representative of German households (Wagner et al., 2007), and an extension study called 'Families in Germany'. The latter dataset provides panel information on large birth cohorts of very young children and is representative of the population of German families with children born between January 2007 and March 2010 (Schröder et al., 2013). In addition, the FiD oversample of parents with particular needs is used for the analyses of single mothers. We match the individual level data of the SOEP waves 2007 to 2012 and of the FiD waves 2010 to 2012 with annual youth welfare office statistics on day-care provision at the county level.

In our multivariate analyses, we apply fixed-effects panel models[14] to control for any unobserved time-invariant characteristics (Allison, 2009). Probable candidates of such characteristics are for instance personal work and family orientations, gender role identities, occupational and industry characteristics, as well as individual-specific response tendencies with respect to subjective well-being. To explore heterogeneity between groups varying in family resources and cultures, we run separate models for mothers who are resident in East versus West Germany and by partnership status, respectively.

We restrict our sample to mothers living with at least one child under school age (mostly age six in Germany) and use an unbalanced panel of mothers observed at least twice between 2007 and 2012. For 3 and 11 percent of mothers, respectively, some items were missing for their own and their partners' characteristics. The final samples consist of 2,612 mothers in couples and 591 single mothers.

Operationalization of the dependent and independent variables

Our dependent variables capture satisfaction with family life and life overall. The wording for the domain satisfaction questions has been 'how satisfied are you today with the following areas of your life?' with one aspect being 'family life'. Furthermore, respondents were asked

[14] A Hausman test comparing random and fixed effects models was conducted and rejected the null hypothesis of no systematic difference, therefore favoring the fixed-effects estimator.

'how satisfied are you with your life, all things considered?'. The answers to both questions have been measured on an 11-point Likert scale ranging from 'completely dissatisfied' to 'completely satisfied'. The variables are treated as continuous and their correlation is strongly positive (r=.49).

A central independent variable is the rate of full-day attendance, which measures in March of any given year the percentage of children in a county who were granted a place in a day-care institution for over seven hours per weekday. We also tested the overall rate of day-care attendance in a county. Both variables are linked to mothers through identifiers of the county the family lived in each respective year. Given that discrete rates are available for children under three and children between three and five years of age, we assign rates to mothers in accordance with the age of their youngest child, while controlling for the child's age in year dummies across all models.

Another key explanatory variable is mothers' employment status. We distinguish five categories: Non-working, part-time work, and full-time work, unemployed, and in education. Full-time employment is defined as working more than 30 hours a week and therefore captures also maternal transitions into relatively long part-time hours.

To investigate the relationship with actual use of day-care, we consider a categorical measure distinguishing between three categories: no use of day-care, half-day use, and more than half-day use. Notably, based on the phrasing of the questions which varied over time, half-day care is understood as only morning or afternoon care or less than five hours per day. Hence, this measure does not mirror exactly the measure of full-day care at the county level.

Separate analyses are conducted for mothers living in East and West Germany and with different relationship status. Relationship status distinguishes between i) married mothers, ii) unmarried mothers who cohabit with their partner, and ii) single women living without a partner. The former two categories are combined to represent partnered mothers.

We consider a number of other variables as potential mediators or to control for other potential confounding factors. Care by relatives is a binary variable signifying if any other relative provides care for the youngest child on a regular basis. Fathers' self-reported childcare and housework hours on a typical weekday represent proxies of informal support available to the mother on a daily basis. We also control for partners' labor force status using the same categories as for maternal employment. We consider the logarithm of the inflation-adjusted equivalized net household income after taxes and transfers to capture access to

economic resources including changes as a result of employment transitions. To reduce the likelihood of reverse causation of changes in well-being leading to changes in labor force status, we control for mothers' self-reported health status. We also consider the age of the youngest child in year dummies and the number of children in the household. Period effects are incorporated in all models using year dummies.

To control for labor market conditions, economic prosperity and public finances, we consider variations in county-level unemployment rates and public expenditure per capita. A dummy is included for changes in the county-level indicators of day-care and economic context due to shifts in county borders which occurred in some counties of four federal states. In the regression models all continuous control variables are mean-centered. We also control for moves across counties. Table 3.1 displays descriptive statistics for the dependent and independent variables.

Table 3.1: Descriptive statistics of dependent and independent variables by mothers' partnership status (pooled 2007 to 2012)

	Partnered mothers		**Lone mothers**	
	Mean	Std. Dev.	Mean	Std. Dev.
Satisfaction with family life	8.41	1.59	7.23	2.38
Satisfaction with life overall	7.67	1.49	6.61	1.86
County full-day care rate	20.93	20.61	31.20	23.33
County day-care rate for under 3s	24.01	14.07	29.99	16.23
Not working	0.42	0.49	0.25	0.44
Part-time work (PTW)	0.40	0.49	0.35	0.48
Full-time work (FTW)	0.12	0.33	0.15	0.35
Mother in education	0.01	0.11	0.02	0.14
Mother unemployed	0.04	0.21	0.23	0.42
Not attending day-care	0.51	0.50	0.31	0.46
Day-care half-day (HDC)	0.21	0.41	0.20	0.40
Day-care full-day (FDC)	0.28	0.45	0.49	0.50
Childcare support by relatives	0.27	0.45	0.36	0.48
Housework hours of father	0.81	0.93		
Childcare hours father	2.48	2.44		
Ln equiv. net household income	7.22	0.44	6.82	0.38
Father not working	0.03	0.18		
Father part-time	0.05	0.23		
Father full-time	0.86	0.35		
Father unemployed	0.05	0.22		
Father in education	0.01	0.07		

Mother poor health	2.26	0.84	2.56	0.98
Cohabiting	0.17	0.37		
Youngest child age 0	0.19	0.39	0.08	0.27
Youngest child age 1	0.22	0.42	0.14	0.35
Youngest child age 2	0.22	0.41	0.18	0.38
Youngest child age 3	0.16	0.36	0.19	0.39
Youngest child age 4	0.11	0.32	0.18	0.38
Youngest child age 5	0.07	0.26	0.15	0.36
Youngest child age 6	0.03	0.18	0.08	0.27
Number of children in household	1.90	0.92	1.79	0.97
Regional unemployment rate	9.22	4.34	10.69	4.66
Municipality expenditure per	272.88	279.19	245.16	284.04
Moved between counties	0.01	0.09	0.01	0.09
County border reform	0.02	0.13	0.02	0.14
Year 2007	0.09	0.28	0.05	0.23
Year 2008	0.10	0.29	0.07	0.26
Year 2009	0.10	0.30	0.07	0.25
Year 2010	0.25	0.44	0.25	0.43
Year 2011	0.25	0.43	0.31	0.46
Year 2012	0.21	0.41	0.25	0.43
Observations	7702		1566	
Number of mothers	2,612		591	

Source: Socio-economic Panel Study 2007-2012 (SOEP v29), Families in Germany 2010-2012 (FiD v3.1).

Analytical strategy

We first estimate baseline models of maternal subjective well-being ($\mathbf{swb_{it}}$) including only the main effect of the regional rate of full-day care use ($\mathbf{c_{ct}}$) and control variables at the individual ($\mathbf{x_{it}}$) and county level ($\mathbf{z_{ct}}$). $\mathbf{u_i}$ denotes the entity-specific intercepts, and $\boldsymbol{\varepsilon_{it}}$ is the error term (see equation 1).

$$swb_{it} = \beta_{1t} + \beta_2 c_{ct} + \beta_3 x_{it} + \beta_4 z_{ct} + u_i + \varepsilon_{it} \qquad \text{[eq.1]}$$

The next two estimation steps involve adding potential mediating variables, such as maternal employment and day-care take-up to the model. In a fourth step, we include an interaction effect between maternal employment status and the regional day-care availability. We furthermore examine whether the mother's actual use of day-care for the youngest child reduces any negative effect of maternal full-time employment as one possible mechanism by interacting maternal employment status with take-up of day-care.

By using fixed effects panel models, we analyze how changes in the day-care context and in work-care arrangements are associated with changes in subjective well-being within the same individuals over time. Therefore, only individuals who experience changes in any of the respective variables are considered in the estimation. Noteworthy, in the estimation of interaction terms, all individuals with variation in either of the two interacted variables are considered. Hence, several interpretations are possible, for instance, for maternal employment interacted with full-day care availability: 1) a change in maternal employment status is differently associated with subjective well-being depending on the (possibly stable) regional level of full-day care provision, or 2) expansions in day-care availability over time may correlate differently with changes in satisfaction among mothers with different (but possibly stable) employment status during the observation period. To clarify the interpretations of the interaction terms, we firstly tested an interaction of maternal employment with a time-invariant within-person mean of full-day care availability over all periods, and secondly estimated models separately for employment subgroups of mothers who did not change employment status. Significant associations in the latter models would provide evidence in support of a direct effect of the day-care expansion on changes in satisfaction. A significant interaction effect with the time-constant average level of day-care availability observed for each person during the observation period may point to unobserved context variation which correlates with day-care availability playing a role, such as social acceptance of maternal employment.

Compared to the baseline models shown in Table A-3.1 in the appendix, the associations with the county full-day care rates hardly changed after including further potential mediators such as maternal employment status and childcare arrangements. Therefore, fixed-effects panel models including these variables are shown in Tables 3.2 and 3.3. Only for satisfaction with family life among partnered mothers in West Germany, two additional modeling steps pointed to significant interaction effects and are therefore also shown. Due to the small samples of lone mother and limited numbers of employment transitions observed, interaction effects cannot be reliably tested for lone mothers and are therefore omitted.

3.6 Results

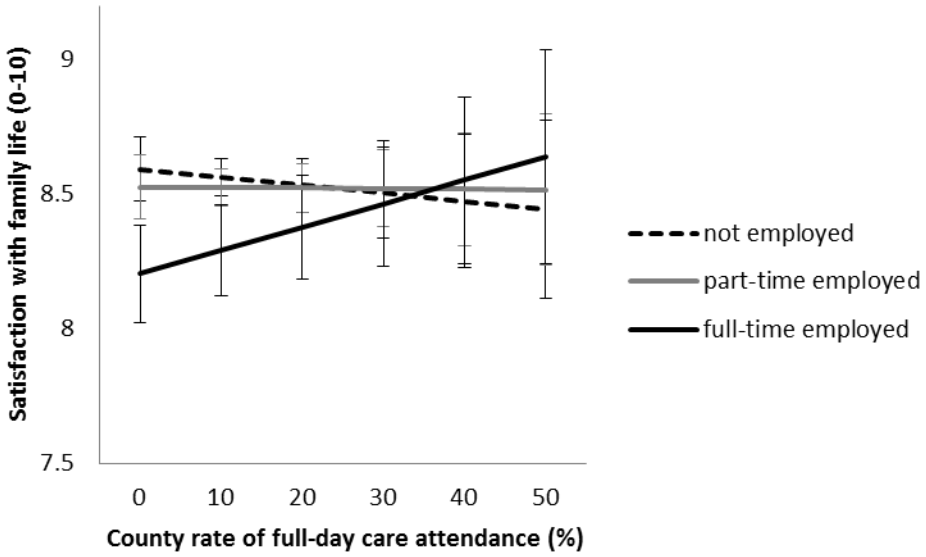
Partnered mothers

For West German mothers in couples, the county rate of full-day care use is not significantly associated with satisfaction with family life in Model 1. However, an interaction term with

maternal employment status in Model 2 is significant. Further tests with county means of the full-day attendance rate over the observation period show a very similar interaction effect. The results indicate that transitioning into (or out of) long part-time or full-time employment is associated with reductions (increases) in maternal satisfaction with family life in counties with limited take-up levels of full-day care below 20 percent, whereas the change is not significantly different from zero otherwise. In the former counties the strength of this association equals a quarter of a standard deviation. For illustration purposes, Figure 3.2 plots predicted values of maternal satisfaction as a function of employment status and regional full-day use of day-care. In separate models for the subgroups of (full-time) employed mothers, satisfaction with family life does not correlate with increased availability of full-day care suggesting that the expansion may not have affected satisfaction directly. We also find a significant interaction effect of maternal employment status with individual use of day-care in Model 3 (see Figure 3.3). Using full-day care partly compensates for an otherwise negative association of full-time employment with maternal satisfaction with family life. However, the difference between full-day and half-day care is not statistically significant. This provides some evidence that greater full-day care availability may benefit full-time working mothers by increasing their probability of using this form of care. By contrast, for non-employed or part-time working mothers, switching to half-day or full-day care (or stopping the take-up) is associated with negative (positive) changes in satisfaction with family life, respectively. The strengths of the associations equal about 9 and 17 percent of a standard deviation, respectively. This may be due to increased (reduced) anxiety about the quality of care. However, the direction of this relationship could also be reverse, as less satisfied mothers may be more likely to start using day-care. Overall, these findings indicate that, if anything, full-day care services may act as a boundary-spanning resource only for full-time employed mothers. The significant regional variation in the association of a transition to full-time work with satisfaction with family life may be due to other differences in local contexts, such as social norms and ideals around maternal employment and childcare, which are likely to correlate with levels of availability of full-day care across West German counties.

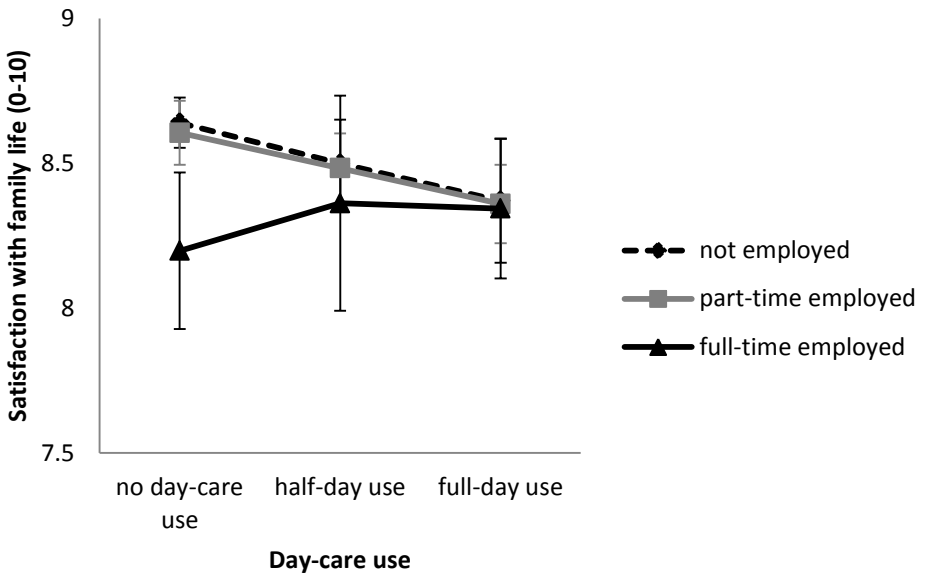
Neither increased availability of full-day care at the county level, nor maternal employment transitions, nor changes in day-care use correlate significantly with life satisfaction of West German mothers in couples.

Figure 3.2: Interaction effect of full-day attendance rate with maternal employment status on satisfaction with family life of West German mothers (based on Model 2 in Table 3.2)



Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics. N=2,022 mothers; n=5,900 observations.

Figure 3.3: Interaction effect of day-care use with maternal employment status on satisfaction with family life of West German mothers (based on Model 3 in Table 3.2)



Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics. N=2,022 mothers; n=5,900 observations.

Table 3.2: Fixed-effects models of satisfaction with different domains for mothers in couples with a child below school age

	West Germany				East Germany	
Satisfaction with..	.. family life- M1	.. family life- M2	.. family life- M3	.life over-all – M1	.. family life – M1	.life overall- M1
County full-day care rate	0.00	-0.00	0.00	-0.00	0.01+	0.01+
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Part-time work (PTW)	-0.04	-0.09	-0.03	-0.02	0.26+	0.15
	(0.06)	(0.06)	(0.07)	(0.05)	(0.16)	(0.14)
Full-time work (FTW)	-0.19	-0.43*	-0.45**	-0.15	0.21	0.48**
	(0.12)	(0.13)	(0.17)	(0.10)	(0.21)	(0.15)
PTW*county full-day care rate		0.00				
		(0.00)				
FTW*county full-day care rate		0.01*				
		(0.01)				
Day-care half-day (HDC)	-0.11+		-0.14	-0.09	0.01	0.11
	(0.06)		(0.09)	(0.06)	(0.17)	(0.16)
Day-care full-day (FDC)	-0.21**		-0.26*	-0.03	-0.04	-0.16
	(0.07)		(0.11)	(0.07)	(0.14)	(0.11)
PTW*HDC			0.02			
			(0.10)			
PTW*FDC			0.02			
			(0.13)			
FTW*HDC			0.32			
			(0.23)			
FTW*FDC			0.42*			
			(0.22)			
Mother in education	0.42*	0.42*	0.45*	0.07	0.18	0.58**
	(0.20)	(0.20)	(0.20)	(0.17)	(0.24)	(0.22)
Mother unemployed	-0.05	-0.05	-0.03	-0.23	0.07	-0.15
	(0.13)	(0.13)	(0.13)	(0.15)	(0.19)	(0.19)
Childcare support by relatives	-0.09	-0.08	-0.09	-0.00	0.04	0.05
	(0.05)	(0.05)	(0.05)	(0.05)	(0.11)	(0.10)
Housework hours of father	-0.01	-0.02	-0.01	0.02	0.10+	0.08+
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Childcare hours father	0.02	0.02+	0.02+	0.03*	0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)
Ln equiv. net household income	0.07	0.05	0.07	0.12	-0.21	0.32+
	(0.13)	(0.13)	(0.13)	(0.11)	(0.19)	(0.18)
Father part-time	-0.07	-0.06	-0.08	-0.10	0.41	-0.17
	(0.20)	(0.20)	(0.20)	(0.16)	(0.33)	(0.26)
Father full-time	-0.03	-0.03	-0.05	0.16	0.20	-0.18
	(0.16)	(0.16)	(0.16)	(0.13)	(0.28)	(0.24)
Father unemployed	-0.15	-0.16	-0.17	-0.38**	0.40	-0.52+
	(0.19)	(0.19)	(0.19)	(0.15)	(0.28)	(0.30)
Father in education	-0.03	0.00	-0.07	0.27	0.57+	-0.22
	(0.24)	(0.23)	(0.24)	(0.42)	(0.33)	(0.46)
Mother poor health	-0.15***	-0.15***	-0.15***	-0.30***	-0.14*	-0.30***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)
Cohabiting	-0.26+	-0.26+	-0.26+	-0.36*	-0.35+	-0.11
	(0.14)	(0.14)	(0.14)	(0.15)	(0.21)	(0.15)
Constant	8.58***	8.60***	8.60***	7.79***	7.99***	7.30***
	(0.19)	(0.19)	(0.19)	(0.17)	(0.36)	(0.30)
Observations	5,900	5,900	5,900	5,900	1,802	1,802
Number of mothers	2,022	2,022	2,022	2,022	590	590
R^2 within/betw./overall	.03/.02/.02	.03/.02/.02	.03/.02/.02	.06/.16/.12	.06/.03/.03	.08/.19/.16

Note: Robust standard errors in parentheses. All models include the following additional control variables: dummies for the age of the youngest child, number of children in household, county unemployment rate, municipality expenditure per capita, move to different county, county border reform, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics.

By contrast, we observe a very different relationship between day-care availability, maternal employment and satisfaction with family life and with life overall in East Germany (last two columns of Table 3.2). An increase in the county full-day care rate is positively associated with maternal satisfaction with family life and with life overall across all employment groups (significant at 10-percent level). The strength of these associations is modest. A 10-percentage point increase in full-day care provision is associated with an increase in satisfaction of around 8 percent of a standard deviation. Transitioning from non-employment into (out of) part-time employment is positively (negatively) associated with changes in satisfaction with family life, whereas a return to (exit from) full-time employment appears to raise (reduce) satisfaction with life overall for mothers in East Germany. The strengths of the associations are moderate with 17 and 31 percent of a standard deviation, respectively. Additional modeling steps including interaction effects and separate models by employment status showed that the increases in subjective well-being following rising full-day care rates were not greater among full-time employed mothers compared to other groups.

Surprisingly, the categorical variable of day-care use and further tests with interactions of maternal employment and day-care use were not statistically significant. One reason may be that our categorical measure of day-care use is inadequate to capture any changes which mainly involve greater flexibility or which occur at more than five hours of care per day, the norm in East Germany. Alternatively, the positive association with the county day-care rate may reflect maternal observations of their social networks and perceptions of greater choice now and in the future rather than actual take-up. We also cannot exclude an influence of all-day school reforms for school-aged children during the same observation period.

Overall, these results provide some support for differences in work-care cultures between East and West Germany moderating the effects of the expansion of full-day care on maternal satisfaction as expected in Hypothesis 1a but not 1b. Additional joint models for the whole sample of partnered mothers with three-way interaction terms between East Germany, county full-day care rate and maternal employment confirm significant differences between East and West Germany in the associations of full-time employment with satisfaction and in the county rate of full-day care for all but full-time employed mothers. East-West differences in

day-care use were not statistically significant. This may be partly due to more dissatisfied mothers in both regions increasing their use of day-care.

Single mothers

We now turn to lone mothers and examine whether the relationship between greater availability and use of full-day care is more positive among single than partnered mothers, as assumed in Hypothesis 2. Looking at the results in Table 3.3, we find no significant associations of the county full-day care rates with satisfaction of lone mothers in either East or West Germany, although the coefficients are of similar magnitude as for partnered mothers. This is likely to be due to the smaller sample size.

For lone mothers in East Germany, a strong positive (negative) association (just under half of standard deviation) of switching to (exiting from) full-day care with satisfaction with family life may be interpreted as some support for Hypothesis 1a assuming a positive effect in East Germany. For West German lone mothers the coefficient is also positive but smaller and does not reach statistical significance. However, additional tests for statistically significant differences between partnered and lone mothers confirm that changes in take-up of more than half-day care are significantly more strongly associated with changes in satisfaction with family life of lone mothers than of partnered mothers in both parts of the country. Since most of these changes actually represent increases in day-care use among non-employed single mothers, these results suggest that lone mothers may mainly use day-care to alleviate pressures in the family sphere rather than to meet work demands.

Increased availability or use of full-day care is not significantly related to lone mothers' life satisfaction. We thus find support for significant differences by partnership status in East and West Germany in line with Hypothesis 2 only with respect to satisfaction with family life.

The control variables show the expected relationships with maternal satisfaction. Improvements in health status, getting married, increased paternal childcare or housework, and transitions to education are positively associated with changes in satisfaction of partnered mothers in one or both domains, whereas partners' unemployment and more children in the household reduce satisfaction with life and with family life, respectively. From birth, satisfaction with both domains decreases until the youngest child is about three years old (coefficients not shown). For lone mothers, health and, only in East Germany, unemployment and household income are significant predictors of satisfaction. Altered public expenditures

per capita correlate with changes in satisfaction with family life for single and partnered mothers in West Germany.

Table 3.3: Fixed-effects models of satisfaction with family life and with life overall of lone mothers with a child under school age in West and East Germany

Satisfaction with….	West Germany		East Germany	
	.. family life	..life overall	.. family life	..life overall
County full-day care rate	-0.01	-0.00	0.01	0.01
	(0.02)	(0.01)	(0.02)	(0.02)
Mother part-time	0.04	0.22	-0.64	0.17
	(0.29)	(0.22)	(0.41)	(0.27)
Mother full-time	-0.11	0.17	-0.83	0.32
	(0.48)	(0.31)	(0.57)	(0.36)
Half-day care	-0.10	0.06	1.02*	-0.02
	(0.25)	(0.24)	(0.48)	(0.34)
Full-day care	0.16	0.02	1.16**	0.15
	(0.26)	(0.21)	(0.38)	(0.28)
Mother in education	-0.39	0.70	0.78	0.32
	(0.56)	(0.57)	(0.71)	(0.47)
Mother unemployed	0.34	0.06	-0.74+	0.03
	(0.29)	(0.22)	(0.40)	(0.25)
Childcare by relatives	0.28	0.06	-0.26	-0.16
	(0.20)	(0.17)	(0.25)	(0.17)
Ln equiv. net household income	0.05	0.38	1.05+	0.38
	(0.31)	(0.26)	(0.57)	(0.33)
Mother poor health	-0.40***	-0.38***	-0.20	-0.63***
	(0.12)	(0.09)	(0.16)	(0.10)
Constant	5.47***	6.08***	7.13***	6.72***
	(0.86)	(0.85)	(0.85)	(0.67)
Observations	948	948	618	618
Number of mothers	371	371	220	220
R^2 within/betw./overall	.06/.06/.06	.06/.04/.04	.08/.02/.04	.15/.22/.18

Note: Robust standard errors in parentheses. All models include the following control variables: dummies for the age of the youngest child, number of children in household, regional unemployment rate, municipality expenditure per capita, move to different county, county border reforms, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics.

Sensitivity analyses

We carried out a number of sensitivity analyses (results available from the authors). We tested all models including interaction effects with the county day-care rate for under-three-year-olds which was not found to be significant. In addition to interactions with day-care provision, we also tested interactions of maternal employment or day-care use with proximity of grandparents or regular childcare support from informal carers. We also examined three-way interactions of maternal employment, the youngest child's age, and the county rate of full-day care or day-care use, respectively. We found very few statistically different relationships in the effects of day-care provision or take-up on maternal satisfaction between

mothers with a child under and over three years of age. In alternative specifications, we excluded families who moved across counties and calculated robust standard errors clustered at the county level. Additional tests showed no differential effects between married and cohabiting mothers and no significant associations with satisfaction with health. Finally, we examined these relationships also for male partners in couples (see Table A-8.3.1 in the general appendix), which showed similar patterns to mothers but no significant associations.[15]

3.7 Discussion

This study set out to explore whether greater availability and use of full-day care as a boundary-spanning resource may impact the subjective well-being of mothers with young children positively by making it easier to meet work or family demands. Our analyses point to heterogeneous effects of availability of full-day care across groups varying in both internalized cultures and access to family resources, which fits with the varied results found in previous studies. In West Germany, we do not find that the expansion of full-day care availability had any effect on maternal satisfaction in the short run. Yet our results point to regional variations within West Germany insofar as taking-up long part-time or full-time employment is negatively associated with satisfaction with family life only in counties with low levels of full-day care use. The latter relationship is similar to the moderating effects identified in a cross-national study of married women by Treas et al. (2011). They however find day-care provision for under-three-year-olds in general to have a moderating effect of full-time employment, whereas we find this in West Germany only for the rate of full-day care use.

East German mothers differ from West German mothers in important ways, which can only be interpreted meaningfully by drawing on work-care culture. Growing prevalence of full-day care has been modestly positively associated with satisfaction with family life and with life overall among partnered mothers in East Germany, irrespective of employment status. Notably, maternal returns to (exits from) long part-time or full-time employment are more positively (negatively) associated with changes in subjective well-being for East German mothers in couples compared to their West German counterparts.

We found some support for partner resources being important moderators of the effect of day-care use on maternal satisfaction with family life in East and West Germany. For lone

[15] In a previous analysis phase, we also ran separate models for mothers with varying educational levels and observed partly significant, opposing associations between the county full-day care rate and satisfaction with life overall but not with family life (see Tables A-8.3.2 and A-8.3.3 in the general appendix).

mothers, taking up (exiting) full-day care appears to relieve (exacerbate) pressures in the family domain more strongly than for partnered mothers.

By using fixed-effects panel models and including a rich set of control variables as well as conducting several sensitivity analyses, we have tried to isolate the observed relationships and describe potential mechanisms. Yet, we cannot control for time-variant unobserved factors, such as the expansion of after-school care, or attitudinal changes which may go along with mothers switching work-care arrangements. Despite these shortcomings, one of the contributions of this study has been to draw attention to the difference between prevalence of any day-care attendance versus full-day attendance. By comparing the different cultural contexts of East and West Germany and mothers with different levels of resources in terms of support from a partner, we also provide a more differentiated analysis of maternal employment transitions and interdependence with contextual day-care support and actual take-up for maternal subjective well-being than previous studies.

As this is one of the first studies considering specifically intensity of care in addition to day-care enrollment rates, future studies for other countries are needed to see to what extent the findings are transferable to other contexts. Ideally, future longitudinal studies should draw on more detailed measures of childcare arrangements, including quality aspects, on direct measures of work-care ideals, and explore relationships with more proximal measures of work-family conflict and other well-being outcomes related to affect and health. Finally, before any policy conclusions can be drawn from this study with respect to further expansions of day-care services in Germany, the consequences of longer hours of care for child development need to be thoroughly assessed, given recent debates about dissatisfying levels of quality in the majority of German day-care centers.

3.8 Interim summary and transition

PART 1 of this dissertation adopted the perspective of parents, answering questions about the possible consequences of recent family policy reforms in Germany – i.e., the expansion of childcare places for children below three years of age, the 2007 parental leave benefit reform, and the increase in provisions of full-day childcare for all children under school age - for maternal employment and parents' subjective well-being. The dissertation thesis indicates that the recent changes partly led to positive developments as intended by politicians, but that they were in some respects also accompanied by (presumably unintended) developments that give reason for concern.

Now, PART 2 shifts attention to the child perspective, tackling questions concerning inequalities in educational opportunity on a socio-economic and a regional dimension. It puts special emphasis on different features of the unique context in which the analyses are embedded, namely the highly subsidized and decentralized ECEC system in Germany. As will be shown in the following two chapters, besides important variations in quality supply in general (e.g., Kuger & Kluczniok, 2008; Tietze et al. 2013), there are systematic socio-economic and regional inequalities in access to, and use of, ECEC services of better or worse quality. The observed patterns partially point to less favorable ECEC choices of low-educated and migrant parents, while less regulated regions and less affluent neighborhoods partially provide lower structural ECEC quality. These findings might be deemed problematic especially in light of research evidence pointing to a compensatory function of ECEC (see Chapter 1): If children from potentially disadvantaged families are exposed to lower ECEC quality than their more advantaged peers, this may interfere with the promoting and compensating functions of ECEC with respect to child development. The results also conflict with the political aim of providing equal living standards independent of families' place of residence.

3.9 Appendix

Table A-3.1: Fixed-effects panel models of satisfaction with different domains for mothers with a child below school age, by partnership status and region (Model 0)

	Partnered mothers				Lone mothers			
	West Germany		East Germany		West Germany		East Germany	
Satisfaction with..	.. family life	.. life overall	.. family life	.. life overall	.. family life	.. life overall	.. family life	.. life overall
County full-day care rate	-0.00	-0.00	0.01+	0.01+	-0.01	-0.00	0.00	0.01
	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)
Father part-time	-0.05	-0.13	0.27	-0.22				
	(0.20)	(0.16)	(0.33)	(0.27)				
Father full-time	-0.05	0.08	-0.01	-0.24				
	(0.15)	(0.12)	(0.26)	(0.24)				
Father unemployed	-0.12	-0.38**	0.35	-0.56+				
	(0.18)	(0.14)	(0.28)	(0.30)				
Father in education	0.02	0.10	0.33	-0.26				
	(0.23)	(0.39)	(0.30)	(0.46)				
Cohabiting	-0.23+	-0.37*	-0.39+	-0.13				
	(0.14)	(0.15)	(0.21)	(0.15)				
Mother poor health	-0.15***	-0.29***	-0.16**	-0.29***	-0.40***	-0.38***	-0.19	-0.63***
	(0.03)	(0.03)	(0.06)	(0.05)	(0.11)	(0.09)	(0.16)	(0.09)
County unemployment rate	-0.01	0.04+	0.00	0.00	-0.06	0.14	0.03	-0.06
	(0.03)	(0.02)	(0.03)	(0.02)	(0.13)	(0.09)	(0.07)	(0.05)
County expenditure per capita	0.00+	0.00	-0.00	-0.00	0.01*	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	8.63***	7.93***	8.36***	7.51***	5.68***	5.95***	6.62***	6.59***
	(0.17)	(0.14)	(0.42)	(0.37)	(0.82)	(0.55)	(0.86)	(0.65)
Observations	5,900	5,900	1,802	1,802	948	948	618	618
Number of mothers	2,022	2,022	590	590	371	371	220	220
R^2 within/betw./overall	.02/.02/.02	.05/.15/.13	.04/.03/.03	.05/.17/.14	.05/.07/.06	.05/.03/.03	.03/.02/.03	.14/.20/.16

Note: Robust standard errors in parentheses. All models include the following additional control variables: dummies for the age of the youngest child, number of children in household, move to different county, county border reform, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics.

4 PARENTAL SOCIO-ECONOMIC STATUS AND CHILDCARE QUALITY: EARLY INEQUALITIES IN EDUCATIONAL OPPORTUNITY?

Juliane F. Stahl, Pia S. Schober and C. Katharina Spiess

This study examines whether children from potentially disadvantaged families attend early childhood education and care centers of lower quality compared to more advantaged children in the universal and strongly state-subsidized ECEC system in Germany. We combine the representative German Socio-Economic Panel with the 2014 K^2ID- SOEP extension study on ECEC quality. We run linear and logistic regression models of 32 quality aspects based on 818 children who attend 749 day-care groups in 647 centers. The findings provide some evidence for social selection which primarily disadvantages children of low educated parents and migrant children on various characteristics of structural and orientation quality. Children from income poor or single parent households experience lower quality on fewer, mostly hardly observable indicators. In conclusion, financial and partner resources may be less critical for families' use of high-quality ECEC than knowledge, preferences, or networks which are stratified by socio-economic status and culture/ethnicity.

4.1 Introduction

With growing labor force participation of mothers with young children in many industrialized countries and increasing acceptance of day-care centers as educational institutions, the percentage of children attending early childhood education and care institutions has risen substantially in many Western countries in recent years. Accordingly, the importance of ECEC attendance for children's education biography and development in various domains has gained increasing attention in numerous disciplines. Studies about the impact of ECEC attendance tend to indicate positive effects on children's development, especially in den domain of cognitive competencies (for literature reviews, see e.g., Burger, 2010; Gormley, Phillips, & Gayer, 2008). An increasing body of research, however, has shown that the effect of ECEC attendance depends on the quality of the interactions and learning environment in these institutions (Anders et al., 2012; Dearing, McCartney, & Taylor, 2009; Keys et al., 2013). It is well established that the use of ECEC institutions is selective in most countries, especially at younger ages (Bainbridge et al., 2005; Liang, Fuller, & Singer, 2000; Schober & Spiess, 2013; Schober & Stahl, 2014). Much less is known about the selectivity of attending ECEC centers with certain characteristics that have been shown to benefit children's development. In this study, we explore whether children from potentially disadvantaged families face less favorable conditions when starting their educational career by attending ECEC centers of lower quality compared to more advantaged children. This study concentrates on potential constraints in terms of time, family budget, knowledge and preferences which may influence parents' opportunities to find a high-quality ECEC institution for their child. In line with definitions in previous studies of early education and care (Schober & Spiess, 2013), we focus on four groups: (1) children with a low educated parent, (2) children with migration background, (3) children from income poor households, and (4) children who live with a lone parent.

The few existing studies on selectivity in terms of ECEC quality mainly have focused on a measure of overall process quality and have been mostly based on regionally restricted subsamples from the United States and Germany (see below). We extend previous studies by drawing on nationally representative data and examining a large set of aspects of structural and orientation quality and ECEC composition, which have been shown to relate to process quality and child development. In addition, we investigate whether the degree of accessible information on ECEC quality moderates any links with parental socio-economic status. Due to near universal ECEC attendance among children aged three years and over, Germany

represents an interesting case, where the question of whether or not to attend an ECEC center has been replaced by the question at which age to enter and which ECEC institution is chosen. The latter question is particularly relevant, as considerable variations in the quality (Tietze et al., 2013) and in the composition (Statistische Ämter des Bundes und der Länder, 2013) of German ECEC centers have been found, while there is no systematic information on the quality of particular centers for the public. At the same time, compared to other countries the ECEC system in Germany has been rather homogeneous in terms of access and costs due to universal state-subsidized provision and low fees for parents. This provides us with the opportunity to test whether parents' use of ECEC institutions with a beneficial learning environment is selective even in a strongly state-subsidized ECEC system. It also allows for contextual comparisons to the childcare market in the United States, which most previous evidence on selection into ECEC quality has been based on.

4.2 Conceptualization of qualitative characteristics of ECEC environments

Regarding the quality of ECEC institutions, the differentiation between structural quality and process quality is well-established (NICHD Early Child Care Research Network, 2002b) but can be complemented with the dimensions of orientation quality and networking with families (e.g., Kluczniok & Roßbach, 2014; Tietze et al., 2013). Following the structure-process model of quality, while each component may impact children and their families separately, process quality mediates or moderates the influences of structural quality, orientation quality and networking with families (Kluczniok & Roßbach, 2014).

Structural quality is usually defined as comprising quantifiable and regulable features of the ECEC context. Whereas many studies find that lower child–staff ratios and higher or more specific teacher qualifications are associated with higher process quality, findings for other structural characteristics such as group size, space per child, availability of materials, and further training or accreditation procedures are more mixed (for a review, see Kuger, Kluczniok, Kaplan, & Rossbach, 2015). In addition, group composition is often considered another important structural quality aspect. Several studies document that a higher average level of peer abilities in an ECEC center is positively associated with children's cognitive and language skills (Henry & Rickman, 2007; Mashburn, Justice, Downer, & Pianta, 2009). In absence of measures of peer abilities, proxy indicators of parental SES and family language are often assumed to capture characteristics linked to peer abilities. Correspondingly, empirical evidence points to negative associations between the percentage of children from less privileged social backgrounds or ethnic minorities in ECEC centers and process quality

(Kuger & Kluczniok, 2008; LoCasale-Crouch et al., 2007; Tietze et al., 2013) as well as children's development (Biedinger et al., 2008; Reid & Ready, 2013; Weiland & Yoshikawa, 2014).[16] Especially low-SES and lower ability children seem to profit from attending ECEC centers that are socially more mixed and serve higher-achieving children (Justice, Petscher, Schatschneider, & Mashburn, 2011; Schechter & Bye, 2007). Possible mechanisms include also indirect effects (Justice et al., 2011; Reid & Ready, 2013), for instance via adaptations of teacher expectations and behavior as a response to the specific composition.

Orientation quality comprises the education- and care-related expectations, attitudes, norms and values of all teachers in ECEC settings. How centers organize their work and assure quality (e.g., pedagogical concept) also falls in this category (Tietze et al., 2013). Orientation quality, in particular perceived responsibility, teacher enthusiasm, and joy and interest in teaching specific activities have been found to correlate with higher instructional quality (Anders & Rossbach, 2015; Kluczniok, Anders, & Ebert, 2011).

Networking with families mainly refers to the cooperation between educators and parents (Anders & Rossbach, 2015; Kluczniok et al., 2011). Several studies have found positive associations of parent involvement in ECEC institutions with children's development (Fantuzzo, McWayne, Perry, & Childs, 2004; OECD, 2006; Zygmunt-Fillwalk, 2011).

Process quality in ECEC institutions includes the entirety of pedagogical interactions with the child, and the child's experience with the social and material environment. Several studies showed that attending ECEC institutions of high process quality positively affects children's development although the effect sizes vary (Anders et al., 2012; Belsky et al., 2007; Dearing et al., 2009; Keys et al., 2013).

4.3 Previous studies on parental choice of qualitative characteristics of ECEC environments

The existing evidence is mixed as to whether children from potentially disadvantaged families attend ECEC institutions of lower process quality. The results depend on how ECE quality and disadvantage are measured, and vary by country context.

Based on data from 10 regions in the US, the NICHD Early Child Care Research Network (1997) did not find a significant association between mothers' education and the process quality of child-care centers. Using data from three US states, Bolger and Scarr (1995)

[16] Composition effects on children's skills were detected even when quality indicators have been considered simultaneously (Henry & Rickman, 2007; Mashburn et al., 2009; Reid & Ready, 2013; Weiland & Yoshikawa, 2014).

detected a significant positive association of parents' years of education and ECEC quality, measured by combining structural features and process characteristics into one factor. Parents' occupational prestige and family income did not show an additional significant effect. Using preschool data from California, Karoly, Ghosh-Dastidar, Zellman, Perlman and Fernyhough (2008) did not find any significant association between the mother's education and different indicators of structural and process characteristics of the ECEC center attended by their child. Based on the same data, Karoly and Gonzalez (2011) found modest differences in so far as children with migration background attended center-based programs of lower average process quality than children of native-born parents.

In the US childcare market, some scholars also observed a curvilinear relationship between family income and the quality of ECEC centers (NICHD Early Child Care Research Network, 1997). Parents with high income could afford costly high-quality centers while poor families were able to profit from special programs for this group so that the "nearly poor" group was worst off. However, this curvilinear relationship was usually only found for some quality indicators, and children from high-income families still received the highest quality of education overall (Dowsett et al., 2008; Phillips, Voram, Kisker, Howes, & Whitebook, 1994).

Regarding composition of children, a few studies have found pronounced differences also in ECEC center composition in terms of social or ethnic composition. Using data on pre-K and Head Start enrollment in the US, Reid, Kagan, Hilton and Potter (2015) reported that most children attend preschools that are segregated by SES and often also by ethnicity.

In the UK in the early 2000s, process quality of ECEC settings attended by children from disadvantaged backgrounds was found to be higher than in settings attended by children from richer backgrounds (Mathers et al., 2007). This was because children from poorer families were more likely to access provision in state-maintained schools, which are staffed by teachers. A more recent study similarly found that children from poorer families were more often in ECEC settings with at least one teacher or early years professional (Gambaro et al., 2015). Yet, process quality characteristics by neighborhood deprivation indicate that ECEC quality is often lower in the most deprived areas (Gambaro et al., 2015).

Based on data from two German federal states, Lehrl et al. (2014) did not find any significant association between the mother's education or the highest occupational prestige in the family and process quality in ECEC institutions. However, they detected that, based on one out of two process quality measures, children with migration background were only about

half as likely to attend a high-quality ECEC center as children without migration background even after considering the social background of the family. Correspondingly, in multivariate analyses Kuger and Kluczniok (2008) observed consistently lower process quality in kindergarten groups with higher rates of migrant children, which at the same time however related to lower group sizes and more favorable child-teacher-ratios in bivariate correlations. Using data from the "National Study of Child-Care in Early Childhood" (German acronym: NUBBEK), Beckh, Mayer, Berkic and Becker-Stoll (2014) reported small bivariate correlations which indicated that children with highly educated mothers and from high-SES families are slightly overrepresented in ECEC centers with high process quality.

Controlling for residential segregation Becker (2010a) showed for South-West Germany that highly educated and native-born parents were less likely to select an ECEC center with a high proportion of children with migration background than low educated parents and those with migration background. Finally, constructing a composite measure of the learning context, Biedinger et al. (2008) found German children to attend preschools of significantly more beneficial social composition as compared to immigrant children. We are not aware of studies investigating social selection into orientation quality or networking with families.

Our study contributes to this literature by drawing on a representative sample of children across Germany and by examining whether there is selective use of ECEC institutions with respect to a wide range of quality aspects including orientation quality and networking with parents, in addition to structural quality. We further explore the importance of non-financial resources by considering potential disadvantages of lone parents and differentiating between ECEC quality aspects in terms of accessibility of information. These may be particularly important in the highly state-subsidized German ECEC system.

4.4 The German ECEC system

In 2015, 33 percent of children under three and 95 percent of children aged three to five years of age attended formal ECEC services in Germany (Statistische Ämter des Bundes und der Länder, 2015). Some German federal states and local authority districts make provision for certain groups such as single mothers in their planning of required slots, and single parents who receive welfare support are to gain prioritized access for their children aged three years and older (Spiess et al., 2008). Parents can generally choose freely between ECEC centers as there are no designated catchment areas. Correspondingly, in a recent survey 91% of parents reported that they had a choice between various centers (see Table 1.1 in Chapter 1.3). When applications exceed places, ECEC center directors reported that they prioritized the oldest

children, those with a sibling in the same institution and children of single or dual-earner parents. Only 7 and 3 percent of institutions, respectively, reported as one of the top three criteria that children were selected based on a waiting list or based on talks with children and parents (own calculations, K^2ID, 2015).

In Germany, ECEC programs are part of the child and youth welfare system. Although the federal government has legislative authority, the states and municipalities are responsible for the implementation and provision, respectively. The financing costs of ECEC centers have been largely covered by municipalities (about 47 percent) and by the state (about 31 percent). Since 2009, the federal level has also contributed a small portion. The rest has been split between providers paying about 5 percent and parents paying on average about 14 percent (Spiess, 2008). For-profit providers play a very limited role, as they receive no or limited subsidies in some German states (Spiess, 2008). Parents' fees are mostly income-dependent (Schröder, Spiess, & Storck, 2015) and relatively low compared to most other OECD countries (Immervoll & Barber, 2005). In 2012 they amounted on average to 144 Euros per month and family (Schröder et al., 2015). In most states, they depend on the number of children, child age, income and whether attendance is half-day or full-day. Parents generally cannot obtain higher quality by paying higher fees.

Minimum standards for structural quality vary considerably across federal states and often fall short of the levels recommended in the targets of the NAEYC Early Childhood Program Standards and Accreditation Criteria (NAEYC 2014) or of the European Commission Childcare Network (1996). Minimum child-teacher-ratios are regulated across all German states but the levels required for different ages vary between states. For instance, for children aged three to five they range from under eight to nearly 20 children per educator (Viernickel et al., 2015). Minimum requirements for most other aspects of structural quality, such as maximum group size, training, and space, range from precise to very general to none at all. Most German states provide additional funding to ethnically / socially disadvantaged areas or to ECEC centers serving (specific shares of) disadvantaged children. The thresholds at which current regulations allocate more resources to ECEC institutions with migrant children vary and can be as high as 40 percent (Hogrebe, 2014). On the whole, due to decentralization, German states and municipalities vary greatly with respect to governance and funding issues as well as quality standards.

4.5 Theoretical framework

To explore the relationship between socio-economic status of families and the quality of the ECEC center attended by the children, we draw on an investment and consumer perspective (Becker & Tomes, 1986; Blau, Ferber, & Winkler, 2002) and combine it with sociological considerations of constrained choices and accommodations (Chaudry, Henly, et al., 2010; Meyers & Jordan, 2006). The basic idea of the investment perspective is that parents aim to maximize their children's economic, social and emotional well-being over the life course by investing in them. Their investment may take various forms, including choosing an external ECEC institution with characteristics of a beneficial learning environment for their child (Becker, 2010b). At the same time, parents face time and budget constraints, as ECEC institutions are usually also used to serve as the best possible substitute for parental care while parents go to work. Therefore, the supply of suitable ECEC institutions is likely to be restricted not only by parental preferences for a high quality of care but also by practical considerations of proximity, costs, and opening hours which match parental work hours. Time and budget constraints will be particularly severe for single parents and financially deprived families.

The economic perspective has been frequently criticized for assuming that i) parents are perfectly informed about the quality of all ECEC institutions, and ii) parents have homogeneous and relatively fixed ex-ante preferences for ECEC characteristics (Chaudry, Henly, et al., 2010; Meyers & Jordan, 2006). The accommodation model seeks to combine a rational action perspective of parents with insights on information asymmetries on the childcare market, and the role of social networks in processing information and making decisions. It suggests that parents adapt their childcare preferences based on context-specific care availability and easily accessible information. Following this model, persistent disparities in the quality of childcare across socio-economic groups may result from childcare preferences and opportunities as well as constraints being distributed unevenly across parents with different resources in terms of education, cultural background, presence of a partner, and family income.

Levels of information

Parents' understanding of the childcare market, how to obtain a place and subsidies, remains limited in some groups, in particular among ethnically and linguistically more isolated groups (Becker, 2010a; Vorsanger, 2005). Several US studies have shown that significant information asymmetries in terms of ECEC quality exist between parents and the care

provider (Cryer & Burchinal, 1997; Helburn & Bergmann, 2002; Mocan, 2007) because it is difficult for parents to observe many qualitative features of childcare and to anticipate the consequences for children's development. Moreover, parents with higher educational attainment were found to rate the quality of their children's classrooms slightly lower and more accurately than less educated parents (Cryer, Tietze, & Wessels, 2002; Mocan, 2007).

In terms of information behavior, low educated families and ethnic minority parents in Belgium began to look for a place in an ECEC center later than those with high education and Belgian parents. Low educated parents also made less use of internet sites providing information about available care providers than high educated parents, regardless of their ethnicity. Families speaking a foreign language at home were found to subscribe less often to multiple waiting lists than families using the dominant languages to enhance their chances of access (Vandenbroeck et al., 2008). In Germany, Turkish parents visited on average fewer centers prior to registration than German parents (Klein et al., 2016).

Preferences and expectations

Previous studies from the US and Belgium provide very mixed evidence as to whether parental education correlates with the importance parents attach to practical considerations (Cryer et al., 2002; Johansen, Leibowitz, & Waite, 1996; Kensinger Rose & Elicker, 2008; Vandenbroeck et al., 2008). Only a few studies found a significant correlation of higher incomes or wage rates with stronger preferences for ECEC quality criteria and less importance attached to practical concerns apart from costs (Johansen et al., 1996; Peyton, Jacobs, O'Brien, & Roy, 2001). In Belgium, ethnic minority parents attached less importance to the quality of the ECEC infrastructure as well as the opening hours of a center than Belgian parents (Vandenbroeck et al., 2008). Descriptive analyses of a German parent survey in 2013 (K^2ID, 2015, own calculations) suggest that when choosing an ECEC center parents with college education were about ten percentage points more likely to report aspects relating to pedagogic quality (e.g., child-teacher-ratios, pedagogical concept) as opposed to practical considerations (e.g., proximity, opening hours) as the most important criterion than those with lower levels of education (see Table A-8.1.1). Still, proximity to home was the most frequently mentioned criterion overall (78 percent; Table 1.1 in Chapter 1.3). Related to this, another recent study has indicated that parents with low levels of education or German language skills are less likely to choose a (possibly higher-quality) ECEC center other than the one closest to their home as compared to parents with higher levels of education and German language competencies (Klein et al., 2016).

Klein et al. (2016) furthermore observed that with rising shares of migrant children in the nearest day-care center, parents with migration background become more likely and native-German parents become less likely to use it. Using the same data, Becker (2010a) showed that increasing shares of children without German nationality in a family's postal code area go along with greater differences in the share of migrant children in the attended day-care center between German and Turkish children. Hence, the relationship of ethnic segregation in the local environment with the day-care center group composition was much more pronounced among Turkish than German families. Among German parents, the higher educated used less segregated centers than the lower educated (Becker, 2010a).

American parents reported that word-of-mouth is the most common method of finding a childcare provider, and it is through personal networks that parents often learn about childcare subsidies (Chaudry, Pedroza, et al., 2010; Kontos, 1995; Pungello & Kurtz-Costes, 1999). In a survey in Germany in 2013, 27 percent of all parents mentioned recommendations by friends or acquaintances as one of the five most important selection criteria for ECEC center choice (Table 1.1 in Chapter 1.3). Given that social networks are presumably stratified by location, race/ethnicity, and other socio-demographic characteristics (Chaudry, 2004), these factors will also shape the recommendations parents receive and subsequently their childcare preferences.

Whereas the present study cannot disentangle the impacts of stratified preferences and knowledge, a major objective is to separate these factors from financial and time resources as measured by household income and partnership status. A further aim is to provide more insights into the importance of migration background net of other socio-economic characteristics of the family. If significant disadvantages remain, this may hint to ethnically/culturally-shaped preferences or networks, language barriers, or lacking knowledge.

Other potential factors influencing ECEC choices

Other potential explanations of parents' ECEC choices, which we cannot fully consider in our data, may comprise skills of the child (e.g., linguistic competence, personality traits) or other child characteristics which parents take into account when choosing a specific center.[17] Moreover, regional characteristics, particularly the local availability of ECEC quality might influence childcare take-up. We control for residential factors as far as possible. We also

[17] Although the SOEP collects child related information on health problems or other developmental problems, this information is not available for all children (it is only available once the mother answered a specific mother-child-questionnaire).

control for mothers' employment, which correlates with SES and may reduce parents' time resources; it might however also increase their motivation or ability to find high-quality ECEC institutions.

Moreover, we cannot entirely rule out that day-care centers discriminate against particular groups which they do not mention in the survey.

4.6 Hypotheses

Following the international evidence on socially stratified preferences and information behavior, we would expect low parental education to be negatively associated with some quality aspects of the chosen ECEC institution (*Hypothesis 1*). Similarly, non-German family background is assumed to be negatively associated with some quality aspects of the chosen ECEC institution (*Hypothesis 2*). Given the relatively low and income-dependent day-care fees for parents in Germany (see section 2), we expect few if any significant disadvantages in ECEC quality for poor households after considering parental education and migration status (*Hypothesis 3*). Single parents most likely have less time resources available to search for high-quality institutions. However, in Germany this group frequently enjoys prioritized access to childcare services and may therefore have more choice compared to couple families. As a result of these contradicting influences, it is a priori unclear whether we would expect a positive, negative or non-significant relationship between single parenthood and ECEC quality.

Given the difficulties in assessing ECEC process quality, we expect potentially disadvantaged groups to experience lower ECEC quality mainly in terms of characteristics which are easy to observe or enquire about for parents (*Hypothesis 4*). These are likely to include most structural characteristics, such as group sizes, indoor and outdoor space, equipment, and group composition. Fewer significant differences are expected for orientation quality, performed activities, and educational qualifications of pedagogic staff, which are difficult to assess for parents.

4.7 Data and method

The analyses are based on a subsample of the German Socio-Economic Panel, the supplementary sample Families in Germany, and an extension study (K²ID-SOEP) which collected further information by parents and ECEC centers. The SOEP is the largest and the longest running multidisciplinary longitudinal study in Germany. In 2013, 24,113 adult members of 14,170 households participated in the study (Wagner et al., 2007). We use the

2013 SOEP wave in conjunction with the 2013 FiD wave. The FiD study specifically surveys families with young children and oversampled low income families, single parents, and large families. In 2013, 6,853 individuals in 3,923 households participated (Schröder et al., 2013). The similar structure and content of these two datasets allows for joint analyses using weighting factors. In fall 2013 the K²ID-SOEP extension study (Camehl et al., 2015)[18] surveyed one parent ('main caregiver') of each child below school age living in a SOEP or FiD household to gather information on the ECEC center they attended, including the center address. The response rate for the additional parent questionnaire was reasonably high (about 74%). The second step was to collect indicators of structural, orientation, and process quality directly from the director of each facility and from the main group educator of the group attended by a SOEP/FiD child.[19] Parents and ECEC institutions in most subsamples were surveyed between October 2013 and November 2014. 680 out of 1,244 contacted ECEC institutions (about 55%) participated in the survey. For 818 out of 857 children with information on their ECEC setting, all control variables and data on at least one of the quality indicators of interest were available. These 818 children belonged to 699 different households and attended 749 unique groups in 647 centers from all over Germany. The average age of the children was 52 months (4.3 years) at the time of the parent survey. Mostly the main caregiver answering the parent questionnaire was the mother (82%).

Data from further sources enriched the set of control variables. First, the Federal Statistical Office (Regionaldatenbank Deutschland, 2016) provides figures on the supply of ECEC centers and the number of children below six for each of the over 400 German counties annually. Administrative records of the average ECEC quality at youth welfare office district level in 2013 represent a second source of information (Strunz, 2014). These just under 600 districts show considerable overlap with German counties but are even smaller in scale. Third, we used data provided by the MICROM dataset containing a few socio-economic neighborhood characteristics of all SOEP households (Goebel, Spiess, Witte, & Gerstenberg, 2007).

Analytical strategy

[18] For more information on this supplementary study see also http://www.k2id.de.

[19] FiD-respondents received a long and SOEP-respondents a short version of the questionnaire by mail. In case of non-response, FiD-respondents were given the option to answer the shorter questionnaire, and for both the parent and institution surveys there was a phone follow-up with a yet shorter version of the parent questionnaire and a highly compressed version of the director questionnaire. Thus, not all quality aspects are covered in all questionnaires.

The multivariate analyses consist of linear and (multinomial) logistic regressions of a broad range of quality indicators. For all linear regressions unstandardized coefficients are shown, although we add information on y-standardized coefficients[20] for outcomes with scales whose interpretation is not straightforward. The coefficients of all non-linear regressions are displayed as average marginal effects (AME). Given that few children come from the same household or attend the same center (at most three and five children, respectively), the nesting of the data is limited and not explicitly accounted for in the models. However, due to the decentralized organization of ECEC and the considerably stronger nesting within counties, standard errors are clustered at county level. Sampling weights correct for selective non-response of both parents and ECEC institutions.

Quality measures

We examine 32 primarily structural and orientation quality outcomes. Table 4.1 displays case numbers and summary statistics for each quality indicator, including the level of measurement (center vs. educator) and our theoretical classification into observable vs. unobservable aspects. The last column indicates whether a unit increase is interpreted as a rise or decrease in quality based on a summary of effects on child development found in previous studies. We rate nine indicators as easy to observe or enquire about for parents. 18 variables are continuous, 13 are binary, and one has three categories. For the purpose of data reduction, (polychoric) factor analysis was applied to quality measures with long item batteries (see Table A-8.4.1 in the general appendix for details on the operationalization). While most quality indicators correlate positively with each other, these correlations rarely exceed 0.3. They tend to be slightly more strongly correlated within the same dimension (i.e., structural quality, orientation quality, or networking with families).

Structural quality

One set of indicators captures the structural conditions of care, such as the number of registered children per group (group size) and per educator usually present (child-teacher-ratio), whether part of the staff holds no vocational degree, and if the main educator received further training within the last 12 months. These represent fairly standard measures of ECEC quality. Additionally, we include less commonly investigated features of the structural learning environment, namely equipment with materials for school preparation and play, per-

[20] Given the clustered structure of the data, we used federal state-specific means and standard deviations for the standardization. However, the results were mostly very similar to those from conventional y-standardization.

child inside and garden space, the number of special-purpose rooms (e.g., gyms), the frequency of performed or offered activities in the group, and the center-level diversity of offered activities. The latter is a dummy variable signifying if the center is in the highest quintile concerning the range of different learning opportunities offered to children (e.g., early musical or foreign language education, trips to the library, museum, theatre, etc.). Lastly, a binary variable specifies if the group composition includes at least 30 percent of children with a foreign language of origin.

Orientation quality

Orientation quality at center level measures the degree of coordination and quality assurance/development. Two dummy variables indicate if the curricular guidelines of the specific federal state ('Bildungspläne') strongly influence daily work at the ECEC center (i.e., median or above-median rating of influence by group educator), and if any internal or external measures intended to improve quality were conducted within the past 12 months. This category furthermore comprises four categorical variables signifying whether a pedagogical concept exists, whether the team has participated in its development, whether a recent group project has been documented, and how regularly the team meets.

Group educators' orientation consists of their satisfaction with the center (11-point scale from 0 "completely dissatisfied" to 10 "completely satisfied), a median or above-median work motivation[21] (for details see Schaufeli, Bakker, & Salanova, 2006), and their personal enjoyment of implementing the dimensions of social pedagogy and math/science into every-day practice. Next to individual satisfaction and enthusiasm, we investigate perceptions of their personal role towards children as experts and partners (median or above-median ratings), respectively, and of the center's responsibility relative to the child's family in terms of promoting children's motor/cognitive and social competences. Additionally, two variables assess the importance educators attach to two educational goals, that is fostering children's conformity and autonomy.

Networking with families

We cover part of the networking dimension by considering i) a summary index of parents' influence on an 11-point scale on five different aspects of care, and ii) whether parents have participated in writing up the pedagogical concept. All of these are reported by ECEC directors.

[21] Averaged rating of how often a) educators are enthusiastic about their job, b) their job inspires them, and c) they are proud of the work they do.

Table 4.1: Descriptive statistics of all quality indicators, level of measurement and interpretation

Variable		N	Unit	Mean	SD	Min	Max	Level[1]	Int.[2]
Structural quality									
Group structure & staff training									
Observable	Group size	701	#children	21.87	13.04	5	136	G	-
	Child-teacher-ratio	687	#children/ educator	8.97	3.90	2.5	27.5	G	-
Unobservable	Unqualified staff	665		0.32	0.47	0	1	G	-
	Participation in further training	549		0.79	0.40	0	1	G	+
Equipment, activities & group composition									
Observable	Materials for school preparation[a]	454	factor[b]	1.58	0.77	0	3.6	G	+
	Materials for play[a]	506	factor[b]	2.50	0.63	0.3	3.4	G	+
	Interior space per child	490	m²	8.09	3.39	1.1	35.1	C	+
	Garden space per child	486	m²	20.07	16.38	0.0	94.7	C	+
	No. special-purpose rooms	473	rooms	3.39	2.54	0	15	C	+
	≥30% foreign language	655		0.25	0.43	0	1	G	-
Unobservable	Activities: arts/ games[a]	536	factor[b]	6.93	0.87	1.8	7.5	G	+
	Activities: verbal/ motor[a]	529	factor[b]	7.08	0.65	2.2	7.7	G	+
	Offered activities (group)[a]	664	factor[b]	5.50	1.19	1.1	6.6	G	+
	Offered activities (center)[a]	477		0.70	0.46	0	1	C	+
Orientation quality									
Center level: Quality assurance & organization									
Observable	Pedagogical concept	718		0.93	0.26	0	1	C	+
Unobservable	Quality improvement measures	594		0.52	0.50	0	1	C	+
	Strong influence curricular guidelines	539		0.61	0.49	0	1	G	+
	Project documented	535		0.63	0.48	0	1	G	+
	Team involved in pedagog. concept	479		0.95	0.22	0	1	C	+
	Regularity of team meetings	579		1.32	0.72	0	2	C	+
Educator level: Satisfaction & enthusiasm									
Unobservable	Educator center satisfaction	506	scale pts	8.13	1.59	1	10	G	+
	Educator highly motivated	545		0.54	0.50	0	1	G	+
	Enjoyment of social pedagogy[a]	514	factor[b]	-0.02	0.87	-3.1	1.1	G	+
	Enjoyment of math/science[a]	538	factor[b]	-0.02	0.69	-2.2	0.9	G	+
Educator level: Perceived role & educational goals									
Unobservable	Educator feels like partner	526		0.55	0.50	0	1	G	+
	Educator feels like expert	528		0.59	0.49	0	1	G	-
	Center responsible: cogn./motor comp.[a]	485	factor[b]	0.04	0.93	-4.3	2.9	G	+
	Center responsible: social competence[a]	492	factor[b]	0.01	0.84	-4.6	4.1	G	+
	Educational goal: conformity[a]	477	factor[b]	-0.07	0.98	-3.3	2.1	G	-
	Educational goal: autonomy[a]	520	factor[b]	0.03	0.86	-3.4	1.2	G	+
Networking with families									
Unobservable	Parental influence[a]	597	scale pts	5.14	1.88	0	10	C	+
	Parents involved in ped. concept	479		0.39	0.49	0	1	C	+

1 Level on which quality indicator was measured (G=group, C=center). **2** Interpretation: an increase in the indicator is positively (+) or negatively (-) associated with child development. [a] Several items. Mean refers to the average of all items included. [b] Factor is the result of (polychoric) factor analysis. Note: Results are weighted. Source: 2014 K²ID-SOEP extension study (own calculations).

Potentially disadvantaged groups

As a first characteristic of family socio-economic status we consider the educational attainment of the main caregiver, which distinguishes three levels based on the CASMIN classification: low (0-1c), medium (2a-2c), and high (3a-3b). Second, a binary variable indicates if the child has a direct or indirect migration background. The third variable specifies whether the net equivalized, inflation-adjusted household income (OECD, 2013) falls below the poverty line of 833€, defined as 60% of the median of the monthly net household income in 2013 (SOEP Group, 2015). The last central variable marks children who live with a single parent (see Table A-4.1 for further details on all key independent variables).

Control variables

All models incorporate diverse *individual, household and regional characteristics*. In addition to considering dummy variables for the child's age at the time of the parent survey, we control for whether the child started attending the center before the third birthday. We also consider if this was more than 12 months ago, as a longer period increases the risk that some quality characteristics may have changed. Two variables capture the number of children up to 16 years in the household and if an older sibling is also attending an ECEC institution. We further include the mother's age and employment, differentiating between long part-time or full-time work (>25 hours/week), short part-time work (≤25 hours/week), and no employment.

Regarding features of the ECEC center, a categorical variable indicates whether or not the attended center serves children below age three, or if this information is missing. To save as many observations as possible, the sample incorporates children attending ECEC settings with an open group structure, but this aspect is controlled for. For relevant outcomes, we also control for the number of children attending the center.

Features of the regional context comprise the household's location in East Germany and in a small (<20,000 inhabitants), medium (20,000 to 500,000 inhabitants), or large town (>500,000 inhabitants). To characterize families' immediate living environment, we control for the mean-centered average household purchasing power index in the street section where the household lives, and for the number of migrant households at residential block level when analyzing group composition.

Given the substantial, systematic regional variation in quantitative and qualitative ECEC supply, all models include the county-level number of ECEC centers per 100 children below

six years for the year the child entered the center. This serves as a proxy for parents' degree of choice of different centers. Moreover, we control for the mean-centered average quality of all ECEC centers in the youth welfare office district for available structural quality aspects. To match the respective outcomes, we include the district's median group size or child-teacher-ratio, respectively, in groups serving children between three and school age. We further incorporate the district-average shares of staff with specialized vocational or university training, or of children aged three to five in ECEC who are of foreign origin and speaking a foreign language at home. Finally, dummy variables indicate missing information on regional quality levels, the number of migrant households in the residential block, or on maternal working hours (see Table A-8.4.2 for descriptive statistics of all control variables).

4.8 Results

Associations between parental education and ECEC quality

Table 4.2 shows the results for all structural quality indicators revealing any significant associations with our defined groups of being potentially disadvantaged (see Table A-8.4.3 for the full results).[22] Among the standard structural quality measures, it becomes evident that children with a medium educated main caregiver attend ECEC groups in which educators look after one child less on average than children with a low educated parent. The coefficient for children with a high educated parent is also negative but smaller and does not reach statistical significance. These children are however 19 percentage points more likely to attend an ECEC group whose educator received some further training within the past year.

Lower ECEC quality for children from lower educated families is not limited to group structure and staff training. Medium or high educational achievement of the main caregiver also goes along with greater availability of materials for school preparation, with y-standardized coefficients amounting to around 30 percent of a standard deviation (SD). Garden space available to children with medium and high educated parents furthermore exceeds space for children with low educated parents by roughly six m² per child. Finally, looking at group composition, the findings provide strong evidence of segregation: Even after controlling for the district-average share of migrant children in day-care and the number of migrant households in the family's residential block, having a medium or highly educated parent reduces the probability of attending ECEC groups with high migrant shares (i.e., ≥30 percent) by 10 and 17 percentage points, respectively.

[22] Models with no significant results are available from the authors upon request.

Turning to aspects of orientation quality at center level in Table 4.3, children of highly educated parents are more often enrolled in centers applying internal or external measures of quality improvement and less frequently in settings whose team members only meet every other week. The differences in probabilities compared to children of low educated parents are considerable for both outcomes (17 and 22 percentage points, respectively) (see Table A-8.4.4 for the full results).

The only significant association indicating less favorable orientation quality at educator level for children of low caregiver education is that children whose parents hold a university degree have a nearly 20 percentage points greater chance to be cared for by a highly motivated group educator (Table 4.4) (see Table A-8.4.5 for the full results).

The overall evidence thus suggests that, in line with *Hypothesis 1*, more parental education is partly linked to significantly better ECEC quality in terms of five structural and three orientation characteristics. On the contrary, children of parents with low educational attainment attend settings offering more frequent artistic and playful activities, and the pedagogical work is more strongly influenced by curricular guidelines. The educators more often enjoy math/science and regard the center as responsible for promoting children's cognitive and motor skills, while they are less prone to consider themselves experts towards the children.

Associations between migration background and ECEC quality

As shown in Table 4.2, after controlling for open group structure children with migration background attend ECEC groups serving almost three more children as compared to non-migrant children. Similar to children with low educated caregivers, their institutions offer about 4.5m² garden space less to each registered child, and they are 11 percentage points more likely to be cared for in groups with high shares of foreign-language children, despite holding parental education and other important socio-economic status and control variables constant.

In terms of orientation quality, migrant children are 11 percentage points less likely to attend centers applying procedures to enhance quality (Table 4.3), while the group educators caring for these children are significantly less satisfied with the institutions they work for (Table 4.4). However, the latter correlation is only moderate in size, amounting to .22 of a SD once satisfaction is standardized.

In sum, the results provide some support for *Hypothesis 2* which assumed that migration background is negatively associated with some quality aspects of the used ECEC facility. We

find corresponding links for three structural and two orientation quality indicators. As opposed to this, migrant children more often perform artistic and playful activities, and their educators are less likely to feel like experts.

Associations between poverty and ECEC quality

Table 4.2 suggests that, if anything, living in a poor household partly correlates *positively* with structural ECEC quality. Also more generally, the estimates reveal few signs of disadvantage encountered by this group. One exception is that low-income parents appear to have less of a say in the center's pedagogical concept (Table 4.3). The difference in probabilities compared to non-poor households is 16 percentage points. Moreover, children from poor households are taken care of by, on average, less satisfied and less motivated staff (Table 4.4). With respect to group educators' satisfaction with the institution, the size of the effect approaches 60 percent of a SD and is therefore large. Also, children from poor families are 17 percentage points less likely to attend a setting with a highly motivated group educator.

The disadvantage experienced by children from poor households is hence limited to three aspects of educator orientation and networking with families. These results are partly in line with *Hypothesis 3* which postulates that poverty hardly correlates with lower ECEC quality. Rather, advantages prevail in terms of less unqualified staff, larger interior and garden space, more artistic activities and games, and educators' greater enjoyment of integrating social-pedagogical themes into their work.

Associations between single parenthood and ECEC quality

Children who live with one parent in the household have a 24 percentage points higher propensity of attending an ECEC group that deploys one or more caregivers without completed vocational training (Table 4.2). This association is highly significant. In respect to orientation quality the results show that those educators serving children of single parents are more inclined to attribute responsibility to the child's family as opposed to the center (Table 4.4). This holds particularly true for the task of fostering children's cognitive and motor abilities, with effect sizes exceeding .8 of a standard deviation, but it also applies to promoting children's social skills, for which the y-standardized coefficient is moderate (.26 of a SD). Considering the networking dimension (Table 4.3), children of single parents are enrolled in centers that consider parental wishes and suggestions to a lesser extent. The coefficient is again highly significant and, drawing on y-standardized results, can be considered large.

On the whole, these findings speak to some disadvantage faced by children with single parents including one structural and two orientation quality indicators, as well as one aspect of parental cooperation. By contrast, these children are cared for by on average more motivated educators who are more likely to receive further training and have more regular team meetings.

Associations between potentially disadvantaged groups and observable vs. unobservable indicators

Focusing on parental education, four out of nine primarily structural quality indicators rated as observable and four out of 23 hardly observable indicators turned out least favorable for children with a low educated main caregiver. In other words, this group faced systematic disadvantages on 44 percent of all observable and 17 percent of all unobservable quality indicators. This gap of 27 percentage points between the observable and unobservable group is notable. Likewise, considering migration background the gap amounts to around 24 percentage points as the respective figures are three observable (33 percent) and two unobservable (9 percent) indicators.

By contrast, none of the observable characteristics signified systematically lower quality for children from poor or single-parent families. Disadvantage experienced by these groups only became evident on three (13 percent) and four (17 percent) quality indicators categorized as difficult to observe or enquire about for parents, respectively. Evidence for *Hypothesis 4*, according to which potentially disadvantaged groups experience lower quality mainly regarding easily observable features, is hence restricted to parental education and migration background.

Sensitivity analyses

To verify the robustness of our results, we conducted several sensitivity tests. The majority of coefficients pointing to potentially disadvantaged groups experiencing lower quality regarding observable indicators became larger after excluding children from small municipalities, where parents' degree of choice should be rather limited. Significance levels mostly increased as well, whereas for unobservable quality indicators changes were more mixed. Furthermore, we replaced the county-level number of centers per 100 children by the year-specific day-care attendance rates for children below or above three, depending on the child's year and age of entry. The conclusions drawn were however very similar.

Table 4.2: Results from regressions of structural quality indicators

Indicator	Standard structural characteristics				Other structural characteristics				
	Group size[a]	**Child-teacher-ratio**[b]	**Unqualified staff**[c]	**Further training**	**Materials: school preparation**	**Interior space per child**	**Garden space per child**	**Activities: arts /games**	**≥30% foreign language**[d]
Type of regression	*linear*	*linear*	*logistic*	*logistic*	*linear*	*linear*	*linear*	*linear*	*logistic*
Observable quality measure	*yes*	*yes*	*no*	*no*	*yes*	*yes*	*yes*	*no*	*yes*
Potentially disadvantaged groups									
Low caregiver educ. (reference)									
Medium caregiver educ.	-0.56	-1.01^{+}	0.03	0.12	0.28*	-0.51	5.62^{+}	-0.23**	-0.10^{+}
	(2.46)	(0.53)	(0.08)	(0.08)	(0.11)	(0.61)	(3.25)	(0.08)	(0.05)
High caregiver educ.	-0.09	-0.66	0.05	0.19**	0.25*	-0.48	6.22*	-0.31*	-0.17*
	(2.75)	(0.54)	(0.09)	(0.07)	(0.11)	(0.68)	(2.89)	(0.14)	(0.07)
Child migration backg.	2.79^{+}	0.11	-0.04	0.04	-0.02	0.41	-4.48*	0.22**	0.11*
	(1.62)	(0.36)	(0.05)	(0.05)	(0.10)	(0.55)	(1.82)	(0.08)	(0.04)
Poor household	1.92	0.38	-0.14*	-0.03	0.09	1.88^{+}	9.96*	0.18^{+}	0.07
	(2.99)	(0.85)	(0.07)	(0.10)	(0.14)	(0.96)	(4.64)	(0.10)	(0.06)
Single parent	1.63	0.34	0.24**	0.09^{+}	-0.11	-0.56	0.24	-0.16	-0.02
	(2.56)	(0.60)	(0.09)	(0.05)	(0.16)	(0.74)	(2.64)	(0.14)	(0.05)
Constant	13.68^{+}	10.11***			1.97***	9.23***	4.29	7.42***	
	(7.30)	(2.04)			(0.43)	(1.97)	(9.25)	(0.48)	
N	701	687	665	549	454	490	486	536	640
adj. R^2 (Pseudo-R^2)	0.464	0.205	(0.088)	(0.181)	0.278	0.076	0.096	0.104	(0.340)

Note: Results are weighted; SE clustered (county) / in parentheses; $^{+}$ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Logistic regression results displayed as average marginal effects; Further control variables: child age, age at entry <3, attendance >12 months, no. children in household, older sibling in day-care, mother's age, maternal employment, open group, age structure in center, East Germany, ECEC centers per 100 children in county, town size, neighborhood purchasing power, maternal working hours missing. Additional controls for [a]county median group size; [b]county median ratio; [c]county share qualified staff; [d]county share foreign children / no. migrant households in neighborhood / information missing. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

Table 4.3: Results from regressions of indicators of orientation quality at center level and networking with families

	Quality assurance & organization				Networking with families	
Indicator	**Quality improvement**	**Strong influence curric. guidelines**	**Team meetings every 2 weeks**[a]	**Team meetings ≤monthly**[a]	**Parental influence**	**Parents involved in pedagogical concept**
Type of Regression	*logistic*	*logistic*	*multinomial*	*multinomial*	*linear*	*logistic*
Observable quality measure	*no*	*no*	*no*	*no*	*no*	*no*
Potentially disadvantaged groups						
Low caregiver educ. (reference)						
Medium caregiver educ.	0.12	-0.13	-0.12	-0.02	0.35	0.09
	(0.08)	(0.09)	(0.08)	(0.05)	(0.32)	(0.09)
High caregiver educ.	0.17^{+}	-0.17^{+}	-0.22**	0.02	0.03	0.01
	(0.10)	(0.09)	(0.08)	(0.07)	(0.33)	(0.11)
Child migration backg.	-0.11^{+}	-0.08	0.03	0.01	-0.22	0.04
	(0.07)	(0.07)	(0.07)	(0.05)	(0.25)	(0.07)
Poor household	0.06	0.01	0.08	-0.03	0.18	-0.16^{+}
	(0.14)	(0.16)	(0.14)	(0.09)	(0.34)	(0.09)
Single parent	0.13	-0.08	-0.16^{+}	-0.11***	-1.13***	-0.02
	(0.11)	(0.12)	(0.10)	(0.03)	(0.33)	(0.08)
Constant					6.88***	
					(1.09)	
N	594	539	579		597	479
adj. R^2 (Pseudo-R^2)	(0.143)	(0.090)	(0.183)		0.068	(0.179)

[a] Reference: at least once a week. Note: Results are weighted; SE clustered (county) / in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Logistic regression results displayed as average marginal effects; Further control variables: child age, age at entry <3, attendance >12 months, no. children in household, older sibling in day-care, mother's age, maternal employment, open group, age structure in center, East Germany, ECEC centers per 100 children in county, town size, neighborhood purchasing power, maternal working hours missing. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

Table 4.4: Results from regressions of orientation quality indicators at educator level

	Educator's satisfaction & enthusiasm				Educator's perception of own / center's role		
Indicator	**Educator center satisfaction**	**Educator highly motivated**	**Enjoyment social pedagogy**	**Enjoyment math/science**	**Educator feels like expert**	**Center respon-sible cogn/motor competence**	**Center responsible social competence**
Type of Regression	*linear*	*logistic*	*linear*	*linear*	*logistic*	*linear*	*linear*
Observable quality measure	*no*	*no*	*no*	*no*	*no*	*no*	*no*
Potentially disadvantaged groups							
Low caregiver educ. (reference)							
Medium caregiver educ.	-0.11	0.13	0.09	-0.18^{+}	0.15^{+}	-0.19	-0.20
	(0.28)	(0.09)	(0.16)	(0.11)	(0.08)	(0.16)	(0.14)
High caregiver educ.	-0.21	0.19*	-0.07	-0.18	0.09	-0.48**	-0.15
	(0.35)	(0.09)	(0.20)	(0.14)	(0.10)	(0.18)	(0.16)
Child migration backg.	-0.36*	-0.03	-0.09	0.07	-0.12^{+}	-0.03	0.24
	(0.18)	(0.07)	(0.13)	(0.10)	(0.06)	(0.11)	(0.16)
Poor household	-0.99*	-0.17^{+}	0.35^{+}	0.12	0.10	0.09	-0.01
	(0.47)	(0.09)	(0.19)	(0.16)	(0.11)	(0.24)	(0.19)
Single parent	0.31	0.14^{+}	0.02	-0.12	0.08	-0.75***	-0.23*
	(0.34)	(0.07)	(0.17)	(0.14)	(0.09)	(0.15)	(0.11)
Constant	8.76***		0.48	-1.06*		0.24	0.48
	(1.18)		(0.50)	(0.47)		(0.51)	(0.42)
N	506	545	514	538	528	485	492
adj. R^2 (Pseudo-R^2)	0.073	(0.092)	0.153	0.102	(0.083)	0.149	0.081

Note: Results are weighted; SE clustered (county) / in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Logistic regression results displayed as average marginal effects; Further control variables: child age, age at entry <3, attendance >12 months, no. children in household, older sibling in day-care, mother's age, maternal employment, open group, age structure in center, East Germany, ECEC centers per 100 children in county, town size, neighborhood purchasing power, maternal working hours missing. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

In terms of operationalization of group composition, we tested various thresholds. Children with low educated parents were significantly more likely to attend groups with at least 15, 20, 25, 35, or 40 percent of foreign-language children compared to one or both of the more educated groups. Likewise, children with migration background revealed significantly higher propensities when the threshold was 15, 20 and 25 instead of 30, respectively. Comparable results were also obtained with a linear regression of the continuous migrant share. Moreover, variations in several measures of the potentially disadvantaged groups showed that the disadvantages reported for migrant children were primarily driven by families in which all parents in the household have a migration background. Lastly, the advantages observed for children of more educated parents were mostly similar when using maternal CASMIN or highest parental CASMIN.[23]

To examine the risk of multicollinearity among the socio-economic status variables, we compared the full models with stepwise models including the potentially disadvantaged groups one after the other. Most estimates were very robust. Two exceptions are the reported disadvantages for children from low educated backgrounds with regard to garden size and the center's implementation of quality improvement measures, both of which turned significant (and garden size became substantially larger) only after controlling for the other groups. Hence, these findings should be treated with caution. Likewise, excluding the control for maternal employment rendered the advantages for the medium educated group regarding garden size and group composition and the disadvantage for migrant children with respect to centers' engagement in quality improvement insignificant. Other than that, the results were consistent across both specifications.

Finally, false discovery rate corrections adjusting p-values for multiple inference were applied to highly similar outcome variables (e.g., materials, perceptions of center's role). These underline again that the marginally significant associations ($p<.10$) are generally less trustworthy compared to those with $p<.05$.

4.9 Discussion

Using nationally representative household data supplemented with direct information from the used ECEC institution, this study represents the most rigorous examination of associations between family socio-economic status and characteristics of ECEC quality in Germany to-date. The analyses provide some evidence for systematic selection disadvantaging in

[23] Substituting poverty with a continuous measure of household income, the associations for staff satisfaction and parental involvement in the pedagogical concept ceased to be significant.

particular children with a low educated main caregiver and those with migration background. These children experience the lowest quality on a range of structural indicators (i.e., group structure, staff training, equipment, and group composition) and orientation characteristics (i.e., centers' quality assurance, frequency of team meetings, and staff motivation). Fewer significant disadvantages emerged for children from poor or single parent households, most of which related to educators' orientation and aspects of networking with families.

Following the accommodation model (Meyers and Jordan 2006), this study incorporated several socio-economic status variables and distinguished outcomes which are easy or difficult to observe or enquire about for parents in order to shed some light on possible opportunities and constraints mediating links between family SES and ECEC quality. Comparing the different groups, a substantial part of the disadvantages found for children with low educated parents and migration background related to observable indicators. We interpret this as an indication that parental characteristics such as knowledge, preferences, or networks might matter in the selection process. At the very least, we can neither rule out that more advantaged groups intentionally choose better-equipped settings (e.g., due to greater knowledge of the importance of ECEC quality for child development), nor that stratified preferences or networks make migrant families favor more culturally/ethnically mixed ECEC institutions and non-migrant families avoid them.

The complete lack of negative selection of children from poor and single-parent households in terms of observable indicators supports our expectations. Being poor does not per se prevent access to care of high structural quality in a highly subsidized ECEC system, even in the absence of targeted programs such as Head Start in Germany. Likewise, while single parents might face greater time and budget constraints in finding high-quality care, this may be offset by their better access to ECEC slots in many places. These results can, however, not mask the fact that these groups experience some significant disadvantage in terms of educators' orientations and parental opportunities to become involved. One explanation for the significant associations with these outcomes rated as less observable may be that when choosing a center parents might not take into account the investigated features at all, but rather pay attention to other aspects which happen to correlate with these features, including provider types or specific pedagogical approaches. Alternatively, we cannot rule out that center directors may discriminate against some groups or that more privileged social groups gain more information also about aspects which are difficult to observe through recommendations in their larger social networks or through interactions with the staff before choosing the center.

Against the backdrop of previous research, a particularly consistent finding is that children with a low educated main caregiver and with migration background are considerably more likely to attend ECEC settings with high shares of foreign-language children even after accounting for a large set of socio-demographic and residential controls. This result confirms earlier findings from Becker (2010a) and therefore deserves greater scientific and political attention in light of studies emphasizing the importance of group composition for process quality and child development.

Overall, the presented evidence on partially systematic selection into ECEC settings of varying quality in Germany represents an important indication of inequality of educational opportunity occurring early in children's life course, which comes in addition to the pronounced selectivity in ECEC use at earlier ages (Schober & Stahl, 2014; see also Chapter 2). Possibly, higher-SES children's greater exposure to early learning and care environments of higher quality interferes with the compensatory function of ECEC thought to reduce the socio-economic gaps in children's school readiness. From a sociological perspective, this selectivity can be seen as one pathway through which (dis)advantage is transmitted between generations, thereby nurturing the social reproduction of inequality. Choosing high-quality ECEC should therefore be recognized as a major early investment of parents in their children.

The present study makes an important contribution by applying a sociological investment and accommodation perspective to parental choices of ECEC quality and by considering a large number of quality aspects and distinguishing between different levels of observability. We also consider more in detail than previous studies how the policy context in terms of varying childcare costs, access to a place, and quality regulations may impact the options faced by different socio-economic groups. Yet the study has several limitations. First of all, ECEC quality was measured after the child's entry into the center. However, the quality at the time of measurement might differ from that at the time parents made the choice. Although survey responses of ECEC personnel might be biased due to social desirability, this is likely to be relatively similar across institutions and stable over time.

As a further limitation, about nine percent of parents in our sample said that they did not have a choice between different institutions due to lack of availability (Table 1.1 in Chapter 1.3). Although we included a number of residential controls in the models, these might not perfectly capture the availability of places or quality around a family's home. Also owing to data limitations, the models neglect centers' freedom to accept or reject individual children.

Finally, our categorizations of quality characteristics into different levels of observability is conceptually driven and will require further examination in future empirical studies.

Although this study answered some important research questions, it also certainly raised new ones. Future studies should investigate in more detail the decision-making process of parents searching for an ECEC institution. In terms of policy implications, one possibility would be to tackle the lacking transparency regarding the quality of individual institutions and to set incentives to improve quality, for instance by implementing a system of quality seals (Spiess & Tietze, 2002). In view of the presented findings, however, great caution must be exercised in designing such measures. Depending on their complexity and accessibility, provisions of such information may boost positive links between family SES and ECEC quality even further if higher-SES parents are more likely or able to utilize them. Therefore, in addition, tighter quality regulations and increased funding for ECEC quality may help counteract early institutional disadvantage for low-SES children. These instruments could either aim at raising the average level of ECEC quality in general and reducing variation in quality across settings, or follow a targeted approach that positively discriminates lower-SES groups.

4.10 Interim summary and transition

This chapter investigated to what extent children from potentially disadvantaged families experience lower-quality environments in ECEC as compared to their more advantaged counterparts. In principle, parents have free choice among ECEC centers, and they differ in terms of the pedagogical and non-pedagogical quality aspects they give priority to when making decisions. By controlling for regional characteristics as far as possible (e.g., average quality supply), the objective of this chapter was to capture the demand side, i.e., to isolate parental choices while holding opportunities and constraints in families' context constant. The presented findings give reason to believe that children from potentially disadvantaged backgrounds, in particular those with low educated parents or migration background, experience systematically lower quality with regard to diverse quality indicators. This is especially true with regard to quality indicators that can be assumed to be relatively easy to observe or enquire about for parents – a hint that strategic choices might be involved.

Next to the demand side, variations in ECEC supply must be considered as well. This is all the more relevant since parents attach such great importance to centers' proximity (see Chapter 1.3), meaning that every family can choose from a limited set of alternatives that are close to their place of residence. Hence, Chapter 5 analyzes the regional distribution of three

important indicators of structural ECEC quality: child-teacher-ratio, group size and staff's participation in further training. To what extent are ECEC settings within the same county more similar than those from different counties, and can these differences in provision be explained by legal differences across federal states? Does quality provision also differ across neighborhoods of diverse socio-economic composition? The analyses provide evidence that a considerable part of variation in ratios and group sizes occurs between regions, and that access to ECEC settings with more favorable group structures is better in counties where more stringent minimum standards prevail. Furthermore, neighborhood affluence is positively associated with structural quality. These findings suggest that ECEC quality is not randomly distributed across the country, but that children's (and families') opportunities in terms of exposure to high-quality environments in ECEC depend on their place of residence. Unless parents are willing to go to great lengths and move to areas with high-quality ECEC services[24], their childcare choices are partially a function of the ECEC quality available in their local context. Overall, Chapter 4 and 5 complement each other, with the former focusing on parental demand and the latter underscoring the role of ECEC quality supply.

[24] Little is known about how many parents choose to do this. From a theoretical point of view, however, this should not happen as frequently as with regard to primary schools. First, ECEC is still not considered an educational stage by many people. Second, the ECEC system is not very transparent, so that it can be very difficult for parents to find out which areas offer the best quality. Third, especially when parents have their first child, they may only start learning about the ECEC system and the importance of ECEC quality while already searching for a center. At the same time, parents are likely required to make tradeoffs between pedagogical and non-pedagogical quality indicators (see also Chapters 1.2 and 1.3).

4.11 Appendix

Table A-4.1: Descriptive statistics of all key independent variables

Variable	N	Mean	SD	Min	Max
Low caregiver education	818	0.19	0.40	0	1
Medium caregiver education	818	0.52	0.50	0	1
High caregiver education	818	0.29	0.45	0	1
Child migration background	818	0.33	0.47	0	1
Poor household	818	0.09	0.28	0	1
Single parent	818	0.09	0.29	0	1

Note: Results are weighted. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

5 ACCESS TO HIGH-QUALITY EARLY CARE AND EDUCATION IN GERMANY: INEQUALITIES ACROSS REGIONS AND NEIGHBORHOODS

Juliane F. Stahl

Germany is characterized by a highly decentralized albeit universal childcare system for children between three and school age. This study examines the variation in structural quality of early childhood education and care prevailing at regional as opposed to center and group level. By comparing ECEC groups of four- and five-year-old children all over Germany, it investigates to what extent different regional quality regulations and, at a lower geographical level, neighborhood affluence shape families' opportunities regarding ECEC quality. The analyses are based a sample of 486 ECEC groups nested in 215 centers in 113 counties and municipalities. These data are combined with information on the socio-economic composition and institutional context of the different geographies in which centers are nested, allowing for a multilevel modeling approach. The models reveal that about one fifth of variation in child-teacher-ratios and group sizes occurs across regions. As expected, ECEC settings exposed to stricter state regulations provide systematically better structural care conditions. Further, higher ECEC quality - as measured by child-teacher-ratio, group size, and staff's participation in further training – is found in higher-SES neighborhoods. However, this association is not observable in regions with very stringent child-teacher-ratio regulations.

This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort Kindergarten, doi:10.5157/NEPS:SC2:2.0.0. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

5.1 Introduction

Early childhood is a phase characterized by tremendous advances in both cognitive and social skills. Although the primacy of family background factors including the home learning environment is undisputed, a vast amount of studies documents the beneficial impact of early childhood education and care on child outcomes, particularly on cognitive skills (see Burger 2010; Camilli et al., 2010; Gorey, 2001; Nores and Barnett, 2010 for comprehensive reviews and meta-analyses of international evidence). The effectiveness of attending ECEC, however, seems to crucially depend on its quality (e.g., Anders et al., 2012; Becker, 2010b; NICHD Early Child Care Research Network, 2002a, 2006). Consequently, the way access to this public resource is distributed may affect children's life chances and skill formation, which may in turn modify the social gradient in child outcomes as well as the degree of intergenerational educational mobility. This argument takes on greater significance in view of findings that ECEC quality in Germany, as in other countries (Phillips & Lowenstein, 2011), is only mediocre on average, with great heterogeneity between different centers in terms of indicators of both structural and process quality (Kuger & Kluczniok, 2008; Tietze et al., 2013). Whereas the former captures objective aspects of the childcare environment (e.g., teacher training, aspects of group structure) which are more easily controllable through policies and measurable via survey methods, the latter refers to the daily interactions and experiences children have. From a policy perspective, improving ECEC quality is most feasible through implementing legal quality standards for structural quality, which has been found to be moderately associated with process quality, and therefore at least indirectly with child development (e.g., Kluczniok & Roßbach, 2014; NICHD Early Child Care Research Network, 2002b).

Following this, the present study examines the variation in principal indicators of structural ECEC quality prevailing at regional as opposed to center and group level. In addition, by comparing ECEC groups mainly consisting of four- and five-year-old children (thereafter 'kindergarten groups') from all over Germany, whose 16 federal states reveal salient differences concerning the legal ECEC quality frameworks, the study investigates to what extent regional quality regulations and neighborhood affluence shape families' opportunities regarding ECEC quality. As an extension, I examine how these two factors interact, testing the hypothesis that neighborhood advantage goes along with higher structural ECEC quality especially when strict regulations are missing. The following questions guide the analysis: *1) Do structural aspects of care vary systematically across geographic entities, that is, counties and neighborhoods of different socio-economic composition, thereby restricting parental*

choice sets to different degrees? 2) Are variations in care conditions significantly associated with differences in federal state regulations? The study's underlying assumption is that place of residence shapes children's educational opportunity structures from a very young age.

This research fills a gap in the literature by examining the ECEC system in Germany, which deviates substantially from systems in countries such as the US and the UK. However, the empirical evidence on associations between ECEC quality and both legal regulations (e.g., Hotz & Xiao, 2011; Phillips et al., 2000) and neighborhood characteristics (Burchinal et al., 2008; Gambaro et al., 2015) has mainly been generated in these countries and may thus not be generalizable. The German childcare system proves to be a particularly relevant case for it maintains a highly decentralized organization whilst at the same time boasting nearly universal attendance among children aged 3 and above (European Commission, EACEA, Eurydice, & Eurostat, 2014). It is highly subsidized, which is why parental fees are generally low to moderate; additionally, they are largely adjusted to family income (Spiess et al., 2008). The system is at the same time characterized by a highly localized governance structure and thus high levels of autonomy on the part of municipalities and providers (Bode, 2003; Kreyenfeld & Krapf, 2010). In countries with highly decentralized systems children have been found to experience stark differences in ECEC provision depending on their place of residence (Gambaro, Stewart, & Waldfogel, 2014). The present study argues that high minimum standards may not only raise overall quality levels, thus making ECEC provision across states more similar, but that they also have the potential to reduce variation across socio-economically diverse neighborhoods within one and the same legal context. As opposed to this, quality regulations in Germany are for the most part mild, meaning that relatively few requirements are stringent enough to meet evidence-based recommendations (NAEYC, 2014; Barnett, Carolan, Squires, Clarke Brown, & Horowitz, 2015). The German case stands out as an example of a highly localized ECEC system and hence appears highly suitable for multilevel analyses of within-country variations in structural ECEC quality.

Whether and to what extent ECEC quality varies systematically across geographical areas in the German context is understudied. Existing analyses either report averages of structural quality indicators at youth welfare office district level[25] without relating them to regulations at all (Strunz, 2014), or they compare actual federal state means or medians of ratios and group sizes with relevant federal state regulations (Viernickel et al., 2015), thus giving an indication of average compliance within states and a broad-brush picture of differences between states. This however leaves unanswered questions about quality variations between individual

[25] These are roughly comparable to counties, see Chapter 4.7.

centers, both within and across states. More specifically, are differences in quality between settings in Germany mainly accounted for by differences in legal regulation at state level, or do they also arise within states? Also, there is little research on whether ECEC quality differs systematically across neighborhoods of diverse social composition, and if such links are mitigated in the presence of legally binding high quality standards. One exception is a recent study reporting less favorable child-teacher-ratios for regions with higher unemployment (Becker & Schober, 2015), and concluding that structural quality could be more strongly related to regional than household characteristics. Most other German studies attended mainly to links between child/household characteristics and the quality of the ECEC setting, and considered broad differences between East and West Germany or between few federal states (e.g., Becker, 2010b; Biedinger et al., 2008; Lehrl et al., 2014; Tietze et al., 2013). In this chapter, the focus shifts to more nuanced differences in the supply of ECEC quality across counties and neighborhoods, possible factors contributing to these at different levels, and their interrelations.

5.2 ECEC quality: Measures and variations across states and neighborhoods

There is great variation in what 'ECEC quality' is taken to mean and in the way it is measured. Most generally, the term refers to those characteristics of childcare that promote optimal development and produce positive child outcomes (Bronfenbrenner & Ceci, 1994; Marshall, 2004; Phillips & Lowenstein, 2011). The present study incorporates three well-established indicators of *structural quality*, although the empirically established correlations between structural quality, educational processes and thus child development are indeed moderate at best (e.g., Kluczniok & Roßbach, 2014; NICHD Early Child Care Research Network, 2002b).

The first indicator I take into account is the ratio between children and educators. As one might expect, the average time educators can devote to each child correlated positively with process quality in previous investigations (Burchinal, Cryer, Clifford, & Howes, 2002; Hestenes et al., 2015; NICHD Early Child Care Research Network, 2000, 2002b; Phillips et al., 2000; Phillipsen, Burchinal, Howes, & Cryer, 1997; Pianta, La Paro, Payne, Cox, & Bradley, 2002; Schipper, Riksen-Walraven, & Geurts, 2006; see also Kuger et al., 2015 for a recent review). But there is reason to assume that relations are non-linear, meaning that ratios must reach a minimum threshold for any links to appear (Le, Schaack, & Setodji, 2015). Research findings furthermore suggest associations between more favorable child-teacher-ratios and better cognitive and social outcomes in children (e.g., Bauchmüller, Gørtz, &

Würtz Rasmussen, 2014; NICHD Early Child Care Research Network, 1999, 2002b; Sagi, Koren-Karie, Gini, Ziv, & Joels, 2002; Vandell & Wolfe, 2000).

As a second indicator of group structure, group size captures the number of children present in a care and learning context. Effects of group size may however strongly depend on peer behavior and the way care is structured (e.g., amount of whole vs. small group activities; cf. Montie, Xiang, & Schweinhart 2006), which may be why evidence is overall more mixed. Accordingly, whereas increased group size was found to be associated with lower classroom quality (e.g., Phillips et al., 2000) and less positive caregiving (e.g., NICHD Early Child Care Research Network, 2000), it correlated positively with ECERS-E ('Early Childhood Environment Rating Scale-Extension'), a measure of global ECEC quality, in another study (Hestenes et al., 2015). Researchers have further reported significant negative associations between group size and cognitive, social and motor skills (Felfe & Lalive, 2014; NICHD Early Child Care Research Network & Duncan, 2003; Vandell & Wolfe, 2000). Finally, a meta-analysis identified 'individualized instruction' as a significant moderator in studies comparing children in treatment vs. alternative treatment groups, leading to significant cognitive gains (Camilli et al., 2010). However, it remains unclear whether this is attributable to group size or ratio, as the term 'individualized instruction' in this study subsumed several treatment aspects such as existence of a formal curriculum, class size below ten, child to staff ratio below five, primarily small group or individual instruction.

As a third indicator of ECEC quality, I consider staff training. While the international literature typically focuses on teachers' formal degrees, this is not feasible for Germany since very low shares of kindergarten teachers hold academic degrees while the great majority has completed vocational training (Strunz, 2014). Therefore, I instead refer to specialized training within the scope of professional development, which is oftentimes delivered through short courses. Research provides support for the relevance of professional development, indicating advances in classroom processes and child outcomes through coaching (Son, Kwon, Jeon, & Hong, 2013), educational sessions and workshops (Burchinal et al., 2002; Jensen, Jensen, & Würtz Rasmussen, 2015). Also, a meta-analysis of (quasi-)experimental research points to positive impacts on caregivers' pedagogical competencies (Fukkink & Lont, 2007). Another advantage is that policies targeting specialized training instead of reforming an entire training system may be easier to implement and can reach all educators, not just future trainees.

In line with these research findings, lower child-teacher-ratios, lower group sizes and the incidence of professional development can be regarded as higher structural quality. Some

professional membership and research organizations go even further and define evidence-based standards of best practice. Regarding child-teacher-ratios, the National Association for the Education of Young Children (NAEYC) accreditation criteria suggest that for children between four years and kindergarten enrollment (usually five to six years in the US), one educator should take care of eight to 10 children, while groups should consist of about 16 to 20 children (NAEYC, 2014). Likewise, the National Institute for Early Education Research (NIEER) standards require a maximum class size of 20 children and a maximum number of children per teacher of 10 for three- and four-year olds (Barnett et al., 2015). Participation of all teachers in professional development training is mandatory for NAEYC accreditation (NAEYC, 2014). NIEER advises a minimum of 15 hours of annual in-service training per teacher (Barnett et al., 2015).

Depending on their location, ECEC settings are exposed to varying social policies. Correspondingly, international research indicates that better ECEC quality is found in states with more stringent legal regulations of care contexts (Hotz & Xiao, 2011; Phillips et al., 2000; Phillipsen et al., 1997; Rigby et al., 2007), and that meeting more recommended quality standards is associated with better child outcomes (Burchinal et al., 2000; Howes, Phillips, & Whitebook, 1992; NICHD Early Child Care Research Network, 1999). However, differences in ECEC quality provision exist even within the same legal context, both across and within centers (Karoly, Zellman, and Perlman, 2013). In terms of (un)equal access, ECEC quality has been found to differ systematically across socio-economically diverse neighborhoods: In the US, neighborhood advantage and safety is positively associated with process quality in ECEC (Burchinal et al., 2008; Dupéré et al., 2010; Marco & Vernon-Feagans, 2013), while it is unclear to what degree this is the result of systematic variations in structural quality across neighborhoods. In the UK, Gambaro et al. (2015) found children from more deprived areas to have access to better qualified caregivers primarily due to a higher prevalence of nursery classes in these areas. By contrast, quality ratings by Ofsted (Office for Standards in Education, Children's Services and Skills) decreased with the level of deprivation. It is an empirical question whether systematic relationships between (structural) ECEC quality and both legal regulations and neighborhood characteristics also exist in the German ECEC system, and whether or not these two interact with each other.

5.3 Institutional context

ECEC in Germany is delivered through a universal, highly subsidized system incorporating public as well as non-profit providers, while private (i.e., for-profit) providers represent a very

small share of 2.8 percent (Statistisches Bundesamt, 2014; own calculations). Market competition likely plays a minor role in Germany: In the dataset analyzed below, out of 233 centers, only six percent of directors agreed that the existence of their institution was endangered, and under one third stated that their institution was in stiff competition with other centers (NEPS Kindergarten cohort, own analyses). Also, teachers' earnings are guided by collective agreements, while parental fees are low to moderate and largely adjusted to family income (Spiess et al., 2008). Still, systematic selection of children into ECEC settings of varying quality may be an issue because parents can in principle choose freely between ECEC settings, while providers and centers can implement their own admission systems (see also Chapter 1.3 and 4).

Another salient feature of the German ECEC system that may result in unequal access to ECEC quality is its multilevel governance structure. In Germany, the primary legal responsibilities for institutional childcare provision are granted to the 16 federal states ('Bundesländer') (Bode, 2003; European Commission et al., 2014). While the German government recently launched an initiative aimed at increasing overall levels of quality (BMFSFJ 2016), the federal states continue to be in charge and can decide whether and how they invest the additional funds. At even lower geographical levels, there are 107 independent cities ('Kreisfreie Städte') and 295 counties ('Landkreise') (henceforth referred to as 'counties'), virtually all of which operate youth welfare offices serving as public bodies responsible for public childcare provision (Deutscher Landkreistag, 2013). In the absence of higher-order regulations, these local authorities as well as other, mostly non-profit providers, enjoy high autonomy in implementing childcare services (Bode, 2003; Kreyenfeld & Krapf, 2010). This circumstance facilitates considerable variations in local ECEC provision (Gambaro et al., 2014) between different centers and providers *beyond* dissimilarities between states with different regulations, for instance in terms of the education and care conditions offered by different providers and centers. Only some German states allocate additional allowances to ECEC institutions placed in disadvantaged residential areas or serving a specific minimum share of children with migration background (Hogrebe, 2014), which may serve to prevent lower-quality ECEC provision in less privileged neighborhoods.

Considering German federal state regulations effective on 1 January 2011, laws of almost no federal state were strict enough to comply with official best-practice standards (see above). Although maximum ratios existed in all states, they ranged widely, from 10 to 20 children per

educator[26] (Table 5.1). Thresholds of maximum group sizes had been agreed upon in only half of all German states, albeit only in West Germany. Where such requirements existed, the cap was between 20 and 25 children. For the most part, existing legal regulations of group structure fell short of evidence-based recommendations. Clear-cut regulations on educators' annual number of days in further training existed in only one fourth of all German states in 2011 (Table 5.1). They required two to five days of training per year. The legal texts of the remaining states partially included further training, however without declaring a specific minimum amount of advanced training. Due to insufficient variation in this indicator, the following analyses distinguish between states with and without precise requirements rather than between degrees of strictness on regulations on the number of further training days.

Table 5.1: Existence and stringency of legally set minimum standards prescribed by 16 German federal states regarding kindergarten groups serving children between three and school age (as of 1 January 2011)

	Federal state regulations			
	Existence		Stringency	
	No	Yes	Most	Least
Child-teacher-ratio	0	16	1:10	1:20
Group size	8	8	20	25
Annual amount of further training	12	4	5 days	2 days

Source: German federal state laws regulating public childcare.

Apart from the fact that laws regulating ECEC quality in Germany appear mild overall, no universal system of regular external, independent inspections to enforce these has been implemented in states other than Berlin (European Commission et al., 2014). Rather, compliance is primarily based on agreements between public authorities and provider organizations, and thus on self-regulatory practices (Oberhuemer, 2014). This lack of external monitoring stands in contrast to current developments in many US states which increasingly launch 'quality rating and improvement systems' (QRIS), partially conditioning funds and other supports on center-level ratings of delivered program quality (cf. Karoly et al. 2013). It also makes non-compliance more feasible. Whether ECEC settings comply with legal regulations is hence an empirical question, and there is indeed evidence for incidences of non-compliance to regulations (Gragert, Peucker, Pluto, & Seckinger, 2008). Modest regulations

[26] Some states prescribe gradual adjustments of maximum ratios and group sizes according to aspects such as daily opening hours, number of closing days, duration of 'off-peak times' ('Randzeiten') in groups, as well as specific child characteristics such as foreign language background and exceptionally long daily attendance.

combined with lacking supervision and high autonomy granted to single providers and centers leave doubts whether the regional variations in legally prescribed quality are mirrored in variations in structural ECEC quality. Quantifying the magnitude of differences across institutionally diverse contexts is thus a central aim of subsequent analyses.

5.4 Research questions and theoretical framework

This chapter rests on the notion that with regard to childcare, "all parents do not select from among similar alternatives; their options are limited by both actual and perceived constrains in supply" (Meyers & Jordan, 2006, p. 62). This likely refers to availability but also quality of childcare in the immediate environment. In this study, however, instead of analyzing single childcare decisions made by families I direct attention to the supply side to picture geographical disparities in the provision of structural ECEC quality and their dependence on socio-institutional contexts. The neo-institutionalist approach serves as a theoretical framework. It acknowledges that institutional environments shape educational practices in important ways (see Arum, 2000 for applications in educational research). ECEC centers are part of a larger (non-local) 'organizational field' incorporating both the providers they belong to (oftentimes social welfare organizations and churches), competing childcare centers, and relevant higher-level organizations fulfilling tasks related to supervision of the childcare system, supply of resources, collective bargaining, etc. (e.g., state governments, youth welfare offices, trade unions). They must comply with a set of institutional rules to ensure legitimacy and funding, and to improve chances of survival (Meyer & Rowan, 1977). According to DiMaggio and Powell's theory of institutional isomorphism (1983), such factors contribute to a set of environmental conditions that are comparable across centers sharing the same organizational field, thereby exerting pressures making them more similar. Correspondingly, I test the following hypothesis:

Hypothesis 1: ECEC groups within the same county are more similar than groups across different counties in terms of structural quality, that is child-teacher-ratios (H1a), group sizes (H1b), and probabilities among ECEC staff to receive further training (H1c).

Due to the German childcare system being organized in a decentralized manner, ECEC centers are subject to legal regulations which differ considerably across regions. According to McLean (2014), studies comparing ECEC systems *across* countries have neglected this aspect. I argue that variation in this control tool may explain differences in ECEC even *within* one country. Variations in quality regulations should be mirrored in the observed quality level: Stronger or, in the case of further training, more precise legal requirements should

result in better ECEC quality. In line with the neoinstitutionalist perspective, the second hypothesis reads as follows:

Hypothesis 2: Stricter state regulations correlate with lower child-teacher-ratios (H2a) and lower group sizes (H2b). Precisely defined training regulations correlate with higher probabilities among ECEC staff to participate in further training (H2c).

Next to differences in ECEC quality across counties, variation might be substantial even within one and the same geographical entity, despite institutional pressures fostering isomorphism. Systematic differences in ECEC quality between socio-economically heterogeneous areas could for example originate from a) center differences in priority-setting or capabilities to attract qualified staff (center-driven); b) providers' and/or centers' responsiveness to parental influence and demand for structural care conditions meeting best practice standards, which might be more commonly expressed by higher-income parents (parent-driven) (Johansen et al., 1996; Peyton et al., 2001); or c) parents moving to areas with structurally better ECEC institutions. Considering these mechanisms, one might even assume that relationships are stronger for structural quality characteristics than, e.g., teacher-child interactions, which should be relatively difficult to observe for parents (Mocan, 2007; see also Chapter 4).

I extend the literature by examining relationships between neighborhood SES and ECEC quality, and by testing whether legal regulations moderate neighborhood influences. In a longitudinal study, Hotz & Xiao (2011) found that imposing or tightening quality regulations benefitted primarily childcare services in higher income areas in terms of obtaining NAEYC accreditation status. Leaving aside the fact that they used this indirect measure of quality, such patterns should occur especially when externally fixed thresholds (and their adherence) are fairly lenient, offering considerable room for deviation. They might for instance develop thanks to selective non-compliance or selective over-fulfilling, i.e., implementation of stronger standards than required mainly among facilities located in rich neighborhoods. I argue that whenever very tight legal requirements are *imposed and adhered to*, variations across settings should be more limited. The third hypothesis is formulated accordingly:

Hypothesis 3: Stricter or precisely defined state regulations attenuate positive links between neighborhood socio-economic status and structural ECEC quality, i.e., lower child-teacher-ratios (H3a), lower group sizes (H3b), and increased probabilities among ECEC staff to receive further training (H3c).

5.5 Data and method

The analyses draw on wave 1 of the Kindergarten cohort (SC2) of the National Educational Panel Study (NEPS), a nationwide study whose main purpose is to follow children over time (Blossfeld, Roßbach, & von Maurice, 2011). Target children were about four years of age in wave 1, which was administered in 2011 (January to October) (Skopek, Pink, & Bela, 2012). Surveys of both educators[27] and principals collected detailed information on children's care contexts. To draw a representative sample of ECEC centers, a multi-stage indirect sampling approach was applied, starting with a sample of primary schools that provided a list of 'feeder' kindergartens their students had typically attended before school entry (for further details see Aßmann, Steinhauer, Zinn, & Goßmann, 2013) .

To specify the context of ECEC settings further, I supplement the dataset with additional information retrieved from 1) the MICROM data on neighborhood characteristics (Goebel et al., 2007); 2) county-level administrative data on the German child and youth welfare published by the Federal Statistical Office; and 3) content analysis of laws regulating structural quality indicators of interest, passed by 16 federal states (online inquiry). The latter information is however coded at county level. Although the original dataset included information on 277 centers with more than 700 groups, group information was missing for about 100 of these cases. A substantial part of observations had missing values on one or several control variables, whereas only few outliers on the quality variables and the variable on neighborhood affluence had to be excluded. The final sample hence comprises 486 kindergarten groups in 215 ECEC institutions in 113 counties which served 9,755 children at the time of data collection. First, the significant amount of non-response may present a source of bias primarily because ECEC settings from East Germany, and therefore settings that are not exposed to any group size regulations, are underrepresented in the final sample. This issue is addressed through additional analyses of West German cases only. Second, the groups in the analytical sample have significantly higher shares of children with disabilities, whereas the centers they belong to more often have a partly or mainly open group structure and their providers are more likely public or non-profit and less likely of the type "other" as compared to the original sample. To prevent the sample from losing more cases and from becoming even more selective, I added categories for cases with missing data regarding several control

[27] If more than one educator provided valid answers concerning a group, one educator was selected based on a marker in the dataset identifying the respondent with the most valid answers. Data provided by other educators were solely included to fill gaps due to partial non-response.

variables, including provider type and group structure. Table 5.2 provides a description of the final sample and all variables.

Dependent variables

The measures of structural ECEC quality were derived from educators' replies. I followed a standardized procedure proposed by the Federal Statistical Office (Statistisches Bundesamt, 2011) to calculate child-teacher-ratios (CTR_{std}) signifying the average number of children each educator has to care for. Precisely, the indicated employment percentages (empc) of *one to four* educators in a group as well as all children's daily hours of attendance (dchs)[28] were converted into a group's number of fulltime equivalent employees (i.e., teachers) (FTE_{empl}) and of fulltime equivalent children (FTE_{child}), respectively. Regarding the latter, it was assumed that children attend ECEC *five days per week* and that fulltime attendance equates to *40 weekly hours*. The fulltime equivalent of children was then divided by the fulltime equivalent of employees:

$$CTR_{std} = \frac{FTE_{child}}{FTE_{empl}} \qquad FTE_{empl} = \frac{\sum_{i=1}^{4}(empc_i)}{100} \qquad FTE_{child} = \frac{\sum_{j=1}^{29}(dchs_j)5}{40}$$

$empc_i$ = employment percentage of employee i

$dchs_j$ = daily childcare hours of child j

Note that daily care hours were collected in three categories: up to five hours, five to seven hours, and above seven hours. In line with official procedures, mean values of these categories were chosen (4.5; 6.0; 8.5 hours) to convert them into a continuous scale (Statistisches Bundesamt, 2011), a potential source of bias.

I created a continuous variable capturing group size based on the number of registered boys and girls. This measure hence represents an upper bound, possibly overestimating the true state because not all children registered 'on paper' might attend regularly. Note that in order to increase comparability of ECEC settings I only kept groups with a maximum of 29 children and with ratios not exceeding 29 children per educator, but only six cases had to be dropped to achieve this. Group size and child-teacher-ratio are positively correlated, but much stronger so among kindergarten groups in West than East Germany, with spearman-rank order

[28] Inconsistencies across answers regarding numbers of children became apparent. To reduce measurement error and still maintain sufficient sample sizes, adjustments were made in case of very small error, i.e., a deviation of one child across answers, whereas cases with larger deviations were dropped.

correlations amounting to .57 and .24, respectively. This likely reflects that in most East German states, human resource planning in ECEC is child-centered, whereas it is more often group-centered in West Germany (Lange, 2008).

Table 5.2: Descriptive statistics of all variables (N=486, unless specified differently)

		W/E	MED	MEAN	SD	MIN	MAX
Dependent variables							
Group level	Child-teacher-ratio (N = 450)	West	8.28	8.85	3.53	2	27
		East	13.09	13.57	5.23	4	27
	Group size (N = 486)	West	21	20.71	4.09	5	29
		East	16	16.34	3.79	10	26
	Further training (N = 484)	West	1	0.77	0.42	0	1
		East	1	0.80	0.40	0	1

		MEAN	SD	MIN	MAX
Independent variables					
County level	Loose ratio regulation	0.15	0.36	0	1
	Moderate ratio regulation	0.29	0.46	0	1
	Strict ratio regulation	0.56	0.50	0	1
	No group size regulation	0.26	0.44	0	1
	Loose group size regulation	0.58	0.49	0	1
	Strict group size regulation	0.16	0.37	0	1
	Precise regulations on further training	0.21	0.40	0	1
Facility level	Neighborhood purchasing power (in 1,000€)	39.84	9.23	20.7	63.3
Control variables					
County level	East Germany	0.15	0.35	0	1
	Public expenses per child (in 1,000€)	4.92	1.58	1.8	9.4
Facility level	Rural	0.26	0.44	0	1
	Public provider	0.28	0.45	0	1
	Non-profit provider	0.48	0.50	0	1
	Other provider	0.04	0.19	0	1
	Provider information missing	0.21	0.40	0	1
	Weekly opening hours[a]	46.94	7.03	28	74
	Hours missing	0.24	0.43	0	1
	Number of children in facility[b]	86.14	38.33	22	245
	Number of children missing	0.14	0.35	0	1
	Group structure: closed	0.06	0.24	0	1
	Group structure: partly open	0.61	0.49	0	1
	Group structure: mainly open	0.17	0.38	0	1
	Group structure: missing	0.15	0.36	0	1
Group level	Children under 3 years in group	0.09	0.29	0	1
	Share of girls	48.64	10.78	14	86
	Share of migrant children	32.65	24.83	0	100
	Share of full-day attending children	36.27	33.14	0	100
	Share of handicapped children	5.28	13.06	0	100

[a]N = 370; [b]N = 417; Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

As a third quality indicator, a binary variable signifies whether the questioned educator received any hours of specialized training in a wide range of topics (e.g., quality development) during the past 12 months. The variable is prone to underestimate participation in further training as the questionnaire offers no possibility to differentiate between respondents skipping the items altogether and respondents not attending any courses unless they enter zero hours for each of the 15 categories, which no respondent did.[29] The higher participation rate in East Germany (Table 5.2) is consistent with previous findings (Gragert et al., 2008).

Main independent variables

Three categorical variables serve to characterize the legal context. They denote the extent to which state governments impose standards with regard to structural quality in institutional childcare for children between three and school age. Although such laws are implemented at state level, in the multilevel framework applied I model them at county level due to methodological concerns[30] and the fact that, at the time of conducting the analyses, state identifiers were not available for the NEPS data. I divided regulations on maximum child-teacher-ratios and group sizes into three categories displaying different degrees of strictness. The aim was to distribute the 16 states as evenly as possible across the three categories. In the case of child-teacher-ratios, I distinguished between regions exposed to *strict regulations* (five states with maximum ratios between 10 and 11.5), *moderate regulations* (five states with maximum ratios between 12.5 and 14.3) and *loose regulations* (six states with maximum ratios between 14.7 and 20). Concerning group size, I distinguished regions with *strict regulations* (three states with maximum group sizes between 20 and 22), *loose regulations* (five states with maximum group sizes of 25 children) and *no regulations* at all (eight states). A third variable on the legal context is binary, turning one if state laws precisely prescribe a minimum number of days per year educators must spend in *further training*. Using categorical variables is preferable to continuous measures of regulations because first, in terms of group size and further training, a substantial number of states set no minimum standards at all. Second, some states prescribe gradual adjustments of the tolerated maximum ratio or group size depending on various factors, including daily opening hours and closing days of the center, specific child characteristics etc. (see Chapter 5.3). This circumstance implies partial

[29] A similar question in the 2014 K²ID-SOEP study, which was shortened to seven categories, yielded a slightly higher participation rate of 81 percent, with larger differences between educators in East (88 percent) and West Germany (78 percent) (K²ID, 2015; own calculations, results weighted).

[30] As stated by Hox and Schoot (2013), in maximum likelihood estimation between 20 and 100 groups are required at the highest level.

imprecision of the calculated figures based on legal texts for states with non-uniform laws. Note that in these cases, the ratio and group size applicable to groups served six to seven hours per day acted as reference.

The last core variable capturing facilities' immediate social environment is neighborhood SES, which I treat as a kindergarten attribute. It is measured using the average purchasing power per household in Euro in the kindergarten's street section. Among others, the variable is based on administrative personal income tax statistics (for further details see Goebel et al., 2007).

Control variables

Several control variables help accounting for confounding aspects of the institutional context, such as regionally varying cultural norms, infrastructure and funding. Next to a dummy variable distinguishing between East (including Berlin) and West Germany, the 2011[31] net public expenses (in units of 1,000€) per child under fourteen in day-care at county level are included in the analyses.

To capture characteristics of ECEC facilities, further controls are whether centers are located in a rural area with less than 20,000 inhabitants, their provider type (public, non-profit, other), hours of operation, center size as measured by the overall number of children served, and type of group structure. The latter differentiates between closed groups without further opening, partially open groups, and mainly open groups, implying open work with occasional closure. Unfortunately, all of these variables displayed substantial amounts of missing values. To save as many groups as possible, I allowed for a separate category capturing groups without information on both type of provider and group structure. Also, missing values regarding opening hours and center size were set to the sample mean, with two binary variables indicating missing data.

A last set of control variables accounts for differences in groups' composition. Four continuous variables contain the shares of girls, of migrant children, full-day attending children, and the share of children disabled or at risk of disability. Finally, a dummy variable signifies whether any children under three years of age attend the group. All continuous variables are centered at the sample mean which allows interpretation of the fixed intercept.

Analytical strategy

After presenting descriptive statistics on the three dependent variables separately for East and

[31] 2012 for Berlin and Saarland due to availability problems.

West Germany, giving first insight into average levels and variation of structural quality across settings and regions, I estimate linear and logit multilevel models, allowing for random intercepts and cross-level interactions. Advantages of the method include the possibility to directly model the data's clustered structure and to compare variance components using level-specific intraclass correlations (ICC) across models. This analytical approach is also well-suited in light of the multilevel governance structure of the German ECEC system. The linear models specify three levels: county, ECEC facility, and group. They are applied to child-teacher-ratio and group size. The core combined model can be specified as follows:

$$ECQ_{gfc} = \beta_0 + \beta_k C_{gfc} + \beta_m X_{fc} + \beta_n Z_c + v_{0c} + u_{0fc} + e_{gfc} \quad (1)$$

, where each quality indicator of group g in facility f located in county c, subsumed by ECQ_{gfc}, is predicted by estimating k coefficients for group-level control variables (C_{gfc}), m coefficients for facility-level main independent and control variables (X_{fc}), and n coefficients for main and control variables varying at county level only (Z_c). β_0 denotes the fixed intercept, v_{0c} represents the random intercept for level three (county), $u0_{fc}$ the random intercept for level two (facility), and e_{gfc} is the residual error at group level.

In terms of further training, since the outcome variable can only take on values of zero and one, multilevel logistic regression is performed. In this case, the highest level is omitted due to lack of variance at this level. Educators' log odds of having received specialized training within the last 12 months are estimated as follows:

$$\log\left[\frac{p_{gf}}{1-p_{gf}}\right] = \beta_0 + \beta_k C_{gf} + \beta_m X_f + u_f \quad (2)$$

, where u_f is the effect of being in kindergarten f, C_{gf} is a vector of group-level control variables, and X_f captures all variables at facility-level or higher.

After running a variance components model, the main independent and control variables enter in a stepwise manner. First, control variables from levels 1 and 2 are included. They are then supplemented by variables located at the highest level, including legal regulations. Next, neighborhood purchasing power enters the model while controlling for town size. The final model incorporates an interaction between regulations and neighborhood SES. I repeat all analyses excluding East Germany. Results are displayed only for the latter two models, while estimates from the first two models are available in the general appendix (Chapter 8.5).

Models are fit using maximum likelihood estimation with robust standard errors. While the number of clusters prevalent in the data (above 100 at both levels) is sufficient according to simulation studies (cf. Hox and Schoot 2013, p. 387ff), enabling unbiased estimation of the

fixed-effects part (Snijders, 2005), previous work indicates that marginal group size - as present in the sample (about four groups per county and two groups per facility) - may entail risks for overestimating between-group variances (e.g., Clarke and Wheaton 2007). On the other hand, omitting a level (e.g., the medium level) to overcome this problem may introduce new bias in coefficients' test statistics (Moerbeek, 2004). Following this, I maintain three levels where feasible, i.e., in the linear multilevel models. All analyses were conducted using Stata (StataCorp, 2013).

5.6 Results

Table 5.2 displays descriptive statistics of the dependent variables for ECEC groups in East and West Germany separately. On average, ratios between educators and children are much more favorable (i.e., lower) in the West than East, whereas the opposite holds true for group size. Median ratios take on values of about eight (West) and 13 (East), while groups serve a median of 21 and 16 children, respectively. This phenomenon has been explained referring to differing traditions: In West Germany, centers used to offer primarily half-day childcare for groups above 20 children with about 1.5 to two educators, whereas in East Germany full-day arrangements in smaller groups equipped with one educator were the predominant principle (Lange, 2008). Whereas the standard deviation for group size is rather similar in East and West, dispersion in ratios is much greater in East than West German groups. Little difference is observable for further training, which about four out of five educators reported experiencing within the last 12 months in both parts. Overall, the figures suggest substantial variation in structural ECEC quality across settings.

Table 5.3 summarizes case numbers prevalent at different levels, as well as the level-specific intraclass correlations for all dependent variables based on the variance components model, summing up to one. The variance located at the highest level is substantial only in the case of group structure, namely child-teacher-ratio (18.3 percent) and group size (18.6 percent), although with regard to ratios this is only true for the total sample including East Germany. Put differently, groups within one county are more similar to each other on these indicators than across regions, justifying use of multilevel techniques. Still, vast heterogeneity continues to exist between single groups and centers once nesting in regions is accounted for. In the case of specialized training, due to a very low county ICC of below 0.002, the highest level was omitted. Three fourth of the variance in the propensity to receive specialized training is attributable to between-group variation, presaging that this indicator might first and foremost hinge on individual settings or teachers and their willingness or resources to acquire

additional knowledge. Hence, the data support Hypothesis 1, which stated higher similarity in structural quality within as compared to between counties, for ratios and group sizes (H1a and H1b) but not staff training (H1c).

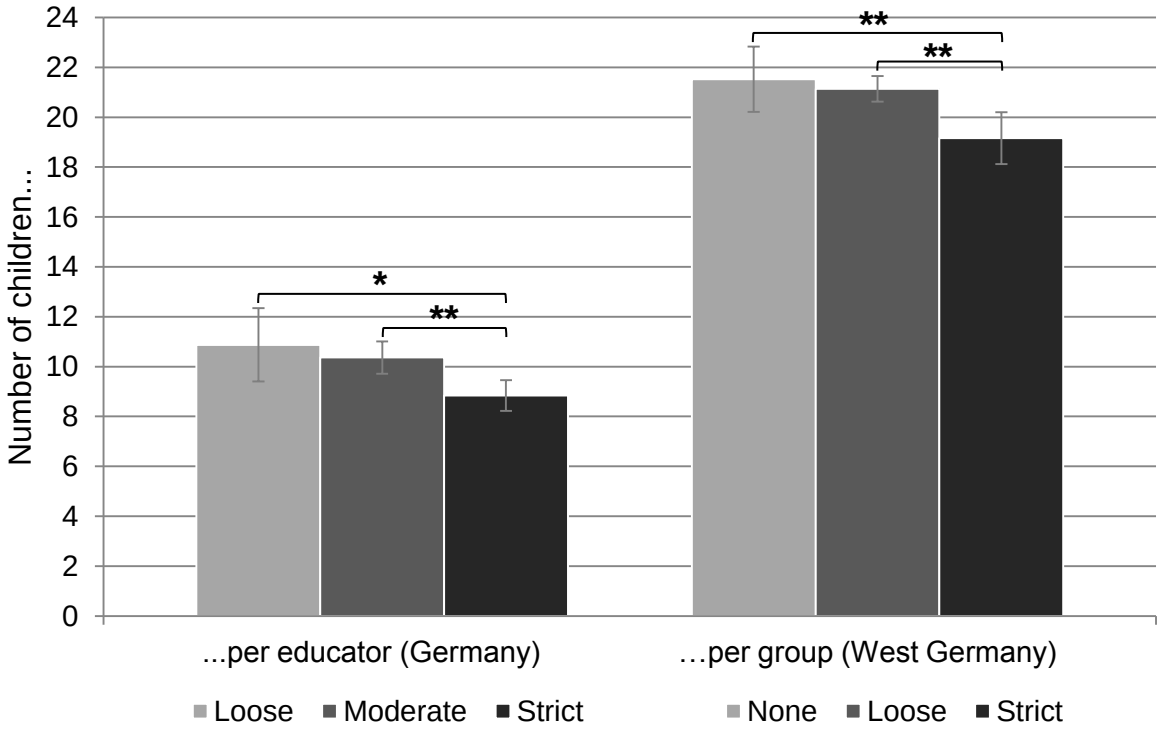
Table 5.3: Level-specific case numbers and intraclass correlations from variance components models

	Child-teacher-ratio		Group size		Further training	
	Germany	West	Germany	West	Germany	West
Case numbers						
County	112	95	113	96	-	-
Facility	213	176	215	177	214	177
Group	450	387	486	415	484	414
Intraclass correlation						
County	0.183	0.012	0.186	0.158	-	-
Facility	0.262	0.246	0.350	0.294	0.246	0.207
Group	0.556	0.742	0.464	0.549	0.754	0.793

Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

Turning to the multivariate analyses, the results indicate that ECEC groups in East Germany reveal significantly higher ratios of about 4.5 more children per educator even after holding all control variables constant (Table A-8.5.1 in the general appendix). Thus, the wide gaps cannot be explained by differences in group composition. Considering Hypothesis 2, which postulates associations between legal regulations and structural quality, results furthermore indicate that the lowest child-teacher-ratios exist in states with the most stringent legal standards. This supports Hypothesis H2a. Higher ratios of about 1.5 and two children are observed in states with moderate and loose rules, respectively (see Table A-8.5.1), which do not differ significantly from each other. The differences equate to medium effect sizes of 37 (strict vs. moderate) and 49 percent (strict vs. loose) of a standard deviation. Compared to the model merely including control variables, the county-level share of variance is reduced by about 70 percent (8.4 vs. 2.4 percent) in the total sample, lending additional support to the thought that institutional discrepancies between states might induce systematic regional variation in ECEC quality. Figure 5.1 (left) illustrates the model-based predictions of the number of children per educator as a function of state regulations. It becomes evident that kindergarten groups offer on average better ratios than what is required by law ('over-fulfilling'), i.e., between 10 and 20 children per educator depending on the specific state. The associations remain (marginally) significant when considering West Germany separately (see Table A-8.5.1), although they are predominantly due to East German groups.

Figure 5.1: Predicted child-teacher-ratios (left) and group sizes (right) as a function of state regulations in (West) Germany



N = 450 / 415; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; 95% confidence intervals included. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

The coefficients shrink slightly when incorporating neighborhood purchasing power (Table 5.4, column 1). What is more important, however, is the finding that ECEC groups located in areas with greater purchasing power offer more advantageous ratios. The coefficients, which can be interpreted as a mean decrease in ratios by .03 for Germany and .04 for West Germany, respectively, as the average purchasing power of households in the center's street section increases by 1,000 €, may appear minuscule at first. But given that the variable has a standard deviation of nine and a range of 20 to 63 thousand Euro, differences in ratios across socio-economically diverse neighborhoods may well exceed one child (Germany) and 1.5 children (West Germany) per educator, respectively. The independent variables of main interest together explain county-level variation in ratios almost entirely.

Hypothesis 3 predicted less positive relationships between neighborhood SES and structural ECEC quality to occur in more regulated contexts. Now, in accordance with H3a, the link between child-teacher-ratio and neighborhood SES is present in less rigorously regulated environments only, while it is absent when strict regulations exist (Figure 5.2). In

Table 5.4: Multilevel linear regressions of groups' child-teacher-ratio, group size, and multilevel logistic regressions of staff's probability of receiving further training

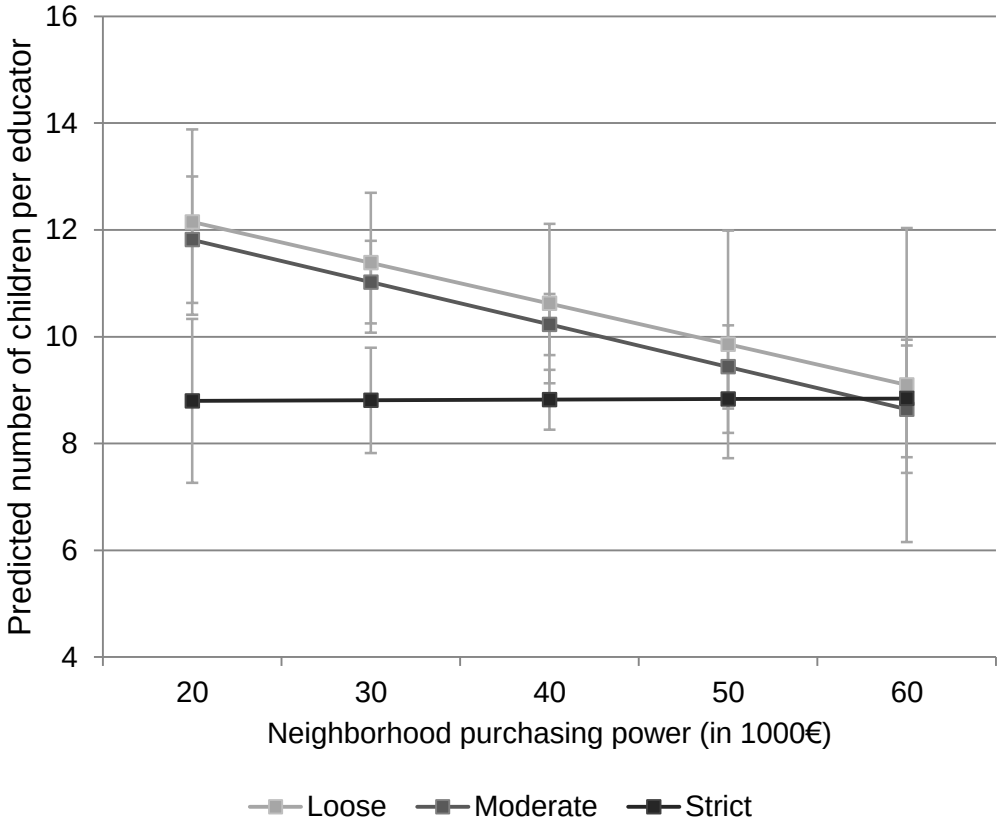
	Child-teacher-ratio				Group size				Further training	
	Germany		West		Germany		West		Germany	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No regulations[a]					2.37**	2.02*	2.54**	2.34*		
Loose regulations[a]	1.84*	1.80*	1.37	1.40+	2.05**	1.96**	1.98**	1.92**		
Moderate regulations[a]	1.42**	1.41***	0.68+	0.70+						
Public expenses per child	0.04	0.03	0.01	-0.00	-0.17	-0.17	-0.11	-0.11	0.15	0.14
NB purchasing power (NPP)	-0.03+	0.00	-0.04+	0.00	-0.04*	-0.11+	-0.06*	-0.11+	0.03+	0.04+
No regulations*NPP						0.12		0.08		
Loose regulations*NPP		-0.08		-0.06		0.06		0.06		
Moderate regulations*NPP		-0.08+		-0.04						
Precise regulations[b]									0.52	0.49
Precise regulations*NPP										-0.02
East Germany	3.73***	3.55***			-5.71***	-5.17***			0.51	0.47
Rural	0.45	0.56	0.55	0.65	-0.54	-0.44	-0.45	-0.39	0.62+	0.59
Public provider	-0.08	-0.02	-0.06	-0.02	-0.16	-0.17	0.06	0.09	0.06	0.07
Other provider	-0.30	-0.26	0.13	0.18	0.47	0.51	1.12	1.18	0.79	0.81
Provider info missing	-0.60	-0.55	-0.54	-0.51	-0.32	-0.32	-0.84	-0.83	-0.88+	-0.88+
Weekly opening hours	-0.01	-0.02	-0.03	-0.03	0.02	0.02	0.05	0.05	0.04	0.04
Hours missing	0.15	0.24	0.01	0.05	1.01+	1.04+	0.61	0.65	0.24	0.26
No. of children in facility	-0.01	-0.00	0.00	0.00	0.01	0.01	0.02+	0.02+	-0.00	-0.00
No. of children missing	0.29	0.46	0.42	0.50	-0.33	-0.30	0.14	0.21	0.52	0.54
Group structure: closed	0.60	0.67	0.17	0.19	0.25	0.17	0.51	0.43	-0.19	-0.20
Group structure: mainly open	-0.80	-0.86	-0.21	-0.29	-1.21+	-1.19+	-1.14	-1.17	0.19	0.20
Group structure: missing	0.99	0.91	0.88	0.86	-0.07	-0.04	0.55	0.49	-0.30	-0.31
Children under 3	-1.50*	-1.53*	-1.71**	-1.76**	-1.12	-1.18	-2.26***	-2.28***	0.48	0.48
% girls	0.01	0.01	-0.00	-0.00	0.00	0.00	0.01	0.01	0.00	0.00
% migrant children	-0.00	-0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00
% full-day attending children	0.02***	0.02***	0.02***	0.02***	-0.01+	-0.01+	-0.01	-0.01	-0.00	-0.00
% handicapped children	-0.06***	-0.06***	-0.06***	-0.06***	-0.10***	-0.10***	-0.10***	-0.10***	0.02	0.02
Constant	8.42***	8.30***	8.60***	8.52***	19.53***	19.59***	19.67***	19.70***	1.14***	1.15***
N (Groups)	450	450	387	387	486	486	415	415	484	484
AIC	2418.83	2419.77	2044.26	2049.24	2605.07	2604.72	2207.00	2209.91	532.21	533.91

BIC	2521.56	2530.72	2135.31	2152.16	2709.73	2713.56	2303.68	2314.65	624.22	630.09
ICC County	0.009	0.000	0.000	0.000	0.000	0.000	0.035	0.037	–	–
ICC Facility	0.229	0.238	0.209	0.213	0.381	0.382	0.280	0.280	0.211	0.212
ICC Group	0.762	0.762	0.791	0.787	0.619	0.618	0.686	0.684	0.789	0.788

Note: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Reference categories: [a]Strict ratio regulations / [b]No precise regulations; West Germany; Urban; Non-profit provider; Hours not missing; No. of children not missing; Group structure: partly open; No children under 3. All continuous variables centered at sample mean. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

other words, if ECEC settings are exposed to less rigorous minimum standards, they are more prone to over-fulfill the legal ratio requirements and thus provide better care conditions if they are located in more affluent neighborhoods. Note that the interaction reaches (marginal) statistical significance only in the complete sample (Table 5.4, column 2), possibly implying that more rigorous quality regulations help prevent differences across socio-economically diverse neighborhoods particularly in East Germany. In terms of model fit, according to AIC and BIC the more parsimonious models are however superior to those including neighborhood SES.

Figure 5.2: Predicted child-teacher-ratio as a function of neighborhood SES and state regulations (Germany)



Note: N = 450, 95% confidence intervals included. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

With respect to group size, East German groups serve on average about five children less than groups in the West even after controlling for diverse kindergarten and group characteristics (see Table A-8.5.2 in the general appendix). Based on the controlled model, their predicted size is 16.5, meaning that they generally fulfill recommendations given by NAEYC and NIEER by far, with no legal prescriptions needed. In West Germany, nine percent of variance remain at the highest level after including all control variables, a share that is greatly reduced once institutional context variables are introduced (2.7 percent).

Correspondingly, and in line with H2b, groups exposed to strict instead of loose or no legal rules are significantly smaller, with differences equating to or exceeding two children (see Table A-8.5.2). Effect sizes are medium to large, ranging between 48 (strict vs. loose) and 58 percent (strict vs. none) of a standard deviation. Again, no significant difference emerges between groups with loose vs. no laws (results not shown). Group sizes predicted as a function of regulations are displayed in Figure 5.1 (right) for West Germany. As can be seen, although West German groups are larger than recommended in less regulated contexts, they are still smaller than one might expected. This could again point to over-fulfilling of regulations, or alternatively reflect within-state deviations in the minimum requirements.

Consistent with the findings above, groups located in economically more privileged neighborhoods serve on average fewer children (Table 5.4, column 5). The correlation even increases when focusing on West Germany (column 7), despite the reduction in sample size, with differences across neighborhoods amounting to a maximum of 2.5 children. While the interaction terms with regulations are insignificant in both subsamples and therefore not illustrated, the association between neighborhood SES and group size tends to be somewhat *stronger* in case of exposure to strict regulations. Thus, there is no empirical support for Hypothesis 3b in the data. Whereas BIC favors the controls-only model, AIC favors the more complex models to similar degrees.

Neither location in East or West nor legal regulations emerge as significant predictors of whether educators received specialized training in the last 12 months (see Table A-8.5.3 in the general appendix). The results reemphasize the before-mentioned impression that participation in further training may be much more dependent of individual educators and ECEC settings than of institutional contexts. Notably, neighborhood SES correlates positively with the likelihood of taking part in further training, and the coefficient reaches marginal statistical significance (Table 5.4, column 9). While this is independent of whether precise laws on further training exist (column 10), this finding speaks once more for provisions of higher structural ECEC quality in higher-SES areas. None of the central independent variables significantly predicts further training participation in the West German subsample, which is why the results are not displayed. Overall, model fit for this outcome is highly unsatisfactory, and H2c and H3c do not receive any support.

Several sensitivity checks were conducted, all of which yielded similar results. For instance, public expenses were specified in multiple ways, that is, next to net expenses per child under fourteen in day-care at county level, these expenses were weighted by age group

based on the assumption that childcare places for under-three year olds are more costly than those for older children. Also, as full-day places are more expensive than half-day services, I replaced number of children with the full-time equivalent variant. Next, the categorical variable capturing state regulations for ratios was substituted with its corresponding continuous variable for the maximum number of children allowed per educator. As another test, the models included further county-level characteristics of the childcare system, namely the share of full-day attending children, the attendance rate among children with at least one foreign-born parent and the degree of expansion of childcare slots in 2011 compared to 2010, which might correlate with both legal regulations and the outcome variables of interest (see Table A-8.5.4 in the general appendix). Overall, these additional tests support the findings reported above.

5.7 Discussion and conclusion

The results from this research confirm again the large variation in structural quality among German ECEC settings (e.g., Kuger & Kluczniok, 2008). They furthermore indicate that settings in the same county are more similar in terms of group structure than settings of different counties, as about one fifth of variation is located at regional level. This is however not true for staff participation in further training, which seems to primarily depend on characteristics of ECEC settings and educators. Notably, more than two decades after German reunification the greatest differences become evident between East and West: Kindergarten groups in East Germany are much smaller but face considerably worse child-teacher-ratios than groups in West Germany.

The findings also suggest that part of the observed heterogeneity in aspects of group structure might be driven by differences in legal regulations, albeit by no means all of it. Both ratios and group sizes are significantly lower by approximately two children in ECEC groups exposed to strict as compared to more lenient or no regulations. Effect sizes are medium to large. This implies that variation in structural ECEC quality across larger regions can be systematic and substantial in a universal, highly subsidized system such as the German one. The question whether more stringent regulations also go along with better process quality (e.g., Phillipsen et al., 1997) and if meeting more recommended quality standards is linked with better child outcomes (e.g., Burchinal et al., 2000) in Germany as well should be addressed in future studies.

The documented differences emerge especially due to East German groups in the case of ratios, and exclusively due to West Germany in the case of group size. This underscores the

historically grown differences in traditions in ECEC which continue to shape the conditions under which children are cared for in East and West Germany (Lange, 2008), and that the practical relevance of specific regulations is highly context-dependent. No significant differences could be observed between the two less stringent categories of legal regulation, nor did settings obliged to grant their staff a specific amount of further training significantly differ from those facing no clear legal requirements. The findings emphasize an important point. First, childcare providers and principals seem to partially *over-fulfill* legal requirements, as for instance in the case of non-strict regulations for ratio (especially West Germany), possibly perceiving the legally set thresholds as insufficient. Second, they sometimes do *not comply* with regulations (Gragert et al., 2008), as in the case of further training.

From this it follows that establishing legal standards does not per se enhance structural care conditions. Legal prescriptions must on the one hand be sufficiently strict in order to elicit improvements. In the German context, maximum group sizes would most likely have to fall substantially below the commonly used benchmark of 25 children. They would assumingly have an impact in West but not East German counties, where virtually all groups fulfilled (or undercut) scientifically established criteria despite a complete absence of regulations. By contrast, tightening ratio regulations should improve proportions between educators and children especially in the Eastern part, while differences across Western counties turned out minor in comparison with the greatly varying legal prescriptions. On the other hand, provided that precise regulations exist, compliance with these needs to be assured for instance through independent, regular monitoring. The result that less than 80 percent of responding educators received specialized training within the last year is striking and underlines this point.

Apart from these broad patterns, results indicate positive associations between neighborhood SES and ECEC quality: Groups located in areas with higher average purchasing power offer more favorable ratios, are smaller and, on top of that, have a higher chance of being run by staff receiving regular training. This is in line with findings from US-American studies considering process quality (e.g., Burchinal et al., 2008; Dupéré et al., 2010; Marco & Vernon-Feagans, 2013), but may be somewhat surprising given the marked deviations of the German from the US-American system (e.g., low parental contributions to childcare, negligible share of for-profit centers). In principle, the observed associations could be due to center differences in priority-setting or capabilities to attract qualified staff, or in parental composition, meaning that parents in more affluent areas might demand better ratios. Alternatively, higher-SES parents might intentionally move to areas with better ratios. It is

beyond the scope of this analysis to explore which processes lead to patterns of this kind. What one can however tentatively conclude is that only the regulations on child-teacher-ratios in some states seem stringent enough to prevent unequal access to favorable staffing in ECEC across socio-economically diverse neighborhoods. By contrast, in the presence of less rigorous laws, better quality is offered in socio-economically more advantaged areas, which matches better with findings by Hotz and Xiao (2011). The analyses do not point to an equivalent pattern with regard to group size. I interpret this to mean that group size regulations lend too much latitude to individual providers of childcare even in states with the most rigorous laws in relative terms. More generally, it appears that whenever regulations leave substantial room for improvement, childcare providers in more affluent areas are more inclined to over-fulfill state requirements as compared to those in less economically advantaged areas.

Limitations of the study

The study faces several limitations which should be kept in mind when regarding the results. First, the possibility that unobserved heterogeneity underlies the reported relationships cannot be ruled out. Second, selective unit- and item-non-response might have biased the results. Of special concern is on the one hand the underrepresentation of ECEC settings from East Germany, and on the other hand the possible underestimation of further training participation of staff due to the way the question was asked. The latter is however only a problem if respondents just skipped this question but none of the other questions relevant for the analyses. Also, since the number of facilities per county was small and a municipality-identifier was missing in the data, the measure of neighborhood purchasing power might reflect municipality rather than neighborhood differences. Even though regional discrepancies in financial resources were partially addressed by controlling for public expenses on day-care, I could not include data on other sources of revenue such as parental fees which might affect quality as well.

Another limitation of the analysis is that, since the data are cross-sectional, reverse causality is principally conceivable. Clearly, governments and lower-level authorities may react to inadequate conditions by implementing laws. However, the pattern observed for state regulations fits reasonably well with a causal interpretation. In support of this, laws should not change very frequently and rapidly, making reverse causality appear less likely. Nevertheless, in order to become more confident about causal links, longitudinal data on ECEC centers across multiple years would be needed.

As a final remark, previous studies demonstrated that any relationships between structural and process quality are imperfect and partially non-linear (e.g., Le et al., 2015). Adequate care conditions as studied in this chapter must rather be regarded as necessary but insufficient preconditions for the provision of high process quality. Besides, interventions targeting structural ECEC quality will likely be effective only if they modify several indicators simultaneously (Cryer et al., 1999).

Conclusions

Despite its limitations, the present study provides more insight into how access to favorable ECEC conditions is distributed across Germany. The results suggest that differences in structural ECEC quality are not random but at least in part pre-structured by the socio-institutional environment. In this way, parents' choices of ECEC institutions are likely not just a matter of personal decision. Rather, place of residence constrains families' opportunity structures, ultimately entailing the potential to alter children's life chances and skill development at the very beginning of formal education in systematic ways. Especially the well-documented problem of early socio-economic gaps in child outcomes may be impeded by adverse ECEC quality prevalent in less affluent neighborhoods. To address the problem of unequal access, sufficiently strict national standards coupled with regular monitoring and additional funding for settings with higher burdens (Hogrebe, 2014) might represent a solution. The idea of linking funding to quality of provision might also be worth considering (Gambaro et al., 2014; Karoly et al., 2014). In any case, improving ECEC quality becomes increasingly urgent given the ever-expanding German childcare system which serves children at increasingly younger ages and over longer periods of life.

6 FINAL CONCLUSIONS

In light of significant family policy reforms introduced at the beginning of the 21st century, this dissertation set out to explore inequalities in availability, accessibility and quality of early childhood education and care in Germany and the possible implications for families. While the first part investigated relationships between maternal employment, satisfaction and changes in (full-time) childcare provision, the second part examined variations in pedagogical ECEC quality across socio-economic groups and regions. This dissertation thus integrates both the parent and child perspective – after all, the expansion of ECEC has been based on hopes to promote mothers' employment and work-family balance as well as to equalize educational opportunities and development of children from different socio-economic backgrounds and geographic regions. The thesis considers ECEC to be an important public resource allocation of which can influence overall life chances as well as gender, socio-economic and regional inequalities therein. It adopts a multi-faceted view on both socio-economic status and ECEC quality and focuses on Germany, a national context that proves unique against the backdrop of persisting East-West differences in work-care cultures and childcare infrastructures, as well as its decentralized ECEC system. In the following paragraphs I summarize the main results of the conducted analyses and draw conclusions for research and policy while acknowledging some of the limitations and unfilled research gaps which need to be addressed in future work.

Summary of findings from PART 1: Increasing provisions of (full-day) childcare: Consequences for mothers' employment and subjective well-being

Regarding mothers of children below three years of age, who have been the primary target of policy reforms related to expansions of childcare places and parental leave benefits, the findings confirm that education-specific work-care arrangements diverged between 1997 and 2013. The shift from familialism to optional familialism occurring in Germany as of the mid-2000s facilitated labor market participation and formal childcare use, in particular for the highest educated mothers. As opposed to this, low educated groups, who generally hold less egalitarian gender role attitudes and face fewer job opportunities, took advantage of the new policies to a much lesser extent. Hence, while informal care use decreased fairly similarly

across all groups, unlike high educated mothers low educated mothers did not uniformly draw on formal childcare instead. As a consequence, their under-3-year-old children are less likely to make early learning experiences in ECEC services, and increasingly so since the mid-2000s.

More generally, while the reforms might have contributed to greater gender equality in labor market participation among parents of young children, the results suggest that this was mainly restricted to higher educated groups. Socio-economic differences within the group of mothers exacerbated in turn, evoking concerns over increasing (intra- and intergenerational) social exclusion of the low educated. While sociologists have long pointed to this group's growing risk of exclusion from the labor market in Germany, more recent studies have linked such patterns of continuing polarization to family policies specifically targeting the group of mothers (e.g., Drasch, 2013). Investigating changes in absolute educational gaps and spanning a longer time period from 1997 to 2013 as compared to other studies (Kreyenfeld & Krapf, 2010), the present research provides evidence for continued educational polarization also following the newest developments in German family policy. Further advances include joint considerations of employment and use of formal and informal childcare types, given their strong interrelations, and comparisons of West with East Germany. A surprising outcome was that educational gradients in maternal employment behavior and formal childcare use became increasingly similar across both parts. This is in contrast to our expectations that educational discrepancies would be larger in West Germany. The findings suggest that over time, class differences in labor market opportunities and gender role attitudes seem to have both augmented and outweighed historically formed cultural beliefs in terms of shaping work-care arrangements of mothers with young children.

As children become older, using formal childcare turns into the norm. Choices between childcare types are replaced by choices of ECEC settings with varying characteristics. As has been shown in Chapter 1.3, parents take into account non-pedagogical quality aspects such as centers' proximity and opening hours when choosing an ECEC institution. Related to the latter aspect, another development emphasized in the thesis is the expansion of full-day childcare services. What became evident is that higher availability of formal childcare for extended hours prevented primarily partnered mothers transitioning to long part-time or full-time work in West Germany from experiencing a decline of family life satisfaction. By contrast, partnered mothers in East Germany profited more generally: Their satisfaction with family life and life overall increased with rising full-day care availability independently of employment status. Furthermore, single mothers turned out more satisfied when using full-

day services as compared to their partnered counterparts. By contrast, no significant associations became apparent for fathers. Hence, the effect of extended childcare provision cannot be expected to be uniform and extant for all groups.

This research underlines that it may be insufficient to just focus on childcare quantity. For some groups of parents to benefit from these places, they need to have access to ECEC centers for extended hours. Since this applies to all parents of children who are too young to attend school, the analyses included all families with children under school age. As a further advantage compared to prior sociological studies (e.g., Steiber, 2009; Stier et al., 2012; Treas et al., 2011), panel data for a single national context with substantial within-country differences enabled us to more adequately address problems of unobserved heterogeneity. Conceptualizing formal childcare as a boundary-spanning resource fulfilling demands in both the family and work domain (Voydanoff, 2005), this work also made a theoretical contribution by elaborating on possible mechanisms through which full-day care provision might affect parental satisfaction and how heterogeneous effects might come about depending on mothers' cultural context, labor market attachment and family resources. In theoretical terms, having access to full-day care services means parents can invest more time in activities other than childcare (e.g., paid work, commuting times, housework, leisure). Additionally, parents gain flexibility and are less pressured to organize additional childcare. Ultimately, offering more full-day care places leads to more freedom of choice on the part of parents, making full-day childcare use (and full-time work among mothers) more normative and less stigmatizing.

Returning to the question which socio-economic groups of mothers benefitted (most) from recent changes in the institutional context, I conclude that in terms of labor market participation it is the more educated mothers who benefitted more from the large increase of childcare availability for children under three combined with the 2007 parental leave benefit reform. Concerning work-family balance and subjective well-being, there is some indication that full-day care provisions contribute to subjective well-being especially among those mothers who carry the greatest work-family conflict due either to high work demands in terms of hours (significant interaction only observed for West Germany) or lacking partner resources. More generally, with regard to policy evaluations PART 1 demonstrated benefits from considering (longer-term) consequences of policy packages – rather than an isolated reform – and from testing for effect heterogeneity. Also, the necessity to take into account the cultural and institutional context in which policy measures are implemented became apparent, backing up the assumption that policy measures may interact with each other, with social

norms, as well as with other factors (e.g., labor market conditions) which may influence employment behavior as well.

Summary of findings from PART 2: Variations in pedagogical ECEC quality: Consequences for children's educational opportunities

Coming back to parental choices of ECEC centers, the criteria parents reported to include in their decisions are not restricted to non-pedagogical quality aspects. The great majority of parents also considered indicators of pedagogical quality such as equipment, pedagogical concepts and group size. The results presented in the thesis point to systematic socio-economic differences in the ECEC quality children in Germany experience. They suggest that predominantly children with low educated parents and with migration background, and to lesser extents children from low-income families and from single-parent households, attend ECEC settings with partially lower-quality characteristics as compared to children from higher-SES families. We interpret this to mean that mediators like preferences, information and social networks might matter more for choosing high-quality settings relative to financial and time resources. The available quality information appears to be an important moderator in the sense that positive relations between SES and ECEC quality emerged in particular with respect to quality indicators assumed to be easily observable for parents.

Previous evidence related to the pursued research questions has mainly been generated using data from Anglophone countries with very distinct childcare systems (e.g., Augustine et al., 2009; Gambaro et al., 2015; McCartney et al., 2007). The finding that in the highly-subsidized German ECEC system poverty is barely predictive of lower ECEC quality did hence not come as a surprise. As compared to the US and the UK, parental fees are substantially lower in Germany and oftentimes adjusted to family income, so that access to high ECEC quality can be assumed to be less strongly linked to family budget. Still, experiencing high quality is not random. In particular, migration background and low parental education are associated with lower quality on several indicators of structural and orientation quality. Especially the latter quality component has hardly been investigated in terms of socio-economic differences in access. The new K^2ID-SOEP extension study offers a unique opportunity to examine these associations for Germany as a whole, given that it is based on a nationally representative household panel including in-depth information on family background characteristics as well as diverse aspects of ECEC quality. By contrast, most other studies have been based on regionally more or less restricted subsamples (e.g., Becker, 2010a, 2010b; Kuger & Kluczniok, 2008; Lehrl et al., 2014; Tietze et al., 2013). Our

contribution thus extends earlier studies in terms of empirical analyses but also theoretical considerations of how associations between SES and ECEC quality might emerge. The findings are furthermore in line with central relationships which were documented beforehand. First, parents differ in preferences for ECEC quality depending on socio-economic characteristics (Klein et al., 2016). Second, there is consistent evidence of social segregation (Becker, 2010a; Biedinger et al., 2008). Children attend settings whose social composition varies systematically by parental education and migration background, a pattern that persists even after controlling for diverse residential characteristics. This brings up the question to what extent this segregation – or other quality differences documented here – are at the core of negative relationships between migrant shares and process quality as reported by Tietze et al. (2013) and Kuger & Kluczniok (2008).

Whereas Chapter 4 focuses on the demand side, Chapter 5 considers the supply side of ECEC quality using national data on ECEC services for four- to five-year-old children. Given parents' strong preference for ECEC centers that are in close proximity, which ECEC quality is available to them in their close environment constrains their choice set. At least two central indicators of structural quality, that is child-teacher-ratio and group size, are not randomly distributed across counties as well as neighborhoods of different socio-economic composition. About 18 percent of variation in these indicators is located at regional level, part of which is explainable through compositional aspects. In addition, differences in federal state regulations seem to matter for the provision of better or worse conditions, with stricter laws going along with lower (and hence better) child-teacher-ratios and group sizes. These legal discrepancies in combination with historically shaped traditions result in significant East-West-differences: While ECEC settings in the West tend to offer better ratios, those in the East provide substantially smaller groups. As a further important finding, structural quality indicators are positively correlated with socio-economic compositions of the neighborhood, i.e., families living in areas with greater purchasing power have easier access to ECEC settings with more favorable relations between children and educators and with fewer children overall; in addition, these settings are more likely to provide ECEC staff with further training opportunities.

In contrast to the analyses in Chapter 4, which aimed at exploring parental choices of ECEC quality net of contextual differences in ECEC provision, Chapter 5 underscored the importance of such variations in local quality supply. The analyses provide evidence that access to high structural ECEC quality depends on families' place of residence. This is in accordance with existing studies on the US-American context that link features of structural

and process quality with between-state variations in legislation (Hotz & Xiao, 2011; Phillips et al., 2000; Rigby et al., 2007) as well as with neighborhood advantage and safety (Burchinal et al., 2008; Marco & Vernon-Feagans, 2013). To my knowledge, comparable analyses for Germany that go beyond mere federal state comparisons of average ratios and group sizes relative to legal regulations (Viernickel et al., 2015) have not been conducted before.

In sum, the findings presented in PART 2 of the thesis indicate both socio-economic and regional inequalities in access to, and use of, ECEC services of better or worse ECEC quality. This implies that already in the first educational institution children encounter in their life course, educational chances are not equal but depend on children's origin. The findings are in line with Meyers and Jordan's (2006) claim that parents do not choose between comparable alternatives but face varying constraints which likely relate to actual supply of ECEC quality but also to other, socially filtered factors (e.g., parental information). The accommodation model's view of childcare choices as contextualized patterns of actions proves to be a very useful, flexible theoretical framework in studies investigating socio-economic and regional differences in ECEC quality choices. It allows researchers to combine perspectives of rational actors with social constructivist perspectives, without neglecting variations in context shaping families' opportunity structures. Assuming that parental choices in the realm of childcare are accommodations rather than optimal choices, the accommodation model is also in line with other theoretical perspectives this dissertation draws on. These include Voydanoff's (2005) conceptualizations of work-family balance which results from a fit between resources and demands originating from the work and family domain; social production function theory (Ormel et al., 1999), according to which individuals strive to achieve multiple instrumental and ultimate goals at the same time; and the assumption of bounded rationality as part of the wide version of RC, which claims that both objective and perceived constraints can influence human behavior (Opp, 1999).

Overall conclusions and implications for policy

The results of the entire dissertation thesis show that variations in childcare availability, accessibility and quality have an impact on parents' and children's life chances – as measured by subjective well-being, employment and educational opportunities. *I come to the conclusion that Germany's childcare system may increasingly serve as a vehicle for higher-SES mothers to preserve advantage in terms of economic activity and well-being as compared to their lower-SES counterparts*. Especially mothers with high endowments of cultural capital (Bourdieu, 1986) were enabled to convert their cultural capital into economic capital sooner

after childbirth relative to before the policy reforms and relative to mothers with lower cultural capital. On top of that, at least in West Germany it was mainly those mothers returning to the labor market for long hours who benefitted from extended hours of childcare provision as their transitions were not associated with decreasing well-being in case of sufficient access to full-day childcare.

I furthermore conclude that the German ECEC system is ill-equipped to assure equal opportunities for every child independent of socio-economic background and place of residence, thereby facilitating the social reproduction of inequality. Regarding parental choices of centers, it seems that differences in cultural and social capital rather than economic capital drive discrepancies in ECEC use of varying quality. In addition to that, the findings also point to irregularities in the regional distribution of ECEC quality playing a role in Germany. By contrast, for the most part the German childcare system prevents families with low levels of economic capital from choosing lower-quality settings – presumably owing to the immense state involvement in funding ECEC services and the relatively low, often income-adjusted childcare fees.

ECEC can be seen as a policy instrument the precise organization of which can affect intra-generational mobility as well as the inter-generational transmission of (dis)advantage. Mothers with higher cultural capital face greater opportunity costs of staying at home, have better job prospects and more egalitarian gender role attitudes, meaning that they have greater incentives to keep labor market interruptions short. At the same time, parents with higher cultural capital may consciously and strategically choose ECEC centers of high quality in order to transmit cultural capital to their offspring (Jaeger and Breen, 2016), i.e., to promote their children's knowledge, (non-)cognitive skills and therefore school readiness. Policies that focus on expanding places and favoring employed parents in the admission process, but do not ensure that ECEC services are of high-quality *and* accessible also to lower-SES groups, can have unintended consequences in terms of inequalities of opportunity**.**

Recent policies in Germany have as yet aimed primarily at raising female employment and improving the reconciliation of work and family life by increasing childcare availability and putting new parental leave policies in place. As I have shown, these changes indeed went along with increased employment among mothers with very young children. At the same time, however, this amplified educational discrepancies in employment and formal childcare use within the group of mothers, which is at odds with the Europe 2020 targets of reducing the share of early school leavers and the number of people at risk of poverty (European

Commission, 2010). Implementing measures to improve job opportunities for low educated mothers and to set incentives for them to make their children attend ECEC services could help achieving these goals. On the one hand, low educated people face a higher risk of poverty. On the other hand, previous studies have found low educated mothers to provide their offspring with, on average, lower-quality home-learning environments than more educated mothers (e.g., Magnuson et al., 2009; Davis-Kean, 2005), so their children would likely benefit the most from early learning settings preparing them for school.

Next to the dimension of accessibility regarding childcare places, however, the importance of quality needs to be stressed again. The German government has initiated a quality initiative and linked it to the goal of providing equal educational opportunities to children independent of their social origin and place of residence (BMFSFJ, 2016). My dissertation underlines that the country does not reach this goal. This leads to several implications for social policy. First, the overall quality level should be raised in order to reduce the great variation in ECEC quality between groups, centers and regions (see also Spiess, 2010). For this to happen, the minimum standards for pedagogical ECEC quality must be tightened and aligned across federal states. Ideally, these standards would be identical, but the federal states strive to maintain autonomy in this respect. Elevating quality standards requires greater financial contributions by the state (Spiess, 2010), which the federal government has already announced for the years to come (BMFSFJ, 2016). In parallel, regular external and independent evaluations are required to ensure compliance of ECEC centers with these legal regulations. So far, Berlin is the only federal state that has taken this step (European Commission et al., 2014).

Clearly, the state's possibilities to intervene do not end here. These and other research findings suggest that children from potentially disadvantaged families (especially those with low educated parents and migration background) experience lower-quality ECEC environments than children from higher-SES families. By allowing ECEC settings additional resources for them, federal states can respond to these children's greater propensity to be in settings with more challenging social compositions as well as to their greater need for high-quality environments that foster early learning ('positive discrimination'). This has already been realized in several federal states; however, the precise regulations vary substantially (Hogrebe, 2014). While some states specifically support centers located in deprived areas, others make extra funding conditional on centers' composition or on the characteristics of single children attending the institution (i.e., child-based calculation of needs). Either way, in

light of the immense costs caused by the childcare expansion and quality development, this option might be the most efficient way of deploying the available financial means.

Society as a whole is responsible for making parents aware of the importance of pedagogical ECEC quality. This might foster parents' efforts to gather information on centers' quality before choosing a setting. However, one has to make sure that more information on the quality of different centers is easily accessible and understandable to *all parents* independent of their socio-economic characteristics. Increasing transparency should better enable parents to take into account qualitative aspects when choosing a center, and to make more informed judgments about the quality of education and care provided to their children after having chosen a setting. This, in turn, could empower parents to demand higher quality in the specific centers they use, thereby contributing to quality improvements in the system themselves (see also Spiess & Tietze, 2002).

A last point that deserves attention is the increase in full-day childcare services. In accordance with policy objectives, this development contributed to mothers' satisfaction. At least in West Germany, this primarily benefitted those mothers facing the greatest difficulties in terms of reconciling family and work, i.e., mothers with long working hours and single mothers. Policy makers should thus ensure that all regions provide sufficient amounts of full-day care places. The thesis suggests that this is not yet the case everywhere – especially some counties in West Germany lack behind in this regard. However, it is essential to keep in mind that the analyses were restricted to parental outcomes of subjective well-being. To arrive at a more complete picture as to whether the expansion of full-day care should be pursued further, additional research is required, which will be further specified below.

The abovementioned policy suggestions partly overlap with the goals of action formulated as part of the government's quality initiative (BMFSFJ, 2016). The initiative is thus a good start – but the goals the government and federal states have agreed upon are as yet not legally binding. On the contrary, each state is free to choose measures from a broad set of instruments. This means that states can use the additional funds to tackle pedagogical quality indicators (e.g., child-educator-ratios, further training opportunities for educators and directors). However, they can also choose to expand the number of full-day care places – which may lead to a deterioration of some aspects of pedagogical quality if these are not improved simultaneously – or states might decide to merely lower parental fees or to make no quality improvements at all. Time will tell if the stakeholders who have committed to the initiative's goals will take appropriate action.

Limitations and outlook

As stated above, the empirical support for expanding full-day care services provided in this thesis is incomplete. Further research is needed on the effects of this expansion on child well-being, especially for children below age three, in the German context. Only if long hours of attendance prove to be harmless, this policy measure is recommendable without restrictions. Furthermore, while the amount of childcare provision might be a relevant factor for parents, it certainly is not the only one. Parents take into account diverse non-pedagogical and pedagogical factors when choosing an ECEC center for their children. However, this thesis has not addressed the question whether and how pedagogical ECEC quality relates to parental employment and well-being. The national and international research base for this issue is as yet limited, in particular with respect to causal relationships (see Schober, Spiess, & Stahl, 2016 for a literature overview).

The thesis suffers from other shortcomings that are often due to insufficient sample sizes, but also due to lacking information in survey data. One class of shortcomings relates to the applied outcome measures. Regarding parental outcomes, in addition to investigating time trends in maternal labor market participation it would have been even more informative to also distinguish full-time work from less intense forms of labor market participation. This was not possible due to low case numbers. Would the increase of the educational gradient have been more or less pronounced in this case? Also, self-reported satisfaction only covers one component of subjective well-being, that is cognitive well-being, while affective well-being has not been analyzed (Schimmack, Schupp, & Wagner, 2008). More generally, the applied measure is just one of many dimensions of well-being, and using other measures of psychological and physiological well-being/health might have led to different results. On the other hand, mothers' satisfaction with family life is still a somewhat imprecise measure that likely captures more than perceived work-family conflict (e.g., congruence of opinions, closeness and quality of interactions between family members). Therefore, using a more direct measure of work-family conflict in addition to satisfaction would have been preferable.

In terms of measures of ECEC quality, although the thesis acknowledges its multi-dimensionality by drawing on a wide range of quality indicators, the central component of process quality could not be analyzed directly. Is the German ECEC system characterized by unequal distributions of high process quality across regions, and could this in part be related to between-state variations in legal regulations? The existing evidence on regional variations in process quality is so far fairly limited (Tietze et al., 2013; Kuger & Kluczniok, 2008).

Future studies will also have to provide answers as to whether it is possible to assess process quality in surveys directly, or if survey methodology mainly enables researchers to collect data on other quality components which correlate with process quality. Thus, assessing the day-to-day interactions in ECEC, which are so central to child development, remains an ongoing challenge for quantitative researchers and policy-makers alike. The qualification of ECEC staff (both initial and further training) and structural characteristics such as child-educator-ratios are key starting points to raise process quality (e.g., Fukkink & Lont, 2007; Kuger et al., 2015; NICHD Early Child Care Research Network, 2002b). However, my findings provide some indication that next to implementing sufficiently strict legal regulations a monitoring system might be necessary to assure that these legal requirements are met in practice. Future research should pursue the question to what extent legal regulations and regular monitoring could prove effective in promoting both process quality and child development in Germany.

A second class of shortcomings refers to underlying mechanisms of the documented associations. Despite discussing potential mechanisms based on theory, previous research, and partially backed up by additional data, the dissertation cannot fully disentangle all channels and pinpoint their relative significance. As an example, lacking data prevented me from including individual gender role attitudes in the analyses. Also, concerning the study of parental ECEC quality choices in Chapter 4, direct measures of beliefs, information, search strategies and social networks parents relied on prior to choosing a center were missing. Even retrospective data on parents' reasons for picking the center was available for only about half of the sample. Another point refers to the positive relationship between neighborhood affluence and structural quality. It remains an open question to what extent this link is i) center-driven, for instance, centers in more affluent areas prioritize good ratios and are better able to find and retain staff, whether for monetary or non-monetary reasons, ii) parent-driven, e.g., higher-SES parents express greater demand for good ratios and exert influence on quality provision, or iii) due to higher-SES parents moving to areas with better structural quality. Albeit the presented findings point to differences in both parental choices *and* opportunities regarding ECEC quality supply in families' environment playing a role, the question which of the factors is more relevant for explaining socio-economic differences in ECEC quality could not be answered either.

Finally, the group of fathers had to be neglected in large part. This was on the one hand due to higher unit non-response among this group. On the other hand, in the large majority of families mothers continue to be the main caregivers. They should therefore be most affected

by childbirth in terms of work-family conflict and labor market attachment, and should be the strongest beneficiaries of policies in support of combining work and childcare responsibilities. This expectation was supported in the analyses in Chapter 3, which did not show significant positive links between of full-day childcare services and paternal satisfaction. Nonetheless, given fathers' increasing involvement in childcare in particular following the 2007 parental leave benefit reform, they deserve more attention in future investigations.

Future studies should furthermore draw on longitudinal data on ECEC quality which allows for more advanced methods to estimate causal effects of ECEC quality. Panel or repeated cross-sectional data would also help to shed light on how quality provision changed in the course of the expansion. Has the large variation in quality indicators increased or decreased? Have certain regions benefitted more than others? And have links between ECEC quality and family SES become stronger or weaker over time? Another point that is worth emphasizing again is this work's focus on the German context. While this provided me with a unique opportunity to study within-country heterogeneities during a phase characterized by accelerated change in ECEC provisions, the results' transferability to other countries is presumably limited. The analyses should therefore be replicated with data from other countries.

Bottom line

Despite all limitations and needs for further research, this dissertation thesis makes some important contributions. This was accomplished by using a mixture of cross-sectional and longitudinal data from Germany that originate from newly available studies on formal childcare institutions (K²ID-SOEP, NEPS) as well as rich household panels (SOEP, FiD). These data were further supplemented with information from various sources including administrative records, legal texts, and MICROM data on small-scale environments. Drawing on these unique data, the analyses expose improvements and deficits in the German ECEC system, which has been subject to major changes in the past decade. The thesis unveils socio-economic and regional inequalities in access and use of ECEC of varying quality, pointing out possible consequences for maternal employment and well-being and children's educational opportunities in early childhood.

In sum, this thesis underscores the great importance of ECEC for children, parents, and thus the society as a whole. ECEC services can alter individual life courses of children and their parents. My dissertation draws attention to the dimensions of ECEC availability, accessibility and quality, which together may affect overall levels as well as inequalities in

parent *and* child outcomes. The explicit focus on the role of ECEC services in promoting early learning opportunities for children continues to be uncommon in sociological research, with some notable exceptions (e.g., Augustine et al., 2009; Becker, 2010b; Schober & Spiess, 2013). Especially in sociological research on social reproduction and social inequality, ECEC has often been overlooked as a potential mechanism through which women with higher cultural capital can maintain their advantage after giving birth as compared to women with lower cultural capital, and through which parents can transmit cultural capital to their offspring – even though ECEC centers represent the first educational institutions in which almost all children spend large portions of their childhood. If the conditions are right, they provide a unique opportunity for society to supply children with cultural capital independent of parents' endowments, and could thus be used to counteract processes of social reproduction.

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8 APPENDICES

8.1 Appendix to Chapter 1

Table A-8.1.1: Average marginal effects of socio-economic status on parents' probability to mention an aspect of quality[1] as the most important reason for choosing the ECEC center

	Caregiver education	Migration background	Poverty	Single parenthood	Full model
Low education	-0.12^{+}				-0.10
	(0.085)				(0.152)
Medium education	-0.09^{+}				-0.09^{+}
	(0.077)				(0.094)
High education (reference gr.)					
Child migration background		-0.03			-0.04
		(0.555)			(0.425)
Poor household			-0.10		-0.04
			(0.180)		(0.651)
Single parent				-0.09	-0.08
				(0.156)	(0.334)
Child ≤2 years	-0.14**	-0.15**	-0.14**	-0.14**	-0.14**
	(0.009)	(0.007)	(0.008)	(0.008)	(0.007)
Child 3 years (reference gr.)					
Child 4 years	0.04	0.04	0.04	0.04	0.05
	(0.561)	(0.544)	(0.501)	(0.519)	(0.478)
Child ≥5 years	0.13^{+}	0.13^{+}	0.13^{+}	0.13^{+}	0.14^{+}
	(0.087)	(0.079)	(0.073)	(0.069)	(0.058)
Full-time empl. mother (reference gr.)					
Part-time empl. mother	-0.01	-0.02	-0.01	-0.01	-0.00
	(0.856)	(0.638)	(0.784)	(0.788)	(0.948)
Non-working mother	0.11^{+}	0.10	0.11^{+}	0.11^{+}	0.12*
	(0.075)	(0.110)	(0.081)	(0.085)	(0.045)
1 child in hh (reference gr.)					
2 children in hh	-0.15*	-0.14*	-0.14*	-0.15*	-0.16**
	(0.015)	(0.032)	(0.027)	(0.020)	(0.009)
≥3 children in hh	-0.17**	-0.16*	-0.16*	-0.18**	-0.18**
	(0.008)	(0.018)	(0.015)	(0.008)	(0.005)
Mother's age	0.01^{+}	0.01*	0.01*	0.01*	0.01
	(0.084)	(0.031)	(0.025)	(0.038)	(0.114)
Town size: small (reference gr.)					
Town size: medium	0.11*	0.11*	0.11*	0.11*	0.11*
	(0.027)	(0.019)	(0.021)	(0.026)	(0.024)
Town size: large	0.00	0.03	0.02	0.03	0.01
	(0.961)	(0.591)	(0.682)	(0.658)	(0.849)
N	695	695	695	695	695

[1]See Table 1.1 for a full list of criteria parents could choose from. Parents who did not have a choice were excluded from the analysis. Note: Results are weighted; SE clustered (household); p-values in parentheses, + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables (all insignificant): age at entry <3, attendance >12 months, older sibling in day-care, East Germany, ECEC centers per 100 children in county,

neighborhood purchasing power, maternal working hours missing. Source: SOEP v31 and 2013 K²ID-SOEP Parent Survey (own calculations).

8.2 Appendix to Chapter 2

Table A-8.2.1: Predicted probabilities of mothers' employment by maternal education, period, and region (see Figure 2.2)

		WEST			EAST		
		Predicted probability	95% ci (lower bound)	95% ci (upper bound)	Predicted probability	95% ci (lower bound)	95% ci (upper bound)
P1 97-01	Low education	0.172	0.130	0.215	0.209	0.077	0.342
	Medium education	0.253	0.219	0.287	0.208	0.145	0.272
	High education	0.300	0.224	0.375	0.236	0.148	0.325
P2 02-06	Low education	0.202	0.136	0.267	0.133	0.025	0.242
	Medium education	0.289	0.248	0.331	0.281	0.223	0.339
	High education	0.307	0.234	0.381	0.288	0.193	0.383
P3 07-10	Low education	0.212	0.135	0.289	0.109	0.037	0.182
	Medium education	0.350	0.305	0.395	0.338	0.262	0.415
	High education	0.416	0.351	0.481	0.467	0.333	0.600
P4 11-13	Low education	0.185	0.127	0.243	0.196	0.097	0.295
	Medium education	0.360	0.322	0.399	0.470	0.378	0.563
	High education	0.430	0.375	0.484	0.519	0.451	0.588

Note: N = 13679 (West) / 4085 (East); ci = confidence interval; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-8.2.2: Predicted probabilities of day-care use by maternal education, period, and region (see Figure 2.3)

		WEST			EAST		
		Predicted probability	95% ci (lower bound)	95% ci (upper bound)	Predicted probability	95% ci (lower bound)	95% ci (upper bound)
P1 97-01	Low education	0.023	0.010	0.037	0.297	0.188	0.407
	Medium education	0.056	0.037	0.075	0.292	0.235	0.349
	High education	0.139	0.087	0.190	0.318	0.239	0.398
P2 02-06	Low education	0.055	0.029	0.081	0.335	0.228	0.442
	Medium education	0.077	0.059	0.094	0.334	0.275	0.392
	High education	0.179	0.122	0.236	0.367	0.285	0.449
P3 07-10	Low education	0.090	0.059	0.121	0.333	0.232	0.435
	Medium education	0.189	0.158	0.221	0.418	0.345	0.491
	High education	0.351	0.280	0.423	0.539	0.453	0.624
P4 11-13	Low education	0.160	0.114	0.207	0.352	0.251	0.453
	Medium education	0.212	0.186	0.239	0.515	0.450	0.580
	High education	0.365	0.317	0.413	0.627	0.570	0.685

Note: N = 13610 (West) / 4061 (East); ci = confidence interval; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-8.2.3: Predicted probabilities of informal childcare use by maternal education, period, and region (see Figure 2.4)

		WEST			EAST		
		Predicted probability	95% ci (lower bound)	95% ci (upper bound)	Predicted probability	95% ci (lower bound)	95% ci (upper bound)
P1 97-01	Low education	0.390	0.309	0.470	0.159	0.063	0.254
	Medium education	0.456	0.411	0.502	0.395	0.299	0.491
	High education	0.366	0.274	0.458	0.358	0.164	0.552
P2 02-06	Low education	0.337	0.262	0.413	0.352	0.161	0.543
	Medium education	0.424	0.376	0.471	0.357	0.272	0.441
	High education	0.430	0.339	0.521	0.474	0.350	0.598
P3 07-10	Low education	0.258	0.176	0.339	0.317	0.180	0.454
	Medium education	0.343	0.291	0.394	0.343	0.250	0.436
	High education	0.343	0.270	0.416	0.268	0.145	0.392
P4 11-13	Low education	0.181	0.131	0.232	0.225	0.134	0.316
	Medium education	0.275	0.234	0.315	0.300	0.197	0.404
	High education	0.259	0.213	0.306	0.251	0.176	0.325

Note: N = 11690 (West) / 3621 (East); ci = confidence interval; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-8.2.4: Predicted probabilities of childcare type use by maternal education and period (see Figure 2.5)

		Parental care only			Informal care only		
		Predicted probability	95% ci (lower bound)	95% ci (upper bound)	Predicted probability	95% ci (lower bound)	95% ci (upper bound)
P1 97-01	Low education	0.599	0.528	0.670	0.322	0.249	0.396
	Medium education	0.505	0.465	0.545	0.385	0.346	0.424
	High education	0.529	0.444	0.613	0.284	0.200	0.367
P2 02-06	Low education	0.580	0.515	0.646	0.276	0.212	0.340
	Medium education	0.508	0.468	0.548	0.347	0.307	0.387
	High education	0.415	0.338	0.492	0.349	0.272	0.427
P3 07-10	Low education	0.614	0.542	0.685	0.231	0.166	0.297
	Medium education	0.492	0.451	0.534	0.257	0.214	0.299
	High education	0.413	0.360	0.466	0.182	0.128	0.237
P4 11-13	Low education	0.661	0.610	0.713	0.134	0.098	0.169
	Medium education	0.534	0.498	0.571	0.194	0.161	0.226
	High education	0.450	0.406	0.494	0.131	0.101	0.162
		Day-care only			Day-care and informal care		
		Predicted probability	95% ci (lower bound)	95% ci (upper bound)	Predicted probability	95% ci (lower bound)	95% ci (upper bound)
P1 97-01	Low education	0.046	0.023	0.069	0.032	0.014	0.051
	Medium education	0.049	0.035	0.063	0.061	0.045	0.078
	High education	0.107	0.064	0.150	0.081	0.049	0.112
P2 02-06	Low education	0.072	0.040	0.103	0.072	0.020	0.124
	Medium education	0.083	0.063	0.102	0.062	0.047	0.078
	High education	0.141	0.105	0.178	0.094	0.056	0.133
P3 07-10	Low education	0.105	0.073	0.138	0.050	0.025	0.074
	Medium education	0.165	0.136	0.195	0.086	0.065	0.107
	High education	0.263	0.205	0.320	0.142	0.096	0.188
P4 11-13	Low education	0.147	0.104	0.190	0.058	0.035	0.080
	Medium education	0.184	0.161	0.207	0.088	0.068	0.108
	High education	0.294	0.251	0.338	0.124	0.100	0.149

Note: N = 15279; ci = confidence interval; Further control variables: single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted, whole sample included. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

Table A-8.2.5: Average marginal effects (AMEs) of education on children's probability of day-care use and chi²-tests of the difference in AMEs between period 1 and subsequent periods (Ref.: High ed.) after controlling for maternal employment (sensitivity check)

	West Germany			East Germany		
	AME	Period diff. in AMEs		AME	Period diff. in AMEs	
		Chi²	p-value		Chi²	p-value
Low ed.						
P1 97-01	-0.100***	Ref.		-0.004	Ref.	
	(-0.025)			(-0.065)		
P2 02-06	-0.112***	0.10	0.75	0.001	0.00	0.96
	(-0.031)			(-0.063)		
P3 07-10	-0.212***	5.75	0.02	-0.104	1.30	0.25
	(-0.04)			(-0.068)		
P4 11-13	-0.136***	0.75	0.39	-0.166**	4.40	0.04
	(-0.035)			(-0.052)		
Joint (df=3)		**6.02**	**0.11**		**6.21**	**0.10**
Med ed.						
P1 97-01	-0.073**	Ref.		-0.017	Ref.	
	(-0.025)			(-0.044)		
P2 02-06	-0.100***	0.51	0.48	-0.036	0.12	0.73
	(-0.028)			(-0.039)		
P3 07-10	-0.141***	2.48	0.12	-0.091	1.08	0.30
	(-0.036)			(-0.055)		
P4 11-13	-0.131***	2.79	0.09	-0.094**	1.98	0.16
	(-0.025)			(-0.034)		
Joint (df=3)		**3.83**	**0.28**		**2.48**	**0.48**
N		13610			4061	

Note: Standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Further control variables: working mother, single mother, migration background, mother's age > median, mother's birth cohort, child age, age², number of children in household, county unemployment rate; Results are weighted. Source: SOEP v30, FiD v4.0, Federal Employment Agency statistics (1997-2013), authors' calculations.

8.3 Appendix to Chapter 3

Table A-8.3.1: Fixed-effects models of satisfaction with different domains for fathers in couples with a child below school age

	West Germany		East Germany	
Satisfaction with..	.. family life- M1	.life over-all – M1	.. family life – M1	.life overall- M1
County full-day care rate	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.01)	(0.01)
Part-time work (PTW)	-0.11	-0.07	0.28	0.51*
	(0.07)	(0.07)	(0.26)	(0.22)
Full-time work (FTW)	-0.16	-0.07	0.54+	0.17
	(0.14)	(0.14)	(0.30)	(0.26)
PTW*county full-day care rate	0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.01)	(0.00)
FTW*county full-day care rate	0.01	0.00	-0.01+	0.00
	(0.01)	(0.01)	(0.01)	(0.00)
Day-care half-day (HDC)	-0.09	0.01	-0.21	-0.34*
	(0.07)	(0.06)	(0.19)	(0.16)
Day-care full-day (FDC)	-0.04	0.11	-0.12	-0.12
	(0.08)	(0.07)	(0.14)	(0.13)
Mother in education	0.11	-0.08	-0.11	0.89*
	(0.20)	(0.22)	(0.25)	(0.35)
Mother unemployed	0.08	0.21	0.20	0.29
	(0.12)	(0.14)	(0.22)	(0.18)
Childcare support by relatives	-0.09+	-0.02	0.15+	0.04
	(0.05)	(0.05)	(0.09)	(0.09)
Housework hours of father	-0.00	0.02	0.03	0.08+
	(0.03)	(0.03)	(0.06)	(0.05)
Childcare hours father	0.02+	0.01	0.01	0.00
	(0.01)	(0.01)	(0.02)	(0.02)
Ln equiv. net household income	0.20+	0.20+	0.11	0.30+
	(0.11)	(0.10)	(0.19)	(0.17)
Father part-time	-0.08	0.23	0.52	-0.12
	(0.16)	(0.18)	(0.33)	(0.27)
Father full-time	0.07	0.35*	0.25	0.15
	(0.14)	(0.15)	(0.28)	(0.24)
Father unemployed	0.02	-0.36+	0.15	-0.27
	(0.17)	(0.19)	(0.35)	(0.28)
Father in education	0.24	0.19	0.67	0.49
	(0.38)	(0.36)	(0.42)	(0.43)
Mother poor health	-0.13***	-0.11***	-0.06	0.00
	(0.03)	(0.03)	(0.06)	(0.05)
Cohabiting	-0.00	-0.00	-0.23	-0.16
	(0.11)	(0.13)	(0.17)	(0.19)
Constant	7.94***	6.36***	5.04*	3.64+
	(0.96)	(0.93)	(2.47)	(2.03)
Observations	6,247	6,246	1,917	1,921
Number of fathers	2,536	2,536	755	755
R^2 within/betw./overall	.03/.02/.01	.03/.07/.06	.06/.00/.01	.06/.07/.07

Note: Robust standard errors in parentheses. All models include the following additional control variables: dummies for the age of the youngest child, number of children in household, county unemployment rate, move to different county, town size, county attendance rate for < 3 year old children, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth

welfare office statistics.

Table A-8.3.2: Fixed-effects models of satisfaction with family life for mothers in couples with a child below school age by educational attainment (sensitivity check)

	Low educated	Medium educated	High educated
County full-day care rate	-0.00	-0.00	0.00
	(0.01)	(0.00)	(0.01)
Part-time work (PTW)	-0.14	-0.06	0.23+
	(0.23)	(0.07)	(0.13)
Full-time work (FTW)	-0.41	0.09	-0.06
	(0.39)	(0.17)	(0.25)
PTW*county full-day care rate	0.00	0.00	-0.01
	(0.01)	(0.00)	(0.00)
FTW*county full-day care rate	-0.00	-0.00	0.00
	(0.01)	(0.00)	(0.01)
Day-care half-day (HDC)	-0.08	-0.03	-0.03
	(0.16)	(0.07)	(0.11)
Day-care full-day (FDC)	-0.14	-0.03	-0.12
	(0.22)	(0.08)	(0.10)
Mother in education	-0.17	0.15	0.89***
	(0.36)	(0.19)	(0.26)
Mother unemployed	0.03	-0.06	0.01
	(0.19)	(0.13)	(0.28)
Childcare support by relatives	0.24+	-0.02	-0.18+
	(0.14)	(0.05)	(0.10)
Housework hours of father	-0.01	0.06*	-0.10*
	(0.07)	(0.03)	(0.04)
Childcare hours father	0.02	0.00	0.03*
	(0.02)	(0.01)	(0.02)
Ln equiv. net household income	0.35	-0.05	0.01
	(0.28)	(0.13)	(0.15)
Father part-time	0.07	-0.03	0.45+
	(0.41)	(0.21)	(0.27)
Father full-time	0.30	-0.07	0.28
	(0.34)	(0.17)	(0.23)
Father unemployed	0.31	0.02	0.46
	(0.32)	(0.20)	(0.36)
Father in education	-0.99*	0.14	0.57+
	(0.46)	(0.22)	(0.29)
Mother poor health	-0.08	-0.14***	-0.21***
	(0.07)	(0.03)	(0.05)
Cohabiting	-0.73**	-0.23+	-0.32
	(0.27)	(0.14)	(0.28)
Constant	6.12*	9.61***	9.33***
	(2.44)	(1.10)	(1.39)
Observations	1,510	6,060	2,478
Number of mothers	710	2,552	1,025
R^2 within/betw./overall	.06/.00/.00	.02/.01/.02	.06/.01/.02

Note: Robust standard errors in parentheses. All models include the following additional control variables: dummies for the age of the youngest child, number of children in household, county unemployment rate, move to different county, town size, county attendance rate for < 3 year old children, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics.

Table A-8.3.3: Fixed-effects models of satisfaction with life overall for mothers in couples with a child below school age by educational attainment (sensitivity check)

	Low educated	**Medium educated**	**High educated**
County full-day care rate	-0.03***	-0.00	0.01*
	(0.01)	(0.00)	(0.01)
Part-time work (PTW)	-0.41+	0.07	0.17
	(0.22)	(0.07)	(0.11)
Full-time work (FTW)	-0.11	0.18	0.01
	(0.29)	(0.16)	(0.18)
PTW*county full-day care rate	0.01	0.00	-0.01
	(0.01)	(0.00)	(0.00)
FTW*county full-day care rate	0.01	0.00	-0.00
	(0.01)	(0.00)	(0.01)
Day-care half-day (HDC)	-0.19	-0.03	0.02
	(0.17)	(0.06)	(0.10)
Day-care full-day (FDC)	0.03	-0.04	-0.09
	(0.21)	(0.07)	(0.09)
Mother in education	-0.14	0.27	0.06
	(0.34)	(0.20)	(0.21)
Mother unemployed	-0.49*	-0.00	-0.10
	(0.20)	(0.15)	(0.24)
Childcare support by relatives	0.22	0.02	-0.12
	(0.15)	(0.05)	(0.08)
Housework hours of father	0.14*	0.00	-0.00
	(0.06)	(0.03)	(0.03)
Childcare hours father	-0.01	0.03*	0.01
	(0.02)	(0.01)	(0.02)
Ln equiv. net household income	0.45*	0.10	0.08
	(0.22)	(0.12)	(0.14)
Father part-time	-0.37	0.19	0.06
	(0.29)	(0.19)	(0.23)
Father full-time	-0.34	0.38*	0.07
	(0.29)	(0.16)	(0.19)
Father unemployed	-0.71**	-0.06	-0.32
	(0.27)	(0.18)	(0.20)
Father in education	-2.05***	0.06	0.54
	(0.37)	(0.34)	(0.50)
Mother poor health	-0.30***	-0.28***	-0.33***
	(0.07)	(0.03)	(0.05)
Cohabiting	-0.11	-0.38**	-0.01
	(0.24)	(0.13)	(0.29)
Constant	3.69+	7.27***	8.90***
	(1.98)	(0.98)	(1.20)
Observations	1,511	6,060	2,480
Number of mothers	710	2,551	1,025
R^2 within/betw./overall	.12/.00/.00	.05/.12/.10	.09/.14/.13

Note: Robust standard errors in parentheses. All models include the following additional control variables: dummies for the age of the youngest child, number of children in household, county unemployment rate, move to different county, town size, county attendance rate for < 3 year old children, and year dummies. *** p < 0.001, ** p < 0.01, * p < 0.05, + p <0.1. Source: SOEP 2007-2012 and FiD 2010-2012 linked with regional youth welfare office statistics.

8.4 Appendix to Chapter 4

Table A-8.4.1: Operationalization of latent quality indicators using (polychoric) factor analysis

Indicator	Original scale	Method & question; factor & items (cronbach's α)
Materials	0 (nonexistent) to 3 (almost all children)	Polychoric factor analysis of group educators' ratings of the share of children (none, some, about half, almost all) being able to play with different materials at the same time
… for school preparation		*Factor 1* (6 items): Books and other materials a) for first-time readers; b) that support learning of letters; letter-sound-allocation; and dealing with geometric forms and spatial patterns; c) that familiarize children with measuring; and with figures/numbers and counting (α=.81)
… for play		*Factor 2* (5 items): Picture books; drawing and writing material; bricks; socially stimulating material; and dolls and hand/finger puppets (α=.76)
Activities (freq)	1 (never) to 7 (daily)	Polychoric factor analysis of group educators' ratings of the frequency with which different activities are performed in the group
Arts / games		*Factor 1* (4 items): Painting or other artistic activities (e.g. doing handicrafts); construction (playing with building blocks, Lego and the like); puzzles; and playing parlor games (e.g. memory) (α=.73)
Verbal / motor		*Factor 2* (4 items): Reading or telling a story or looking at picture books; singing, making music, or dancing; motor games (e.g. playing tag); and finger or language games (guessing, rhyming) (α=.68)
Offered activities (freq)	1 (not offered) to 6 (several times a week)	Polychoric factor analysis of group educators' ratings of the frequency with which different learning opportunities are offered to the children
		Factor 1 (4 items): Early musical education; painting and other artistic activities; development of the German language; support in development of mathematical skills (α=.66)
Enjoyment	1 (no pleasure) to 6 (great pleasure)	Factor analysis of group educators' ratings of how enjoyable they find integrating different themes into their pedagogical work
… of social pedagogy		*Factor 1* (3 items): Social topics; intercultural education; pedagogy (α=.71)
… of math / science		*Factor 2* (2 items): Math; natural sciences (α=.62)
Responsibility	1 (only the family) to 7 (only the center)	Factor analysis of group educators' assessment as to whether the family or ECEC center should primarily promote a set of skills in children
… for cogn. / motor comp.		*Factor 1* (4 items): Fostering pleasure in motor games; rhymes and poetry; making the children deal with natural phenomena; and familiarize with numbers and letters (α=.74)
… for social		*Factor 2* (3 items): Teaching children how to solve conflicts

comp.		peacefully and verbally; to adhere to agreed rules; and to find solutions themselves (α=.75)
Educational goals	1 (not important at all) to 5 (very important)	Factor analysis of group educators' importance ratings of different educational goals
Conformity		*Factor 1* (8 items): The child behaves like normal girl/boy; has good manners; and good self-control; obeys their elders and betters; is neat and clean; will be good in school; learns to avoid risks in life; is liked by others/ friendly (α=.82)
Autonomy		*Factor 2* (5 items): the child is responsible; has good judgment; strives to achieve their goals; has good self-control; and is considerate of others (α=.75)

Source: 2014 K²ID-SOEP institution survey.

Table A-8.4.2: Descriptive statistics of all control variables

Variable	N	Mean	SD	Min	Max
Child age ≤2	818	0.21	0.41	0	1
Child age 3	818	0.20	0.40	0	1
Child age 4	818	0.26	0.44	0	1
Child age ≥5	818	0.33	0.47	0	1
Age at entry <3 years	818	0.64	0.48	0	1
Attendance of center >12 months	818	0.68	0.47	0	1
1 child in hh	818	0.29	0.46	0	1
2 children in hh	818	0.50	0.50	0	1
≥3 children in hh	818	0.21	0.40	0	1
Older sibling in ECEC	818	0.14	0.35	0	1
Mother's age	818	34.69	5.75	17	56
Long part-time or full-time empl. mother (>25 hours)	796	0.31	0.46	0	1
Part-time empl. mother (≤25 hours)	796	0.28	0.45	0	1
Non-working mother	796	0.40	0.49	0	1
Working hours missing	818	0.03	0.16	0	1
Open group	818	0.09	0.28	0	1
Center serves children below 3	818	0.79	0.41	0	1
Center only serves children from 3 years	818	0.18	0.38	0	1
Information on age composition missing	818	0.03	0.18	0	1
Town size: small	818	0.38	0.49	0	1
Town size: medium	818	0.40	0.49	0	1
Town size: large	818	0.22	0.41	0	1
Neighborhood purchasing power (street section)	818	102.54	22.27	49.4	169.3
ECEC centers per 100 children (county)	818	1.27	0.25	0.7	2.4
East Germany	818	0.22	0.42	0	1
District group size (median)	774	21.63	2.88	14	27
District group size missing	818	0.07	0.25	0	1
District child-teacher-ratio (median)	818	9.61	1.74	7.0	16.6
District share qualified staff	818	75.43	12.25	47.2	96.5
District share foreign children	818	18.76	11.63	0.9	56.9
No. migrant households in neighborhood (residential block)	781	1.68	3.54	0	45.2
No. migrant households missing	818	0.04	0.20	0	1

Note: Results are weighted. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

Table A-8.4.3: Full results from regressions of structural quality indicators

Indicator	Classical structural characteristics				Other structural characteristics				
	Group size[a]	**Ratio**[b]	**Unqual. staff**[c]	**Further training**	**Mat: school preparation**	**Interior space p.c. (m²)**	**Garden space p.c. (m²)**	**Act.: arts /games**	**≥30% foreign lng**[d]
Type of regression	*linear*	*linear*	*logistic*	*logistic*	*linear*	*linear*	*linear*	*linear*	*logistic*
Observable	*yes*	*yes*	*no*	*no*	*yes*	*yes*	*yes*	*no*	*yes*
Disadvantaged groups									
Low caregiver educ. (reference gr.)									
Medium caregiver	-0.56	-1.01^{+}	0.03	0.12	0.28*	-0.51	5.62^{+}	-0.23**	-0.10^{+}
educ.	(2.46)	(0.53)	(0.08)	(0.08)	(0.11)	(0.61)	(3.25)	(0.08)	(0.05)
High caregiver educ.	-0.09	-0.66	0.05	0.19**	0.25*	-0.48	6.22*	-0.31*	-0.17*
	(2.75)	(0.54)	(0.09)	(0.07)	(0.11)	(0.68)	(2.89)	(0.14)	(0.07)
Child migration backg.	2.79^{+}	0.11	-0.04	0.04	-0.02	0.41	-4.48*	0.22**	0.11*
	(1.62)	(0.36)	(0.05)	(0.05)	(0.10)	(0.55)	(1.82)	(0.08)	(0.04)
Poor household	1.92	0.38	-0.14*	-0.03	0.09	1.88^{+}	9.96*	0.18^{+}	0.07
	(2.99)	(0.85)	(0.07)	(0.10)	(0.14)	(0.96)	(4.64)	(0.10)	(0.06)
Single parent	1.63	0.34	0.24**	0.09^{+}	-0.11	-0.56	0.24	-0.16	-0.02
	(2.56)	(0.60)	(0.09)	(0.05)	(0.16)	(0.74)	(2.64)	(0.14)	(0.05)
Important controls									
Child ≤2 years	-6.81***	-2.53***	0.12	-0.02	-0.68***	1.49*	-0.69	-0.23	-0.09
	(1.98)	(0.68)	(0.13)	(0.07)	(0.18)	(0.64)	(3.53)	(0.18)	(0.08)
Child 3 years (reference gr.)									
Child 4 years	1.21	0.18	-0.00	-0.14*	-0.05	0.58	1.29	0.05	-0.13*
	(1.32)	(0.57)	(0.07)	(0.07)	(0.14)	(0.69)	(3.53)	(0.17)	(0.07)
Child ≥5 years	0.82	0.15	0.01	0.02	-0.22	0.54	0.37	0.05	-0.20**
	(1.45)	(0.49)	(0.07)	(0.06)	(0.17)	(0.64)	(3.79)	(0.16)	(0.06)
Full-time empl. mother (reference gr.)									
Part-time empl. mother	2.40	0.49	-0.02	-0.03	-0.23*	-1.21*	0.49	0.03	0.02
	(1.53)	(0.48)	(0.07)	(0.06)	(0.11)	(0.54)	(2.57)	(0.12)	(0.04)
Non-working mother	2.25	-0.02	0.04	-0.09	-0.47***	-0.35	-0.62	-0.30^{+}	0.02
	(1.41)	(0.53)	(0.08)	(0.07)	(0.11)	(0.51)	(2.41)	(0.15)	(0.05)
East Germany	1.99	-0.72	-0.08	0.00	0.13	-0.68	6.79*	-0.12	0.03
	(2.85)	(0.58)	(0.08)	(0.06)	(0.10)	(0.66)	(3.30)	(0.11)	(0.07)
ECEC centers per 100	-3.34	1.41*	0.01	-0.08	0.02	-0.99	-2.96	-0.14	0.06
children	(2.65)	(0.64)	(0.09)	(0.09)	(0.16)	(0.77)	(4.52)	(0.15)	(0.08)
Other controls									
Working hours missing	-1.88	-0.60	0.07	0.13*	0.32	0.28	14.02	-0.28	

	(2.60)	(0.61)	(0.18)	(0.06)	(0.27)	(1.36)	(12.81)	(0.32)	
Age at entry < 3 years	0.43	-0.09	-0.04	0.02	-0.10	0.02	0.56	-0.12	-0.04
	(1.09)	(0.37)	(0.06)	(0.06)	(0.11)	(0.54)	(2.15)	(0.12)	(0.05)
Attendance >12	0.35	0.14	0.05	0.03	-0.04	-0.57	-0.03	0.09	0.13**
months	(1.25)	(0.59)	(0.08)	(0.06)	(0.15)	(0.61)	(3.26)	(0.14)	(0.05)
1 child in hh (reference gr.)									
2 children in hh	-3.62+	0.60	0.06	0.06	-0.06	0.12	2.94	0.06	-0.01
	(2.01)	(0.45)	(0.06)	(0.06)	(0.09)	(0.61)	(2.68)	(0.10)	(0.05)
≥3 children in hh	-3.82+	1.49*	0.08	0.10	0.14	-0.14	5.10	0.13	0.03
	(2.01)	(0.60)	(0.08)	(0.07)	(0.11)	(0.59)	(3.51)	(0.11)	(0.06)
Older sibling in ECEC	-1.25	0.49	-0.03	-0.05	-0.06	0.50	1.82	0.04	-0.04
	(1.19)	(0.47)	(0.07)	(0.06)	(0.11)	(0.52)	(3.63)	(0.11)	(0.04)
Mother's age	0.33*	-0.06	0.00	-0.00	-0.00	0.03	0.29	-0.00	-0.00
	(0.16)	(0.04)	(0.00)	(0.00)	(0.01)	(0.03)	(0.24)	(0.01)	(0.00)
Open group	27.10***	-0.65	0.15	-0.17	0.01	-0.19	7.36	-0.13	-0.08
	(5.96)	(1.14)	(0.13)	(0.12)	(0.16)	(0.51)	(6.82)	(0.15)	(0.06)
Center serves children below 3 (reference gr.)									
Center only serves	-1.40	0.98+	0.13*	0.01	0.03	-0.48	2.50	-0.17	0.06
children from 3 years	(1.08)	(0.56)	(0.06)	(0.05)	(0.10)	(0.52)	(3.04)	(0.15)	(0.06)
Information on age	-2.92+	-0.12	0.06	-0.02	-0.15	-0.65	-2.30	-0.15	0.18
composition missing	(1.70)	(0.88)	(0.13)	(0.13)	(0.16)	(1.43)	(3.87)	(0.21)	(0.12)
Town size: small (reference gr.)									
Town size: medium	-1.13	-0.47	0.09	-0.08	-0.04	-0.55	-0.71	0.08	-0.01
	(1.34)	(0.43)	(0.06)	(0.05)	(0.10)	(0.55)	(2.55)	(0.11)	(0.08)
Town size: large	-1.79	-0.62	0.09	-0.10	-0.01	0.03	-2.94	0.17	-0.03
	(1.40)	(0.47)	(0.08)	(0.09)	(0.13)	(0.78)	(2.99)	(0.12)	(0.10)
Neighborhood purcha-	-0.00	-0.01	0.00	-0.00**	-0.00*	-0.01	-0.01	-0.00	-0.00**
sing power	(0.03)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.05)	(0.00)	(0.00)
District group size	-0.15								
(median)	(0.51)								
District group size	-6.64								
missing	(9.47)								
District child-teacher-		0.58***							
ratio (median)		(0.15)							
District share qualified			-0.00+						
staff			(0.00)						
District share									0.01***
foreign children									(0.00)
No. migrant hh									0.01

in neighborhood									(0.00)
No. migrant hh									-0.11
missing									(0.11)
Constant	13.68+	10.11***			1.97***	9.23***	4.29	7.42***	
	(7.30)	(2.04)			(0.43)	(1.97)	(9.25)	(0.48)	
N	701	687	665	549	454	490	486	536	640
adj. R^2 (Pseudo-R^2)	0.464	0.205	(0.088)	(0.181)	0.278	0.076	0.096	0.104	(0.340)

Note: Results are weighted; SE clustered (county) / in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Logistic regression results displayed as average marginal effects. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

Table A-8.4.4: Full results from regressions of indicators of networking with families and orientation quality at center level

	Quality assurance & organization				Networking with families	
Indicator	**Quality improvement**	**Strong influence curric. guidelines**	**Team meetings every 2 weeks**[1]	**Team meetings ≤monthly**[1]	**Parental influence**	**Par. involved in ped. concept**
Type of Regression	*logistic*	*logistic*	*multinomial*	*multinomial*	*linear*	*logistic*
Observable	*no*	*no*	*no*	*no*	*no*	*no*
Disadvantaged groups						
Low caregiver educ. (reference gr.)						
Medium caregiver educ.	0.12	-0.13	-0.12	-0.02	0.35	0.09
	(0.08)	(0.09)	(0.08)	(0.05)	(0.32)	(0.09)
High caregiver educ.	0.17^{+}	-0.17^{+}	-0.22**	0.02	0.03	0.01
	(0.10)	(0.09)	(0.08)	(0.07)	(0.33)	(0.11)
Child migration backg.	-0.11^{+}	-0.08	0.03	0.01	-0.22	0.04
	(0.07)	(0.07)	(0.07)	(0.05)	(0.25)	(0.07)
Poor household	0.06	0.01	0.08	-0.03	0.18	-0.16^{+}
	(0.14)	(0.16)	(0.14)	(0.09)	(0.34)	(0.09)
Single parent	0.13	-0.08	-0.16^{+}	-0.11***	-1.13***	-0.02
	(0.11)	(0.12)	(0.10)	(0.03)	(0.33)	(0.08)
Important controls						
Child ≤2 years	-0.10	-0.09	0.20*	0.02	0.22	0.27*
	(0.10)	(0.10)	(0.10)	(0.08)	(0.37)	(0.12)
Child 3 years (reference gr.)						
Child 4 years	0.12	0.15^{+}	-0.02	0.09	-0.27	-0.03
	(0.10)	(0.08)	(0.10)	(0.06)	(0.35)	(0.09)
Child ≥5 years	0.11	0.17*	0.06	0.07	-0.00	0.04
	(0.09)	(0.09)	(0.07)	(0.05)	(0.33)	(0.09)
Full-time empl. mother (reference gr.)						
Part-time empl. mother	0.14*	-0.19**	0.02	0.01	-0.17	-0.15^{+}
	(0.07)	(0.07)	(0.08)	(0.04)	(0.33)	(0.09)
Non-working mother	0.03	-0.15*	-0.05	0.04	-0.27	-0.16^{+}
	(0.08)	(0.07)	(0.07)	(0.05)	(0.34)	(0.09)
East Germany	0.27**	0.13	-0.05	0.32***	0.71*	0.22**
	(0.09)	(0.08)	(0.07)	(0.09)	(0.29)	(0.08)
ECEC centers per	-0.25*	0.11	-0.13	-0.04	-1.29**	0.07
100 children	(0.11)	(0.13)	(0.11)	(0.07)	(0.48)	(0.14)
Other controls						
Working hours missing	-0.04	-0.04	0.19	-0.15***	-0.58	0.19
	(0.16)	(0.14)	(0.15)	(0.03)	(0.50)	(0.16)

Age at entry < 3 years	-0.01	0.08	0.10	0.01	-0.23	-0.31***
	(0.06)	(0.07)	(0.06)	(0.05)	(0.24)	(0.07)
Attendance >12 months	-0.05	-0.13*	-0.17+	0.01	0.18	0.03
	(0.07)	(0.07)	(0.09)	(0.07)	(0.34)	(0.09)
1 child in hh (reference gr.)						
2 children in HH	-0.06	-0.08	-0.01	-0.06	-0.43	-0.15+
	(0.08)	(0.08)	(0.07)	(0.05)	(0.30)	(0.08)
≥3 children in HH	-0.13+	-0.10	-0.03	-0.02	-0.17	-0.05
	(0.08)	(0.08)	(0.10)	(0.06)	(0.33)	(0.11)
Older sibling in ECEC	0.02	0.04	-0.10+	-0.02	0.26	-0.09
	(0.06)	(0.07)	(0.05)	(0.06)	(0.27)	(0.08)
Mother's age	-0.00	0.00	-0.01	-0.00	0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)
Open group	-0.13	0.01	-0.02	0.04	0.02	-0.15
	(0.12)	(0.14)	(0.15)	(0.10)	(0.47)	(0.11)
Center serves children below 3 (reference gr.)						
Center only serves	-0.05	0.00	-0.20**	0.00	-0.11	-0.17*
children from 3 years	(0.07)	(0.08)	(0.06)	(0.06)	(0.33)	(0.07)
Information on age	-0.44***	-0.19	0.23	0.18	-0.86	-0.34***
composition missing	(0.09)	(0.13)	(0.18)	(0.18)	(0.92)	(0.10)
Town size: small (reference gr.)						
Town size: medium	0.14+	0.08	-0.03	-0.01	0.03	0.08
	(0.08)	(0.06)	(0.07)	(0.05)	(0.27)	(0.09)
Town size: large	0.07	-0.06	0.05	-0.04	-0.69+	-0.12
	(0.10)	(0.10)	(0.09)	(0.07)	(0.38)	(0.09)
Neighborhood purcha-	-0.00	-0.00	0.00	0.00	-0.01	-0.00
sing power	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Constant					6.88***	
					(1.09)	
N	594	539	579		597	479
adj. R^2 (Pseudo-R^2)	(0.143)	(0.090)	(0.183)		0.068	(0.179)

Note: Results are weighted; SE clustered (county) / in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Logistic regression results displayed as average marginal effects. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

Table A-8.4.5: Results from regressions of orientation quality indicators at educator level

	Educator's satisfaction & enthusiasm				Educator's perception of own / center's role		
Indicator	**Educator center satisfaction**	**Educator highly motivated**	**Enjoyment social pedag.**	**Enjoyment math/science**	**Educator feels like expert**	**Center resp. cogn/motor**	**Center resp. social com.**
Type of Regression	*linear*	*logistic*	*linear*	*linear*	*logistic*	*linear*	*linear*
Observable	*no*	*no*	*no*	*no*	*no*	*no*	*no*
Disadvantaged groups							
Low caregiver educ. (reference gr.)							
Medium caregiver educ.	-0.11	0.13	0.09	-0.18^{+}	0.15^{+}	-0.19	-0.20
	(0.28)	(0.09)	(0.16)	(0.11)	(0.08)	(0.16)	(0.14)
High caregiver educ.	-0.21	0.19*	-0.07	-0.18	0.09	-0.48**	-0.15
	(0.35)	(0.09)	(0.20)	(0.14)	(0.10)	(0.18)	(0.16)
Child migration backg.	-0.36*	-0.03	-0.09	0.07	-0.12^{+}	-0.03	0.24
	(0.18)	(0.07)	(0.13)	(0.10)	(0.06)	(0.11)	(0.16)
Poor household	-0.99*	-0.17^{+}	0.35^{+}	0.12	0.10	0.09	-0.01
	(0.47)	(0.09)	(0.19)	(0.16)	(0.11)	(0.24)	(0.19)
Single parent	0.31	0.14^{+}	0.02	-0.12	0.08	-0.75***	-0.23*
	(0.34)	(0.07)	(0.17)	(0.14)	(0.09)	(0.15)	(0.11)
Important controls							
Child ≤2 years	-0.23	-0.05	-0.58**	-0.20	-0.11	-0.36^{+}	-0.03
	(0.39)	(0.12)	(0.21)	(0.18)	(0.14)	(0.19)	(0.17)
Child 3 years (reference gr.)							
Child 4 years	-0.43^{+}	-0.05	-0.25	0.35*	0.10	-0.22	-0.32^{+}
	(0.25)	(0.09)	(0.18)	(0.14)	(0.11)	(0.24)	(0.17)
Child ≥5 years	-0.72**	0.02	-0.06	0.30*	0.12	-0.16	-0.45*
	(0.26)	(0.09)	(0.16)	(0.13)	(0.12)	(0.28)	(0.20)
Full-time empl. mother (reference gr.)							
Part-time empl. mother	-0.15	-0.12	-0.07	-0.03	-0.00	-0.14	-0.12
	(0.27)	(0.08)	(0.12)	(0.13)	(0.09)	(0.15)	(0.14)
Non-working mother	0.01	-0.10	-0.12	0.02	0.02	-0.18	-0.06
	(0.27)	(0.09)	(0.13)	(0.14)	(0.08)	(0.18)	(0.13)
East Germany	-0.10	0.06	-0.06	0.39***	-0.06	0.26^{+}	0.17
	(0.24)	(0.08)	(0.14)	(0.11)	(0.06)	(0.14)	(0.17)
ECEC centers per	0.10	0.16	-0.11	0.22	-0.06	0.12	0.14
100 children	(0.45)	(0.13)	(0.21)	(0.18)	(0.10)	(0.23)	(0.20)
Other controls							
Working hours missing	0.12	0.16	0.22	-0.19	0.08	-0.20	-0.36**
	(0.53)	(0.13)	(0.27)	(0.15)	(0.18)	(0.22)	(0.14)

Age at entry < 3 years	0.19	-0.02	0.09	0.11	0.03	-0.17	-0.27*
	(0.26)	(0.07)	(0.14)	(0.10)	(0.07)	(0.13)	(0.13)
Attendance >12 months	0.03	0.06	-0.31+	-0.19	-0.00	0.05	0.38*
	(0.29)	(0.09)	(0.17)	(0.13)	(0.09)	(0.17)	(0.16)
1 child in hh (reference gr.)							
2 children in HH	-0.13	0.00	0.03	0.01	0.04	-0.44**	-0.31*
	(0.36)	(0.09)	(0.15)	(0.12)	(0.08)	(0.16)	(0.13)
≥3 children in HH	0.16	0.19*	0.19	0.05	0.03	-0.39*	-0.31+
	(0.36)	(0.09)	(0.15)	(0.13)	(0.09)	(0.19)	(0.16)
Older sibling in ECEC	-0.07	0.03	0.02	0.09	0.07	0.11	-0.04
	(0.30)	(0.07)	(0.15)	(0.13)	(0.07)	(0.14)	(0.09)
Mother's age	-0.01	-0.01	0.00	0.02**	-0.01	0.02+	-0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Open group	0.24	-0.06	-0.84***	-0.06	-0.15	0.32+	0.18
	(0.37)	(0.14)	(0.25)	(0.17)	(0.17)	(0.19)	(0.19)
Center serves children below 3 (reference gr.)							
Center only serves	0.29	-0.04	0.21+	-0.27*	-0.05	-0.04	0.02
children from 3 years	(0.26)	(0.08)	(0.13)	(0.11)	(0.08)	(0.14)	(0.12)
Information on age	0.08	0.20+	0.06	0.09	-0.00	-0.10	-0.19
composition missing	(0.43)	(0.11)	(0.21)	(0.14)	(0.15)	(0.27)	(0.21)
Town size: small (reference gr.)							
Town size: medium	0.16	0.07	-0.09	0.08	-0.10	-0.15	-0.21+
	(0.25)	(0.07)	(0.12)	(0.11)	(0.07)	(0.13)	(0.13)
Town size: large	-0.10	0.07	-0.10	-0.01	0.02	-0.10	-0.02
	(0.37)	(0.09)	(0.18)	(0.13)	(0.08)	(0.15)	(0.13)
Neighborhood purcha-	0.01+	-0.00	0.00	0.00	0.00+	-0.00	0.00
sing power	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	8.76***		0.48	-1.06*		0.24	0.48
	(1.18)		(0.50)	(0.47)		(0.51)	(0.42)
N	506	545	514	538	528	485	492
adj. R^2 (Pseudo-R^2)	0.073	(0.092)	0.153	0.102	(0.083)	0.149	0.081

Note: Results are weighted; SE clustered (county) / in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Logistic regression results displayed as average marginal effects. Source: SOEP v31 and 2014 K²ID-SOEP extension study (own calculations).

8.5 Appendix to Chapter 5

Table A-8.5.1: Multilevel linear regressions of groups' child-teacher-ratio, previous modelling steps

	Germany				West			
Loose regulations[a]		2.04*		2.04*		1.60+		1.60+
Moderate regulations[a]		1.51**		1.52**		0.85*		0.85*
Public expenses per child			-0.01	0.03			-0.02	-0.00
NB purchasing power (NPP)	-0.04*				-0.05*			
East Germany	4.42***	4.04***	4.96***	4.08***				
Rural	0.69+				0.69+			
Public provider	0.11	-0.07	0.10	-0.08	-0.00	-0.10	-0.01	-0.09
Other provider	-0.36	-0.31	-0.44	-0.33	0.03	0.10	-0.02	0.10
Provider info missing	-0.51	-0.69	-0.63	-0.70	-0.44	-0.67	-0.57	-0.66
Weekly opening hours	-0.01	-0.01	-0.01	-0.01	-0.03	-0.03	-0.04	-0.03
Hours missing	0.20	0.08	0.09	0.08	0.00	-0.05	-0.05	-0.05
No. of children in facility	-0.00	-0.01	-0.00	-0.01	0.01	0.00	0.01	0.00
No. of children missing	0.38	0.30	0.42	0.31	0.43	0.52	0.58	0.52
Group structure: closed	0.79	0.59	0.80	0.60	0.32	0.14	0.31	0.14
Group structure: mainly open	-0.50	-0.81	-0.48	-0.81	0.05	-0.27	0.04	-0.27
Group structure: missing	1.03	1.04	1.08	1.02	0.90	0.87	0.88	0.87
Children under 3	-1.46*	-1.45*	-1.41*	-1.45*	-1.71**	-1.67**	-1.66*	-1.67**
% girls	0.01	0.01	0.01	0.01	-0.00	0.00	0.00	0.00
% migrant children	-0.01	-0.00	-0.01	-0.00	-0.00	0.00	0.00	0.00
% full-day attending children	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
% handicapped children	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***
Constant	8.78***	8.47***	8.94***	8.47***	8.85***	8.67***	8.99***	8.67***
N (Groups)	450	450	450	450	387	387	387	387
AIC	2423.74	2415.56	2426.30	2417.53	2045.51	2041.80	2049.27	2043.80
BIC	2514.14	2505.97	2512.60	2512.05	2128.63	2120.97	2128.44	2126.93

Note: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Reference categories: [a]Strict ratio regulations / [b]No precise regulations; West Germany; Urban; Non-profit provider; Hours not missing; No. of children not missing; Group structure: partly open; No children under 3. All continuous variables centered at sample mean. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

Table A-8.5.2: Multilevel linear regressions of group size, previous modelling steps

	Germany				West			
No regulations[a]		2.35**		2.27**		2.38**		2.36**
Loose regulations[a]		2.03***		2.07**		1.96**		1.97**
Public expenses per child			-0.07	-0.09			-0.02	-0.02
NB purchasing power (NPP)	-0.04				-0.05+			
East Germany	-5.10***	-5.10***	-4.93***	-5.17***				
Rural	-0.47				-0.39			
Public provider	-0.51	-0.28	-0.48	-0.24	-0.28	-0.02	-0.26	-0.01
Other provider	0.02	0.28	0.01	0.33	0.73	0.93	0.68	0.95
Provider info missing	-0.79	-0.38	-0.77	-0.35	-1.39+	-0.92	-1.40+	-0.91
Weekly opening hours	0.05	0.02	0.05	0.02	0.08	0.05	0.08	0.05
Hours missing	0.93+	1.02+	0.98+	1.02+	0.43	0.60	0.47	0.61
No. of children in facility	0.00	0.01	0.01	0.01	0.01	0.02*	0.01	0.02*
No. of children missing	-0.04	-0.40	-0.20	-0.44	0.49	0.05	0.38	0.04
Group structure: closed	0.27	0.43	0.33	0.40	0.49	0.63	0.54	0.62
Group structure: mainly open	-1.51*	-1.10+	-1.47*	-1.13+	-1.45*	-1.10	-1.45*	-1.11
Group structure: missing	-0.10	-0.09	0.05	-0.03	0.54	0.55	0.62	0.56
Children under 3	-1.09	-1.12	-1.09	-1.12	-2.18***	-2.27***	-2.18**	-2.26***
% girls	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
% migrant children	-0.01	-0.00	-0.00	-0.00	-0.01	-0.01	-0.00	-0.01
% full-day attending children	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
% handicapped children	-0.09***	-0.09***	-0.09***	-0.09***	-0.10***	-0.10***	-0.10***	-0.10***
Constant	21.46***	19.35***	21.28***	19.34***	21.64***	19.55***	21.47***	19.54***
N (Groups)	486	486	486	486	415	415	415	415
AIC	2611.40	2601.22	2612.11	2604.91	2213.02	2206.67	2215.38	2208.65
BIC	2703.49	2689.13	2700.02	2701.20	2297.61	2291.26	2295.95	2297.27

Note: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Reference categories: [a]Strict ratio regulations / [b]No precise regulations; West Germany; Urban; Non-profit provider; Hours not missing; No. of children not missing; Group structure: partly open; No children under 3. All continuous variables centered at sample mean. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

Table A-8.5.3: Multilevel logistic regressions of staff's probability of receiving further training, previous modelling steps

	Germany			
Public expenses per child			0.05	0.07
NB purchasing power (NPP)	0.03			
Precise regulations[b]		0.45		0.48
East Germany	0.32	0.00	0.23	0.12
Rural	0.55			
Public provider	0.17	0.14	0.14	0.10
Other provider	0.87	0.96	0.88	0.91
Provider info missing	-0.89+	-0.84+	-0.92+	-0.86+
Weekly opening hours	0.04	0.03	0.03	0.03
Hours missing	0.27	0.21	0.20	0.19
No. of children in facility	-0.00	-0.00	-0.00	-0.00
No. of children missing	0.58	0.66	0.78	0.69
Group structure: closed	-0.27	-0.32	-0.31	-0.29
Group structure: mainly open	0.17	0.10	0.16	0.12
Group structure: missing	-0.14	-0.30	-0.28	-0.35
Children under 3	0.42	0.48	0.43	0.49
% girls	0.00	0.00	-0.00	-0.00
% migrant children	-0.00	-0.01	-0.01	-0.01
% full-day attending children	-0.00	-0.00	-0.00	-0.00
% handicapped children	0.02	0.02	0.02	0.02
Constant	1.22***	1.32***	1.37***	1.31***
N (Groups)	484	484	484	484
AIC	531.11	532.43	533.49	534.02
BIC	614.75	611.89	612.95	617.66

Note: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Reference categories: [a]Strict ratio regulations / [b]No precise regulations; West Germany; Urban; Non-profit provider; Hours not missing; No. of children not missing; Group structure: partly open; No children under 3. All continuous variables centered at sample mean. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.

Table A-8.5.4: Multilevel linear regressions of groups' child-teacher-ratio, group size, and multilevel logistic regressions of staff's probability of receiving further training after controlling for additional county-level characteristics (sensitivity check)

	Child-teacher-ratio	Group size	Further training
No regulations[a]		2.53**	
Loose regulations[a]	1.58+	2.00**	
Moderate regulations[a]	1.15**		
Public expenses per child	0.11	-0.17	0.06
NB purchasing power (NPP)	-0.03	-0.04*	0.03+
Precise regulations[b]			0.54
East Germany	4.12***	-5.61***	0.67
County full-day attendance rate	0.00	-0.00	0.01
County migrant attendance rate	-0.01	0.02	0.01
County expansion of slots (2011 vs. 2010)	-0.00	0.00	-0.00
Rural	0.38	-0.26	0.62
Public provider	-0.16	-0.14	0.12
Other provider	-0.28	0.30	0.88
Provider info missing	-0.44	-0.56	-0.81
Weekly opening hours	-0.01	0.02	0.04
Hours missing	0.08	1.04+	0.23
No. of children in facility	-0.00	0.01	0.00
No. of children missing	0.22	-0.22	0.57
Group structure: closed	0.60	0.33	-0.09
Group structure: mainly open	-0.72	-1.25+	0.25
Group structure: missing	0.92	0.06	-0.30
Children under 3	-1.34*	-1.24	0.51
% girls	0.01	0.00	-0.00
% migrant children	-0.00	-0.01	-0.00
% full-day attending children	0.02***	-0.01+	-0.00
% handicapped children	-0.06***	-0.10***	0.02
Constant	8.49***	19.49***	1.03***
N (Groups)	452	488	486
AIC	2427.73	2616.16	539.26
BIC	2538.80	2729.30	643.91

Note: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; Reference categories: [a]Strict ratio regulations / [b]No precise regulations; West Germany; Urban; Non-profit provider; Hours not missing; No. of children not missing; Group structure: partly open; No children under 3. All continuous variables centered at sample mean. Source: NEPS Starting Cohort 2 (Kindergarten), version 2.0.0; own calculations.