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Family demographic processes and in-work poverty: A systematic review

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Abstract

This article reviews ever published quantitative evidence on in-work poverty and family demographic processes in OECD and EU-28 countries. Despite the increasing attention to in-work poverty in Europe and beyond, a comprehensive and critical review on how family demographic processes shape in-work poverty risks is still missing. In this systematic review, we first provide a quantitative review of results from analyses that estimated the association between in-work poverty and parental home leaving, union formation, marriage, parenthood, and dissolution of non-marital and marital unions. This allows us to formulate tentative conclusions about whether and in which direction family demographic processes are associated with in-work poverty. Second, we discuss in detail conceptual and methodological advances in in-work poverty research, such as longitudinal analytical designs or attempts to make in-work poverty research more sensitive to policy context, gender, and the life course. Our review highlights theoretical and methodological challenges for future studies linking in-work poverty and family demography.

Keywords: In-work poverty, Family demography, Systematic review, Cross-national

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1. Introduction

The presence of working poor individuals – employed individuals who live in households with incomes below the poverty threshold – represents a worrisome phenomenon in advanced democracies that can engender social exclusion. Moreover, in-work poverty challenges work-based anti-poverty strategies that grew popular in the 1990s, because it highlights that employment is not always sufficient to protect individuals and their households from poverty. Although in-work poverty became a central concern in most western affluent democracies at the turn of the 21st century, the working poor tended to attract more journalistic than social scientific attention (Brady, Fullerton, and Cross 2010). In fact, scholarship in sociology and economics referring to in-work poverty has focused so far mainly on the growth of the low-wage sector and individual selection into low-paid occupations rather than in-work poverty as a broader phenomenon.

More recent research in the field provides evidence that in-work poverty represents a distinct form of poverty. First, in-work poverty is not synonymous with low-paid employment. While low-paid employment is a characteristic of an individual's position in and earnings from the labor market, in-work poverty is, in most cases, household-related and defined on the basis of income from all household members and from all market and non-market sources. Second, the processes that increase the risk of poverty for the (self-)employed are generally different from those affecting persons not attached to the labor market, such as retirees. Due to the lack of market income, inadequate pensions and residual government transfers are the main causes of poverty for persons outside the labor market. In contrast, the poverty risk of persons active on the labor market is shaped by the interaction of macroeconomic (e.g., recessions and deindustrialization), demographic (e.g., rising divorce rates), and institutional (e.g., labor market and childcare policies) factors (Crettaz 2021; Lohmann and Crettaz 2018). Together, these macro-level factors also determine how micro-level circumstances, such as changes in employment and partnership status, affect financial hardship among workers. Given the specific risk factors for poverty among the (self-)employed, a separate

body of literature has rapidly emerged that focuses on the factors associated with the entry and exit of working people into and out of poverty (see Andreß and Lohmann 2008; Fraser, Gutiérrez, and Peña-Casas 2011; Lohmann and Marx 2018 for three recent handbooks).

Individuals in in-work poverty constitute a sizeable group in rich countries, with the share of employed people at risk of poverty in the EU approaching 10% before the COVID-19 pandemic (Peña-Casas et al. 2019). However, there are considerable cross-national differences in the prevalence of in-work poverty and the extent to which in-work poverty rates have changed over time (Lohmann and Marx 2018). In affluent western democracies, in-work poverty has traditionally been attributed to the role of economic restructuring, tertiarization, technological change, and the polarization of skills and job opportunities (Acemoglu and Autor 2011). In addition, studies on cross-national differences have often applied approaches from the comparative welfare state literature (Esping-Andersen 1990) to assess the role of macro-level factors, such as the centralization of wage bargaining, in explaining cross-country variation in in-work poverty risk. Finally, research that has sought to account for variation in individuals' risks to enter in-work poverty has revolved around theories imported from the poverty literature stressing behavioral explanations, such as educational attainment (Brady 2019).

Another line of research emphasizes the relation between in-work poverty and different steps of the income generation and redistribution process within and across households (e.g., from wages to gross household income to post-tax/post-transfer household income; Lohmann 2010; Lohmann and Crettaz 2018; Strengmann-Kuhn 2003). This line of research highlights how the household context is shaped by family demographic processes that affect both the household composition and the actual opportunities on the labor market. For example, the transition to parenthood not only increases the economic needs of households, but may also reduce households' labor supply if mothers, or fathers, exit the labor market following childbirth. More generally, the link between family demographic processes, such as union formation and dissolution, and in-work poverty has

gained increasing attention within the broader literature assessing the complex interplay between family demography and social inequalities. However, to date, we lack a systematic assessment of the effect of family demographic processes on in-work poverty risk. This review fills this gap by systematizing and summarizing the findings of empirical research on the association of family demographic states and transitions with in-work poverty. Specifically, we concentrate on: parental home leaving, union formation, marriage, parenthood, and dissolution of non-marital and marital unions.

Our review considers empirical studies on in-work poverty in OECD and EU-28 countries¹ without any restriction on the year of publication, eventually covering studies published between 2000 and 2019.² First, we provide a quantitative review of results from analyses that estimated the association between family demographic processes and in-work poverty. This allows us to formulate tentative conclusions about whether and in which direction family demographic processes are associated with the risk of in-work poverty. Second, we complement the quantitative review by critically discussing conceptual and methodological advances for studying the relationship between family demographic processes and in-work poverty, including attempts to make in-work poverty research more sensitive to policy context, gender, and the life course. While necessarily selective, we believe that a discussion of these issues can advance the in-work poverty literature in important ways, for example by motivating researchers to adopt longitudinal analytical designs, account for selection into employment and family states, or estimate group-specific associations between family demographic processes and in-work poverty. We conclude with a discussion of methodological and theoretical considerations for future research. Before outlining our method of searching and systematizing the literature, we provide a brief summary of in work poverty statistics as well as

¹ This article reflects membership in 2019.

² See Crettaz (2021) for a discussion of how the COVID-19 pandemic might have affected the different drivers of in-work poverty.

theoretical arguments regarding the link between family demographic processes and in-work poverty.

2. Background

2.1. In-work poverty in OECD and EU-28 countries

In-work poverty is commonly operationalized by referring to an objective monetary indicator of economic deprivation, namely income. Drawing on the poverty literature, the identification of economic deprivation based on income requires a close consideration of three issues.³ First, poverty can be defined either in relative terms, usually compared to a share of the median income in a given country, or in absolute terms, compared to having an income to maintain basic living standards in that country. Second, income can be measured on a spectrum ranging from (1) disposable cash income after taxes and transfers, which is the sum of all types of money income, including all cash and near-cash transfers, minus taxes and social insurance contributions, to (2) market income before taxes and transfers, which does not account for taxes, social insurance contributions, or transfers. Finally, equivalence scales are used to adjust household income for economies of scale. Relative poverty measures generally assign an equivalence weight to each household type based on the size of the household and the age of its members. In contrast, equivalization is implicit in some absolute poverty measures that calculate different thresholds by household composition (e.g., the US federal poverty line). Because countries follow very specific in-work poverty definitions (see Crettaz 2013:351 for an overview), we focus on those used by institutions that cover multiple OECD and EU countries: the OECD, the European Statistical Office

³ We refer here only to the dimensions that are relevant to the definitions of in-work poverty used in the studies included in the review, see Smeeding (2016) for an overview of issues related to poverty measurement.

(Eurostat), the International Labour Organization (ILO), and the U.S. Bureau of Labor Statistics (BLS).

OECD reports are based on a household-level definition of the working poor: individuals are considered in-work poor if, in a given year, they live in a poor household where at least one household member is employed. Therefore, the OECD definition extends the working poverty status to all household members – including inactive adult household members as well as dependent children. The OECD poverty threshold is set at 50% of the national median equivalized disposable household income (i.e., after taxes and transfers). The most recent OECD report, referring to the year 2010, shows that in-work poverty rates vary between 3.3% in Germany and 18.5% in Mexico, with in-work poverty in the entire OECD amounting to 8.1%. Less than five percent of the working population lived in poor households in Germany, the Czech Republic, Ireland, Denmark, the UK, Australia, Belgium, and Finland, whereas the working poor population exceeded ten percent in Greece, Italy, Spain, the US, Japan, Israel, Chile, Turkey, and Mexico (OECD 2013).

In contrast to the OECD definition, Eurostat considers as working poor all working-age (18–64) individuals who were employed for at least seven months of a given year while living in a household with less than 60% of the national median equivalized disposable household income. Thus, the poverty threshold is slightly higher compared to the OECD definition. When adopting the Eurostat definition, in-work poverty rates in 2017 were lowest in Finland (2.7%) and highest in Romania (17.1%). The in-work poverty rate in the EU (including the UK) at the time was 9.6%. Between 2012 and 2017, in-work poverty in the EU increased by 0.7 percentage points. The increase in in-work poverty rates was largest in Hungary (+4.5 percentage points), while the strongest decrease was observed in Greece (–2.3 percentage points). In 2017, in-work poverty rates were below five percent only in Finland and the Czech Republic, while they exceeded ten percent in Hungary, Portugal, Italy, Greece, Spain, Luxembourg, and Romania (Peña-Casas et al. 2019).

Next, the ILO defines the working poor as individuals aged 15 and above who worked for at least 1 hour in the preceding week, with a poverty threshold set at \$1.90 household income or consumption per person per day (Gammarano 2019). Thus, while the employment definition focuses on individuals, the poverty definition draws on the household. In 2000, the ILO in-work poverty rate for upper-middle income countries was around 25%. By 2015, this rate almost reached that in high-income countries, where the ILO in-work poverty rate has been constantly below 1% in the time period 2000–2015. In the same time frame, the in-work poverty rate for lower-middle and low-income countries decreased from around 35% to 14% and from around 60% to 40%, respectively. Thus, while the use of the low ILO consumption threshold seems to be less useful in the context of high-income countries, our systematic review will show that the employment threshold of 1 hour per week is commonly applied also for rich countries.

Finally, while the BLS definition of in-work poverty is very specific to the US context, its wide application in the in-work poverty literature warrants further discussion. The BLS identifies as working poor those individuals above 16 years of age who were active in the labor market (working or searching for a job) at least 6 months (27 weeks) of a given year while living below the federal poverty line. When measuring poverty, the BLS considers household income before taxes (U.S. Bureau of Labor Statistics 2020). The use of an absolute poverty threshold that is only updated for inflation is likely the reasons why official in-work poverty numbers in the US are very low. Calculations using a relative threshold identify an in-work poverty rate around 12% for 2013 (Thiede, Lichter, and Sanders 2015), whereas the corresponding number based on an absolute threshold is only 7% (U.S. Bureau of Labor Statistics 2015). By 2018 the official in-work poverty count had decreased to 4.5% (U.S. Bureau of Labor Statistics 2020).

2.2. *Previous reviews on in-work poverty*

Previous literature reviews on in-work poverty have provided an overview of the relationship between socio-demographic characteristics of individuals and households and in-work poverty or have discussed the role of macro-level developments and specific interventions in altering the in-work poverty risk of families with children.

Crettaz (2013) conducted a state-of-the-art review of the literature until 2011 with a focus on theoretical models, definitions, and social groups with the greatest risk of in-work poverty in Australia, Europe, and North America. With respect to family demographic processes, the author identified single parents, single and divorced men and women, and families with children and large families as being among the groups with the greatest risk of in-work poverty. One important drawback of this review is that it included both empirical and non-empirical (e.g., summary articles) contributions together. Among the empirical contributions, no differentiation was made between descriptive and multivariate analyses. However, such a differentiation would be advisable, because multivariate analyses provide more robust estimates of the association between family demography and in-work poverty *net of* the influence of confounding factors. Although not necessarily without biases, accounting for confounding through a multivariate framework is ever more important given that strictly causal research is rarely feasible in the realm of family demography.

Kalugina (2013) reviewed the main findings of the empirical in-work poverty literature from industrialized countries until 2011, focusing on risk factors related to labor market status, individual and household characteristics, and institutional context. Again, single parents and families with children were identified as being among the groups with the largest in-work poverty risk. Similar to Crettaz (2013), both descriptive and multivariate findings were considered together in this review. Moreover, this review did not aim at giving a systematic overview of all previously published studies. The disadvantage of such an approach is that counterintuitive research findings

may not have been included in the summary, thereby giving the impression of a more homogeneous research field than is actually the case.

Focusing on the UK, Tripney and colleagues (2009) conducted a systematic review on the success of interventions aiming to reduce in-work poverty among families with dependent children. Similarly, Torraco (2016) provided an integrative review of the US literature on the relationship between the persistence of working poor families and changes in the job market. Despite providing important insights on the macro-level factors associated with the in-work poverty risk of families with dependent children, neither publication considered the effect of a transition to parenthood on in-work poverty risk or examined the moderating role of macro-level factors for the magnitude of this effect.

As our overview of existing reviews has shown, family demographic states and transitions have emerged as important drivers of in-work poverty risk in the existing research literature. Our systematic review builds on these previous reviews in at least four ways. First, we update the reviews by Crettaz (2013) and Kalugina (2013) by including numerous new studies published after 2011. Second, rather than a broad focus on risk factors of in-work poverty in general, the aim in our systematic review is to narrow the focus on multivariate analyses of family demographic states (e.g., being married) and transitions (e.g., from being single to being married) as determinants of in-work poverty. Third, following the lead of Tripney et al. (2009) and Torraco (2016), our systematic review accounts for the moderating role of the broader institutional context for the association between family demographic processes and in-work poverty by considering the historical and welfare state context in which empirical studies were conducted.

The fast increase in publications on the topic of in-work poverty in recent years, especially of analyses from a diverse set of European countries as well as analyses taking a longitudinal approach to the study of in-work poverty, calls for a systematic review to integrate these single studies. In the next section, we review some of the main themes discussed in the literature on labor

market and social policy to further illustrate the importance of family demography for in-work poverty risk.

2.3. *Family demographic processes and social inequality*

Increased social scientific interest in the interplay between family demographic processes and social inequalities has coincided with two trends across most rich industrial democracies: the sharp increase in the complexity and diversity of family lives following the second demographic transition (Van Winkle 2018) and the re-emergence of large social and economic inequalities (McCall and Percheski 2010). In this section, we wish to briefly sketch the interrelationship between family demographic processes and social inequalities across social contexts. However, we refrain from discussing in-work poverty specifically or formulating hypotheses, as is common for systematic reviews. In the conclusion, following the review, we will discuss the theoretical linkages between family demography and in-work poverty.

Five family demographic processes are especially relevant for in-work poverty. First, as the transition to adulthood has become a delayed and prolonged affair, increased attention has been given in the social scientific literature to *parental home leaving*. Next to the probability of returning to the parental home, the age of exiting the parental home and establishing a separate and independent household is most commonly studied. As an example, recent studies have shown that earlier parental home leaving has a negative impact on the financial wellbeing of young adults, but can protect the parental household from a premature depletion of household wealth (Sandberg-Thoma, Snyder, and Jang 2015).

Second, *union formation*, that is two persons establishing a common household, is one of the most studied family demographic processes in the social sciences. Recently, studies on union formation have focused on non-marital cohabitation, although many first unions continue to be marriages (Billari and Liefbroer 2010). It is nonetheless important to note that union formation is a

distinct transition compared to our third process, *marriage*, even if the two often coincide. Studying the formation of cohabiting unions, regardless of marital status, and the formation of marital unions is important from both demographic and economic perspectives. In most countries, the median age of marriage has increased despite the median age of first union remaining nearly constant (Billari and Liefbroer 2010). Individual taxation and the regulation of cohabiting unions has made marriage more of a symbolic commitment in many Nordic countries, but it continues to be linked with considerable legal and economic benefits in other countries (Heuveline and Timberlake 2004).

The fourth family demographic process – fertility – subsumes both the transition to *parenthood* as well as all subsequent, higher-parity births. However, many studies simply concentrate on parenthood as the presence of children in a household. Motherhood penalties and fatherhood premiums, that is the gendered consequences of parenthood on labor market outcomes, have been central areas of research. Numerous studies have demonstrated that mothers' disadvantages and fathers' advantages on the labor market continue to increase with the number of children (Budig and England 2001; Glauber 2018; Van Winkle and Fasang 2020).

Finally, *union dissolutions* describe both separations from non-marital cohabiting unions as well as marriages ending in divorce or separation. The influence of divorce and separation on the social and economic wellbeing of remaining household members has been of particular interest, because women and their children tend to be affected negatively (Raley and Sweeney 2020). These five processes are, of course, not an exhaustive list of family demographic events, transitions, and states that are of interest for social scientists. For example, there is a burgeoning literature on step-family building and its impact on the social and economic wellbeing of all household members. However, this list of family demographic processes covers a wide range of factors thought to have an impact on the social and economic wellbeing of individuals and households.

Broadly speaking, there are three classes of theories that link family demographic processes to social inequalities: selection, causation, and mechanistic change. The first perspective – selection

– is commonly found in the literature on parenthood wage gaps (Mari 2019) and ties in with arguments of reverse causation and confounding. Here, it is usually hypothesized that men and women with diverging earnings potential select into different family demographic events. In contrast, the second perspective – causation – focuses on changes in social and economic wellbeing that follow from the interplay of family demographic events and external factors. This theoretical perspective is illustrated by empirical findings such as the wage discrimination of mothers on the labor market (Correll, Benard, and Paik 2007) or the drop in mothers' labor market participation in the absence of widespread and well-funded early childhood education and care (Hook and Paek 2020). Finally, the third perspective – mechanistic change – considers changes in household needs and resources that result from changes in household composition (Strengmann-Kuhn 2003). For example, due to economies of scale, union formation increases the needs of a household by only a small degree but may double the amount of household resources available to meet those needs if both partners work. Conversely, union dissolution may only decrease needs marginally, while halving household resources. It is also important to note that the outcomes of mechanistic change tend to work in a gendered manner (e.g., Holden and Smock 1991). For instance, women usually have lower earnings capacities than men (i.e., lower resources) but are more likely to retain custody of children following union dissolution (i.e., higher needs). We distinguish the mechanistic change perspective from the causal perspective, since the former only accounts for changes in the distribution of total income following family demographic events as opposed to changes in total income itself. However, these three theoretical perspectives are not mutually exclusive but rather tightly intertwined. For example, the transition to parenthood will not only increase household needs (i.e., mechanistic change) but may also drive women to leave the labor market to care for children, leading to a reduction in household resources (i.e., causation).

The links between family demographic processes and social inequalities vary considerably across social and historic contexts (Fasang and Mayer 2020). Labor market institutions as well as

social and family policies are commonly used to discuss how socio-historic contexts moderate the impact of leaving the parental home, forming a union and marriage, entering parenthood, and dissolving a union on individuals' social and economic wellbeing. For example, generous social systems, as are common in Nordic countries, are known to facilitate early parental home leaving with little impact on young adults' economic wellbeing. Moreover, Nordic countries are thought to help mothers maintain their ability to gain resources through the market by providing childcare and paid parental leave to both parents. In contrast, generous child and family benefits, as are common in continental European countries, may mitigate negative consequences of changing household needs and resources, for example following union dissolution, but are also known to reduce women's earnings capability.

3. Methods

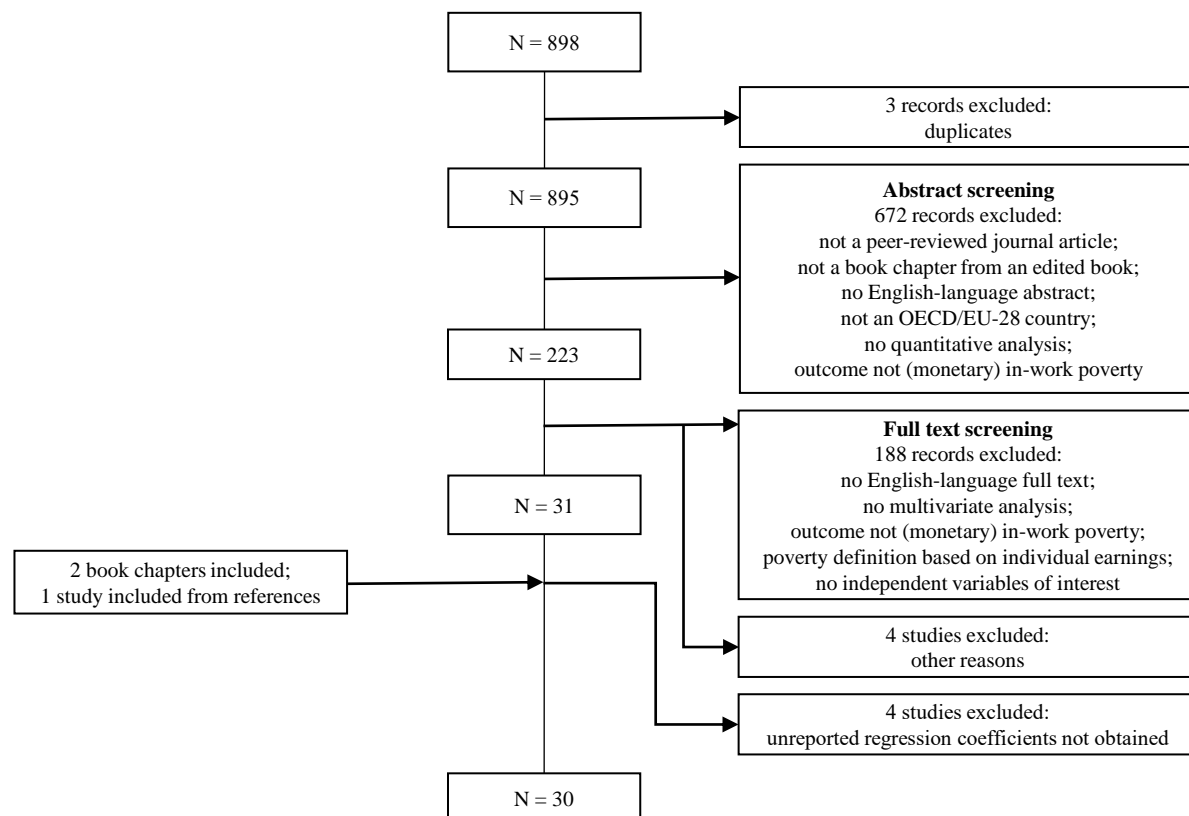
3.1. Literature search

The systematic review summarizes findings from multivariate analyses that gauged the association between the following five family demographic processes and the risk of being or becoming in-work poor in OECD and EU-28 countries: parental home leaving, union formation, marriage, parenthood, and dissolution of non-marital and marital unions. Prior to conducting the literature search, we restricted the scope of the review to English-language publications that appeared in peer-reviewed journals or edited books. We therefore excluded reports, working papers, conference proceedings, dissertations, and presentations. As we are interested in extracting estimates, we also excluded qualitative studies and theoretical texts. To identify relevant studies, we conducted a literature search on Web of Science (using the "All Databases" option) in July 2019 with the following search terms:

“working poor” OR “in-work poverty” OR “working poverty” OR “in-work poor” OR
“working and poor” OR “working but poor”

This literature search resulted in 895 unique records (Figure 1), corresponding to publications between 1973 and 2019.

Figure 1: Flow diagram of the literature search: Number of publications included and/or excluded at each step



Note: See Table A1 for a detailed overview of studies and analyses included in the systematic review.

A variety of additional strategies were applied to identify relevant studies not found via our initial literature search. First, the book chapters of three edited handbooks on the topic of in-work poverty (Andreß and Lohmann 2008; Fraser et al. 2011; Lohmann and Marx 2018) were scanned for inclusion. Two of these book chapters were not identified via our initial search but met all our inclusion criteria (as described below). Second, we identified three (non-)systematic review articles on in-work poverty through the literature search on Web of Science (Crettaz 2013; Kalugina 2013; Torraco 2016). The reference lists of these three review articles were scanned for potential studies

to be included in our systematic review. However, no additional publications were identified via this strategy. Third, to identify recently published studies that were not listed in Web of Science at the time of our initial literature search, we conducted a second literature search in November 2019 on Google Scholar (using the “in the title of the article” option) with the same search terms as listed above. In this case, publication dates were restricted to the years 2018 and 2019. We did not identify additional studies to be included in our systematic review via this second literature search. Finally, we conducted a backward literature search among the studies identified via our initial literature search on Web of Science that met all our inclusion criteria for the systematic review. This backward literature search identified one additional study that met all our inclusion criteria.

3.2. *Inclusion and exclusion of studies*

To ensure some degree of comparability in our systematic review, we only considered studies (or parts of studies) that defined poverty based on income. Studies defining poverty only using other indicators – such as benefit receipt – were excluded. Furthermore, and consistent with the in-work poverty definitions discussed above, we concentrated on studies that adopted a definition of poverty based on *household* income, excluding studies that only took *individual* earnings into account. We retained studies that used absolute or relative definitions of poverty.

Regarding the definition of employment, we did not impose any restrictions. As described in more detail below, this resulted in a heterogeneous pool of employment definitions applied in the selected analyses.

Finally, to be included in the review, studies had to report results from at least one multivariate statistical model with in-work poverty as the dependent variable and at least one independent variable reflecting one of the five family demographic processes listed above.

As shown in Figure 1, the inclusion and exclusion of studies unfolded in two steps. First, we scanned the titles and abstracts of the 895 publications from our initial literature search for the

above-mentioned inclusion and exclusion criteria. In this first step, we excluded 672 publications. Second, we retrieved the full texts of the remaining 223 publications. These full texts were then scanned for inclusion and exclusion. In this second stage, we excluded another 192 publications, 188 of them due to the above-mentioned exclusion criteria and four due to other reasons described in detail in Table B1 in the online supplementary materials. In the case of four additional studies, we were unable to obtain unreported regression coefficients from the authors. These studies were also excluded.

Including the three publications identified via our alternative search strategies (see above), the systematic review was based on 30 studies published between 2000 and 2019.

3.3. Data extraction

To aggregate findings from the studies included in our final pool, we followed the procedure of a recent systematic review (Anderson, Sheppard, and Monden 2018). The unit of analysis in our systematic review is what has been termed an *analysis*. An analysis is distinct from a study (or publication) in that a study may contain more than one analysis. Within the same study, we distinguished separate analyses by the country (or country group) under consideration. For each analysis, we used the most aggregated results available. For instance, if, for a given country, separate results were reported for the dependently employed and the self-employed as well as for the pooled sample, only the results referring to the pooled sample were considered for review. However, if no results were reported for the pooled sample, results for the different sub-samples were treated as separate analyses.

As described above, we only considered results from multivariate regression models. Where a sequence of multivariate regression models was reported for a given analysis, we applied the following hierarchical set of criteria to select the most appropriate regression model. The first set of selection criteria refers to unreported regression coefficients. For this systematic review, we only

took regression coefficients into account that were reported in the main body or appendix of our included studies, therefore not considering unreported regression coefficients (e.g., from robustness checks or additional regression models). An exception was made if the micro-level coefficients from multilevel regression models or regression coefficients of control variables were not reported. In these cases, the respective authors were contacted via email and asked to send the unreported regression coefficients.

The second set of selection criteria refers to the sample under study and the operationalization of the dependent variable and aims at maximizing comparability between the analyses considered. First, we made one exception to our general rule of preferring the most aggregated results for each analysis by giving regression models *excluding* non-working-age individuals consideration over regression models *including* these age groups. Next, regression models in which in-work poverty was defined in terms of disposable income (i.e., post-tax and post-transfer) were preferred over regression models assigning in-work poverty status based on other types of income (e.g., pre-tax and post-transfer). However, in analyses of the US where in-work poverty was defined with reference to the federal (absolute) poverty line, we preferred a poverty classification based on income before taxes and after transfers (excluding near-cash and non-cash transfers) in line with the BLS (see section 2.1 above). Third, if multiple regression models applying different definitions of employment were available, models assigning in-work poverty status based on the Eurostat definition were preferred (i.e., employed for at least seven months of the reference year with no constraints on the minimum amount of time worked per week). Finally, if poverty definitions differed across regression models in terms of the poverty threshold adopted, we opted for results from regression models applying a relative poverty threshold rather than an absolute poverty threshold.

If there were still multiple regression models available for the same analysis after applying the above sets of selection criteria, we relied on the following final set of selection criteria: We

preferred the regression model with the greatest number of covariates. Where interaction terms with the family demographic variables of our interest were introduced, the fullest model prior to the introduction of interactions was selected. Coefficients from regression models including interaction effects were nevertheless retained in the systematic review but only to be discussed in the narrative part of our review (see below). If several models contained the same number of covariates, we opted for the regression model with the best model fit. If no information on model fit was available, we preferred the last regression model reported.

We classified the analyses selected for the systematic review according to several categories including: (1) the characteristics of the sample, that is dataset, country, study period, sample size, sample age, inclusion or exclusion of the self-employed; (2) the employment and poverty definitions used, including the type of income considered and the poverty threshold applied; (3) the analytical strategy, that is whether the analysis was cross-sectional or longitudinal, the unit of analysis (individual vs. household), whether family demographic variables were introduced into the analysis as control variables or main independent variables, and other types of variables included in the analysis (i.e., micro-level and/or macro-level variables); and (4) the operationalization of family demographic processes. Given the ongoing debate in the social stratification literature on the potential income underreporting of the self-employed (e.g., Hurst, Li, and Pugsley 2014), the inclusion or exclusion of self-employed respondents was singled out as a separate analysis characteristic

Table A1 in the Appendix displays all studies that we included in the systematic review with references to the analyses selected from each study. Table B2 in the Online Supplementary Materials reports detailed information on coding decisions for missing and ambiguous analysis characteristics or variable operationalizations. Whenever possible, we imputed the missing

information with plausible values, for example based on other publications that used the same dataset or studied in-work poverty within a similar geographical context.⁴

3.4. Operationalization of family demographic variables

Given the vast number of approaches used in the empirical literature to operationalize the family demographic processes considered in our systematic review, we did not decide a priori to include only one or several types of operationalizations. Rather, for each analysis, we tried to maximize the amount of information to be considered for review. We only considered one regression coefficient per family demographic process and analysis. However, it was not uncommon to encounter analyses that simultaneously included multiple operationalizations and, therefore, regression coefficients of the same family demographic process. For each family demographic process, Table A2 in the Appendix displays the operationalizations encountered in the analyses selected for review. To choose among multiple operationalizations, the entries in the table were sorted hierarchically, with operationalizations appearing closer to the top given consideration over operationalizations appearing closer to the bottom.

Only two analyses considered the association between parental home leaving and in-work poverty. Both analyses were taken from the same study and, therefore, applied the same operationalization (i.e., one binary variable indicating whether the respondent was living with the family of origin or not).

While reviewing analyses for union formation, we found that most of them did not distinguish between unmarried and married cohabitations (with the exception of Maldonado, Prieto,

⁴ All data collected for the systematic review are available via the GESIS SowiDataNet-datorium: Polizzi, A., Struffolino, E., Van Winkle, Z. (2022): Systematic review on family demographic processes and in-work poverty. Version 2.0.0. WZB Berlin Social Science Center. Dataset. DOI: <https://doi.org/10.7802/2366>.

and Feres 2018): individuals classified as cohabiting might have also been married, but this information was usually not added to the models. This led us to consider as ‘formed unions’ any cohabiting union for which the civil status of the partners was not specified. In addition, some of our selected analyses captured the association of union formation with in-work poverty only indirectly by using a set of multiple dummy variables describing the structure of the household (i.e., number of adults and children). For these analyses, we assigned the regression coefficient of *couple without children* to the category ‘formed unions’ if *single adult without children* was chosen as the reference category, given that it was unclear whether couples were or were not also married.

With respect to marriage, the analyses selected for the review did not explicitly differentiate between non-cohabiting and cohabiting marriage, so that individuals classified as married were not necessarily cohabiting. However, we assumed that all marriages were cohabiting marriages and labeled these analyses as referring to ‘marriage’.

We observed the greatest variety with respect to the operationalization of ‘parenthood and subsequent births’. Broadly speaking, we identified analyses operationalizing parenthood and subsequent births using either continuous (e.g., *number of children in the household*, *share of children in the household over the total number of household members*) or categorical (e.g., *parenthood*, *number of children in the household*, *birth event*) variables, as well as measuring this process either directly (e.g., *parenthood*, *number of children*, *birth event*) or indirectly (e.g., *share of children in the household*). Among the latter were analyses incorporating a set of dummy variables describing the household structure (e.g., *couple with children* with *childless couple* as the reference category). If multiple operationalizations of this family demographic process were simultaneously used in the same model, we preferred coefficients from direct operationalizations. Moreover, we preferred coefficients from categorical measures because we expected continuous measures to carry at least some bias if true associations were non-linear.

Finally, with only one exception, the analyses selected for the review did not distinguish between separation and divorce.⁵ As a result, we subsumed the two processes into one category, that is ‘dissolved unions’. In one case, we also assigned the regression coefficient of *single adult with children* to the category ‘dissolved unions’, given that *couple with children* was chosen as the reference category. Here, we assumed that parents lived together before they separated.

We distinguished between five types of associations between family demographic processes and in-work poverty risk: negative significant, negative non-significant, indeterminate, positive non-significant, and positive significant. The terms ‘positive’ and ‘negative’ indicate an increase and a decrease in the risk of in-work poverty, respectively. For categorical variables with multiple levels (e.g., number of children), we coded the overall association with a family demographic process as ‘positive’/‘negative’ if all levels of the respective variable had a positive/negative association with in-work poverty (relative to the reference category). If the associations of in-work poverty with different levels of a categorical variable pointed in different directions, the overall effect of the respective family demographic process was coded as ‘indeterminate’, regardless of the levels of significance of the associations of the individual levels of that variable with in-work poverty. This was also done if the associations of a continuous variable or all levels of a categorical variable with in-work poverty were exactly 0 (linear estimator/logit/probit) or 1 (odds-ratio).⁶

For each family demographic process, Table A2 in the Appendix offers a summary of the criteria applied to determine whether the overall association with in-work poverty risk was significant.

⁵ In three analyses, the category for separation and divorce included widowhood as well.

⁶ If the family demographic process of interest was the reference category of a categorical variable, we inverted the sign of the regression coefficient to obtain the appropriate reference category (e.g., reference category “childless” rather than “with children”).

3.5. *Presentation of the results*

The systematic review comprises 86 analyses from 30 studies (see Table A1). These analyses are reviewed in two segments: a *quantitative review* and a section that we refer to as *conceptual and methodological advances in in-work poverty research*.

The *quantitative review* is organized as follows. First, we offer an overview of the number of analyses investigating the association between each family demographic process and in-work poverty. Here, we also provide a breakdown by analysis characteristics. Second, for each family demographic process, we review variations in the direction and significance of associations by analysis characteristics. Given the small number and relatively low heterogeneity of the selected analyses, we decided to restrict this second part of the quantitative review to the two family demographic variables ‘formed unions’ and ‘parenthood and subsequent births’. In addition, we focus only on a few key characteristics of analyses, that is the welfare state regime, the income reference period, the sample size, and the inclusion vs. exclusion of self-employed respondents. With regard to the income reference period (i.e., the period to which income data in the analyzed datasets referred), the vast majority of our analyses focused on the period 2000 to 2014. We decided to differentiate between analyses referring to the time period before or after the global financial crisis (i.e., pre-2008 vs. post-2008 vs. both) because it may have caused a shift in the direction and significance of the associations between family demographic processes and in-work poverty, particularly due to a weakening of the protective effects associated with some family demographic processes and/or an aggravation of the in-work poverty risks associated with others (e.g., Filandri and Struffolino 2013). However, the association between family demographic processes and in-work poverty may have also changed following the global financial crisis because the composition of the population choosing to undergo a certain family demographic process, for example parenthood, may become more selective in times of crisis (e.g., Bellido and Marcén 2020; Comolli 2021; González-Val and Marcén 2018).

As for transition to parenthood and subsequent births, we were able to additionally examine variations in the direction and significance of associations by type of analysis (cross-sectional vs. longitudinal), the role of family demographic processes in the empirical analysis (control vs. main independent variable), and the type of operationalization (continuous vs. categorical), given the larger number of analyses considering this family demographic process.

In the part of the systematic review focusing on the *conceptual and methodological advances in in-work poverty research*, we describe in detail the analyses selected for the quantitative review that deviated from the more conventional approaches adopted in the vast majority of analyses. In addition, we discuss results from statistical models not included in the quantitative review that accounted for the interaction between family demographic processes and individual or context characteristics (see Table A1 in the Appendix).

In the first case, these advances refer to the use of the household (rather than the individual) as unit of analysis, to the use of non-standard definitions of poverty, to the use of models that account for selection into employment, and to the direct estimation of the association between family demographic transitions (rather than states) and in-work poverty. In the second case, the family demographic variables of our interest were interacted with individual-level variables (e.g., gender or age) or contextual variables (e.g., diffusion of family services). In addition, given that only one study meeting our inclusion criteria directly considered parental home leaving – and did so using an interaction effect with age – we review the association of this family demographic event with in-work poverty together with the other interaction effects in the section on conceptual and methodological advances. As a result, the quantitative review only focuses on the four family demographic variables ‘formed unions’, ‘marriage’, ‘parenthood and subsequent births’, and ‘dissolved unions’.

4. Results

4.1. Quantitative review

4.1.1. General overview

From the 30 studies included in the systematic review, we selected a total of 84 analyses for the quantitative review.⁷ Table 1 shows some characteristics of these analyses. While the second column does not differentiate between the type of family demographic process considered in the analyses, columns three to six focus only on those analyses that included formed unions, marriage, parenthood and subsequent births, and dissolved unions as an independent variable, respectively. The numbers in columns three to six do not sum to the numbers in the second column, given that many analyses simultaneously studied the association between more than one of the four family demographic processes and in-work poverty.

As can be seen from Table 1, of the four family demographic processes considered, parenthood and subsequent births was most often included as a predictor of in-work poverty (around 90% of all analyses ($76/84 = 0.905$) included in our quantitative review), followed by formed unions ($57/84 = 0.679$). In contrast, only around ten percent of all analyses ($9/84 = 0.107$) investigated the association between marriage and in-work poverty, whereas only slightly more analyses ($11/84 = 0.131$) included a variable indicating union dissolution.

⁷ Results using a smaller, highly comparable set of analyses are similar to those presented (available from authors).

Table 1: Analyses selected for the quantitative review by analysis characteristics

	Total	Formed unions	Marriage	Parenthood and subsequent births	Dissolved unions
Total number of analyses	84	57	9	76	11
Sample characteristics					
<i>Dataset</i>					
British Household Panel Survey/ UK Household Longitudinal Study	2	2	0	1	1
Current Population Survey	2	0	2	2	2
Dutch Socio-Economic Panel	1	0	0	1	1
European Community Household Panel + European Union Statistics on Income and Living Conditions	69	52	4	62	6
Family Resources Survey	3	3	0	3	0
Luxembourg Income Study	2	0	0	2	0
Socio-Economic Characterization Survey	1	0	1	1	1
Survey of Income and Program Participation	1	0	1	1	0
Survey on Household Income and Wealth	1	0	0	1	0
US Census	1	0	1	1	0
Multiple datasets	1	0	0	1	0
<i>Country/countries under study</i>					
Single-country study	68	48	8	61	8
Multiple-country study	16	9	1	15	3
Nordic countries	4	4	0	2	0
Continental welfare state	6	3	0	5	1
Liberal welfare state	15	8	4	13	3
Southern welfare state	13	5	3	12	3
Central and Eastern European countries	25	24	0	24	0
Baltic countries	10	10	0	10	0
Other welfare state	1	0	1	1	1
Multiple welfare states	10	3	1	9	3
Europe	77	57	4	69	8
USA	5	0	4	5	2
Chile	1	0	1	1	1
Multiple regions	1	0	0	1	0
<i>Income reference period</i>					
1980s	1	0	1	1	0
1990s	4	1	2	4	1
2000s	59	42	4	53	6
2010s	14	11	2	13	3
1990s–2000s	2	0	0	2	0
2000s–2010s	3	2	0	2	0
1990s–2010s	1	1	0	1	1
Pre-2008	54	33	6	48	6
Post-2008	26	22	2	24	3
Both	4	2	1	4	2
<i>Sample size</i>					
Unclear	2	0	1	1	1
< 1,000	3	3	0	3	0
1,000–5,000	30	26	3	24	4
5,000–10,000	23	18	1	23	1
10,000–50,000	13	6	2	12	1
≥ 50,000	13	4	2	13	4
<i>Sample age</i>					
15–64/5	4	0	1	4	2
16–64/5	11	11	0	10	0
17–64	2	0	0	2	1
18–64/5	61	45	5	54	5
20–64	1	1	0	1	0
25–65	1	0	0	1	0
0–99	1	0	0	1	0
16–99	3	0	3	3	3

	Total	Formed unions	Marriage	Parenthood and subsequent births	Dissolved unions
<i>Self-employed</i>					
Self-employed included	63	43	8	56	10
Self-employed not included	13	9	0	13	0
Unclear if self-employed included	8	5	1	7	1
In-work poverty definition					
<i>Employment definition applied</i>					
Individual level	75	53	6	68	9
Household level	9	4	3	8	2
Prev. year: ≥ 6 months	2	1	1	2	0
Prev. year: ≥ 7 months	8	5	1	2	2
Prev. year: full time	2	0	2	2	2
Prev. year: ≥ 6 months; time of interview: employment status	1	1	0	1	0
Prev. year: ≥ 7 months; time of interview: employment status	46	38	0	45	0
Curr. year: ≥ 7 months	1	0	0	1	0
Curr. year: ≥ 7 months; time of interview: employment status	3	0	3	3	3
Time of interview: employment status	16	11	1	16	1
Time of interview: ≥ 1 hour/week	5	1	1	4	3
<i>Poverty definition applied</i>					
Annual income	75	53	7	67	9
Monthly income	6	1	2	6	2
Weekly income	3	3	0	3	0
Absolute poverty threshold	4	0	4	4	2
Relative poverty threshold (50% of the median)	3	0	1	3	1
Relative poverty threshold (60% of the median)	77	57	4	69	8
Pre-tax and post-transfer income	4	0	4	4	2
Post-tax and post-transfer income	79	57	5	71	9
Post-tax and pre-transfer income	1	0	0	1	0
Modified OECD equivalence scale	67	49	4	64	7
Square root equivalence scale	3	0	0	3	0
Official poverty line	4	0	4	4	2
No equivalence scale	5	5	0	0	0
Other equivalence scale	5	3	1	5	2
Analytical strategy					
<i>Type of analysis</i>					
Cross-sectional	72	55	6	65	7
Longitudinal	12	2	3	11	4
<i>Unit of analysis</i>					
Individual	78	54	6	70	9
Household	6	3	3	6	2
<i>Role of family demographic variables</i>					
Control variable	15	3	5	14	5
Main variable	69	54	4	62	6
<i>Other variables used</i>					
Only micro-level	69	52	6	62	7
Only micro-level + country/region and/or year fixed effects	9	4	2	8	3
Micro- and macro-level (without country/region and year fixed effects)	6	1	1	6	1

Note: Some analyses contained more than one of the four family demographic variables of interest. Therefore, the sum of the numbers in the last four columns can exceed the corresponding number in the “Total” column. See Table A1, column 2, in the Appendix for a detailed list of the analyses selected for the quantitative review.

The majority of the selected analyses ($69/84 = 0.821$) used data from the EU Statistics on Income and Living Conditions (EU-SILC). As a result, almost all analyses ($77/84 = 0.917$) focused on one or multiple European countries, whereas only few analyses ($7/84 = 0.083$) looked at countries outside of Europe, particularly the US. Within Europe, a large number of countries was studied, as indicated by the welfare states and welfare state regimes under consideration.¹ With respect to the historical period, analyses using income data collected before the onset of the 2008 global financial crisis were more common ($54/84 = 0.643$). In addition, most analyses ($61/84 = 0.726$) focused on the population between 18 and 64/65 years of age, used small-to-medium sized (1000–10,000 respondents) samples ($53/84 = 0.631$), and included the self-employed ($63/84 = 0.75$).

Overall, we observed great homogeneity with regard to the employment definition applied. Following an approach consistent with the BLS, Eurostat, and ILO definitions of in-work poverty (vs. the OECD definition), the largest share of analyses ($75/84 = 0.893$) focused only on the employment history of the individual respondent (vs. other household members). Regardless of whether the employment definition referred to the individual or household level, most analyses ($49/84 = 0.583$) followed an even more conservative approach to defining employment than

¹ Our classification of European welfare states follows well-known typologies, see Arts and Gelissen (2002) for a review. The US was classified as liberal welfare state regime, while Chile was classified as ‘other’ welfare state regime. Finally, analyses conducted on a pooled sample of respondents from two or more different welfare state regimes (e.g., continental and liberal) were assigned to the category ‘multiple welfare states’. In our systematic review, these two categories do not overlap. We decided not to collapse the ‘multiple’ and ‘other’ categories, as we suspected that different mechanisms are driving the in-work poverty patterns in the different categories: whereas patterns observed in the ‘multiple’ category are likely to be driven by contradictory institutional arrangements in different countries, patterns observed in the ‘other’ category must be attributed to idiosyncrasies in institutional arrangements in countries not commonly considered in mainstream typologies of welfare state regimes.

Eurostat (i.e., ≥ 7 months (self-)employed in the previous year), using information on the employment history in the previous/current year *and* the employment status at the time of the interview. In contrast, only few analyses followed the Eurostat ($8/84 = 0.095$) or ILO (i.e., working ≥ 1 h/week at the time of the interview; $5/84 = 0.060$) definitions of employment, whereas the OECD definition (i.e., employment status at the time of the interview) was more often followed ($16/84 = 0.191$). Finally, an employment definition in line with but more restrictive than the BLS definition was followed in some analyses ($2/84 = 0.024$), including individuals or households who were employed for at least 6 months in the previous year but excluding those who were searching for a job. In addition, we encountered two analyses ($2/84 = 0.024$) that defined employment in terms of full-time employment in the previous year, as well as one analysis ($1/84 = 0.012$) that considered individuals to be working if they were employed for at least six months in the previous year and at the time of the interview.

In accordance with the Eurostat definition of (in-work) poverty, most analyses determined respondents' poverty status by comparing their equivalized annual ($75/84 = 0.893$) disposable ($79/84 = 0.941$) household income against a relative threshold set at 60% of the national median income ($77/84 = 0.917$). In contrast, only few analyses applied a relative poverty threshold of 50% (as in the OECD definition; $3/84 = 0.036$). All analyses applying an absolute threshold were conducted on US samples ($4/84 = 0.048$). Accordingly, they used the federal poverty line as their poverty threshold and measured household income in terms of pre-taxes and post-transfer income (in line with the BLS).

Most analyses followed the practice of Eurostat and the OECD by calculating one poverty threshold that was equally applied across all household types ($80/84 = 0.952$), rather than using household type-specific poverty thresholds ($4/84 = 0.048$), as is done by the BLS. Where only one poverty threshold was calculated, authors usually followed the Eurostat and OECD definitions by using equivalized household income ($75/80 = 0.938$). Equivalization was achieved in most cases

($67/75 = 0.893$) by applying the modified OECD equivalence scale, which assigns a weight of 1 to the first adult person in the household, a weight of 0.5 to each additional household member aged 14 and above, and a weight of 0.3 to each additional household member aged 13 and below.²

Regarding the analytical strategy, the majority of analyses ($72/84 = 0.857$) were cross-sectional in nature, while only few analyses investigated longitudinal associations between family demographic variables and in-work poverty ($12/84 = 0.143$). Similarly, most analyses used the individual ($78/84 = 0.929$) rather than the household ($6/84 = 0.071$) as unit of analysis. Family demographic processes were mostly included as main independent variables ($69/84 = 0.821$), although it was not uncommon to include them as control variables ($15/84 = 0.179$). Finally, the largest share of analyses ($69/84 = 0.821$) only accounted for influences of micro-level variables on in-work poverty.

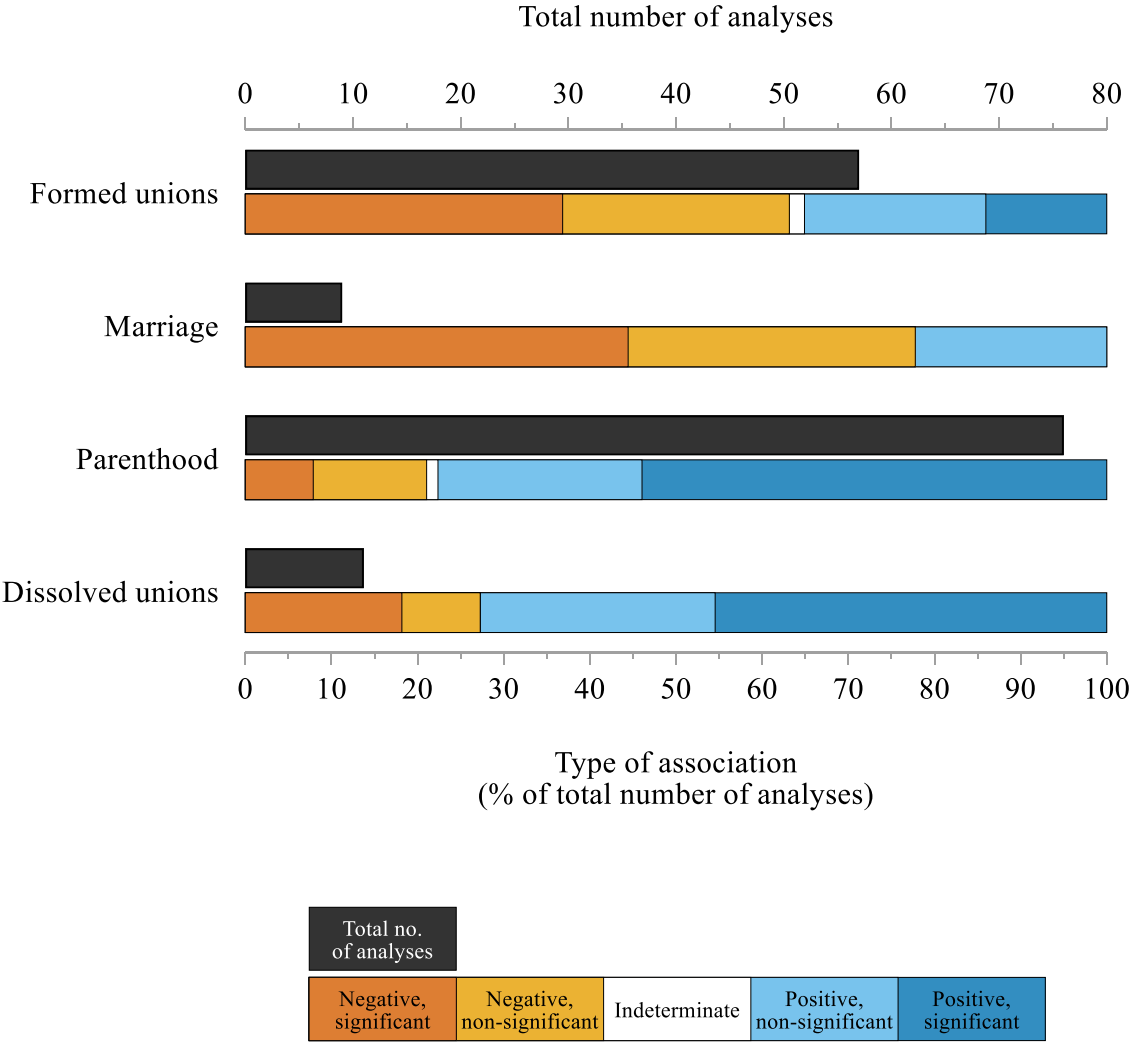
4.1.2. Direction and significance of associations

For each of the four family demographic categories formed unions, marriage, parenthood and subsequent births, and dissolved unions, Figure 2 displays the total number of analyses (top bar) and the direction and significance of the association with in-work poverty expressed as a percentage of the total number of analyses per family demographic process (bottom bar).

² The choice of the equivalence scale has crucial implications for the link between household needs and resources. For example, if a second adult joins a single household, the equivalence weight of that household grows by only $\sqrt{2} - \sqrt{1} \approx 0.41$ if the square root equivalence scale is used, but by 0.5 if the modified OECD equivalence scale is used. Regarding a couple's transition to parenthood, the equivalence weight grows by 0.3 (modified OECD) vs. 0.32 (square root) for the first child, but by 0.3 (modified OECD) vs. 0.21 (square root) for the fourth child. Thus, conclusions about the impact of family demographic processes on in-work poverty risk may partly depend on the equivalence scale utilized.

We found that a majority of associations between formed unions ($21/57 = 0.368$ of all analyses including this variable) and marriage ($4/9 = 0.444$) and in-work poverty were negative and significant. In contrast, positive and significant associations with in-work poverty were identified for parenthood ($41/76 = 0.540$) and dissolved unions ($5/11 = 0.455$). It has to be noted that most of the remaining analyses for formed unions ($15/57 = 0.263$) and marriage ($3/9 = 0.333$) indicated negative but non-significant associations with in-work poverty, while a minority of analyses returned positive, but usually non-significant coefficients ($20/57 = 0.351$ and $2/9 = 0.222$, respectively). Similarly, in the case of parenthood ($18/76 = 0.237$) and dissolved unions ($3/11 = 0.273$), half of the remaining analyses reported positive though non-significant estimates, while only a minority found negative, but in many instances non-significant, associations ($16/76 = 0.211$ and $3/11 = 0.273$, respectively).

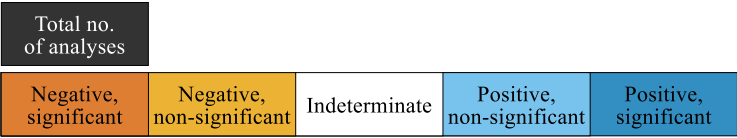
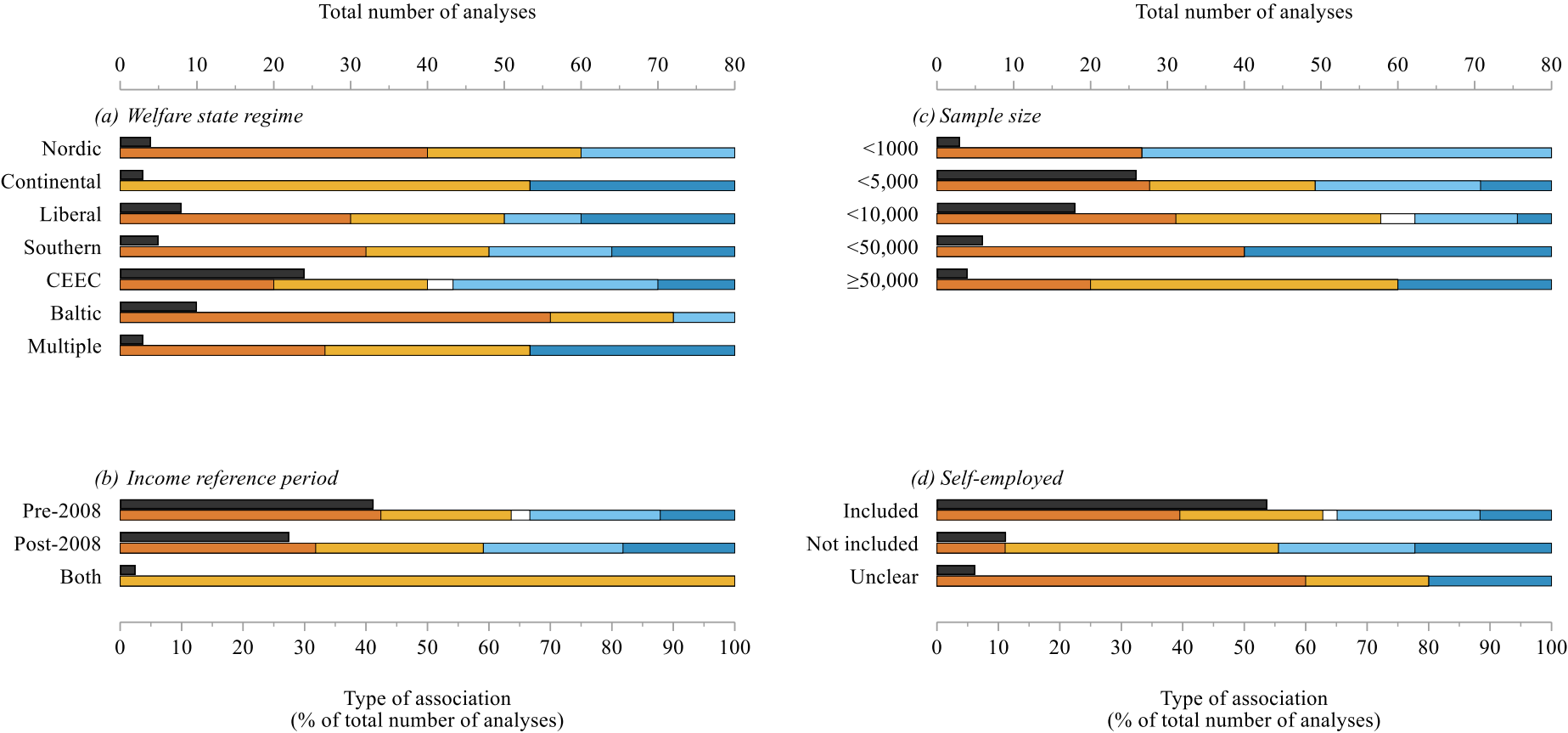
Figure 2: Total number of analyses selected for the quantitative review by family demographic process: direction and significance of associations



4.1.3. *Formed unions*

The probability of finding a negative (and significant) association between formed unions and in-work poverty was not specific to a certain welfare state regime (Figure 3a). Thus, for virtually all welfare state contexts, the distribution of coefficients is analogous to the pattern displayed in Figure 2, with the exception of countries belonging to the continental welfare state cluster. However, only a few analyses looked at countries in this cluster. Regarding the income reference period (Figure 3b), the share of analyses returning a negative and significant association between formed unions and in-work poverty was somewhat smaller for the period during/after 2008 (vs. before 2008): this result could hint at a weakening of the protective role of living in a couple (i.e., with a potential second earner) compared to being single, which might have been driven in part by higher unemployment rates in most EU countries as well as in the US following the financial crisis. With regard to the sample size (Figure 3c), no clear trend can be identified: while the share of analyses returning negative and significant coefficients was smaller in the category “ $\geq 50,000$ ”, this share was calculated on a very small number of analyses. Finally, among the analyses excluding the self-employed, we identified a smaller proportion of estimates indicating a negative and significant association between formed unions and in-work poverty compared to analyses including the self-employed. In contrast, the share of estimates indicating a negative non-significant association was larger (Figure 3d).

Figure 3: Formed unions: number of analyses, direction and significance of associations by (a) welfare state regime, (b) income reference period, (c) sample size, and (d) inclusion/exclusion of self-employed respondents

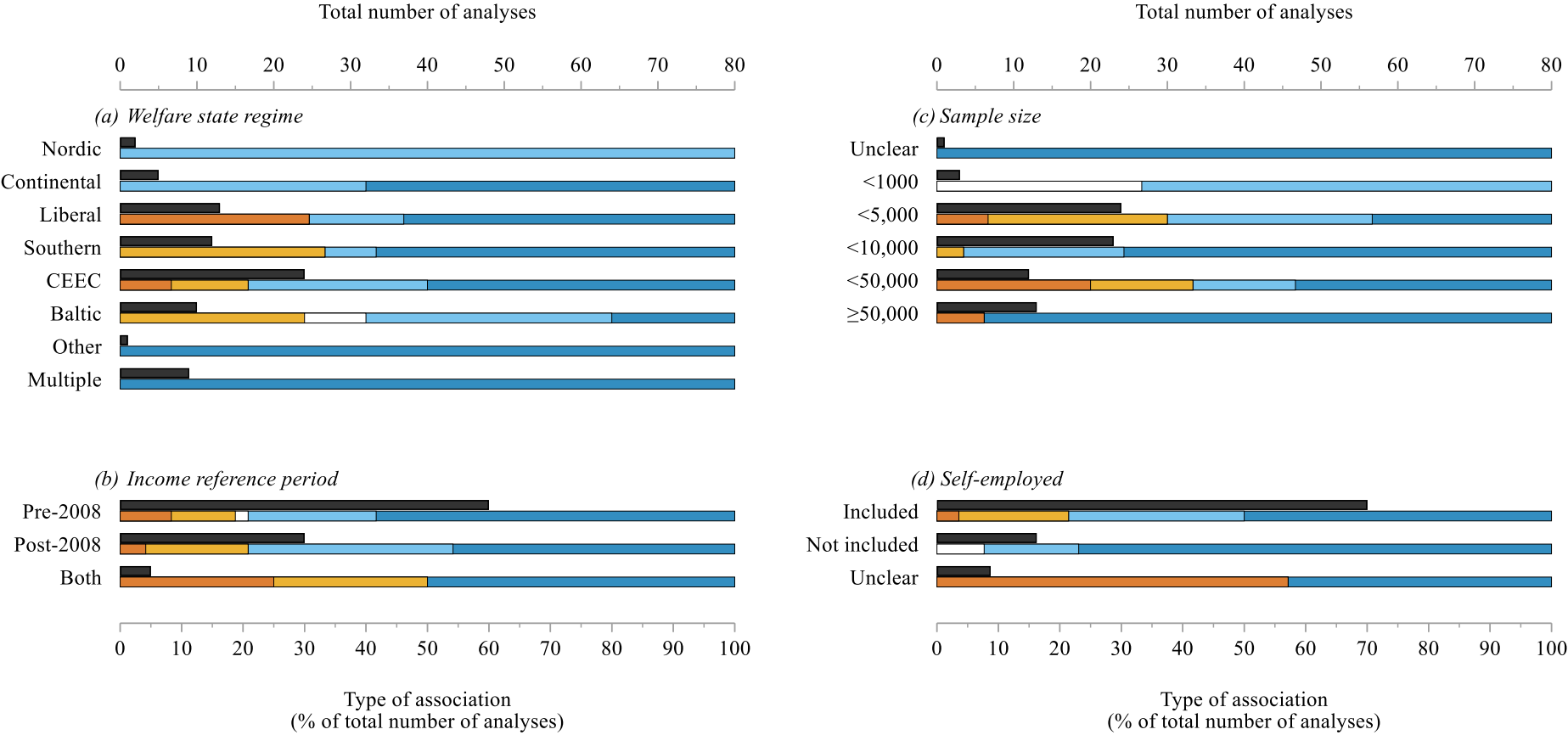


4.1.4. Parenthood and subsequent births

The few analyses uncovering a negative (either significant or non-significant) association between parenthood and subsequent births and in-work poverty were limited to specific welfare state regimes, namely liberal welfare states as well as Southern European, Central and Eastern European (CEEC), and Baltic countries (Figure 4a). These findings correspond with the notion that the welfare state may act as an important moderator of the association between family demography and in-work poverty. One possible explanation is that welfare state generosity is limited in these contexts and that direct forms of cash transfers are predominantly targeted towards families with (many) children (Blum and Rille-Pfeiffer 2010; Janta et al. 2019). Finally, all analyses conducted among a pooled sample of respondents from two or more different welfare state regimes (i.e., multiple welfare states) found positive and significant associations between children and in-work poverty. However, this finding may well be explained by the larger sample sizes in these analyses. As shown in Figure 4c, the probability to find a significantly positive association increased with sample size, whereas the share of analyses finding non-significant and/or negative associations was larger when samples were smaller.

The direction and significance of the association between parenthood and subsequent births and in-work poverty varied only weakly with the income reference period (Figure 4b). If anything, analyses using income data collected during/after the 2008 global financial crisis found positive and significant associations less often, in favor of a larger share of positive and non-significant estimates. Finally, as Figure 4d shows, negative non-significant associations were concentrated in analyses including the self-employed. One reason might be that the self-employed represent a selective population with regard to other characteristics associated with family demographic processes and, therefore, with in-work poverty. However, as already alluded to above, this pattern might also be the consequence of differential income reporting among the self-employed.

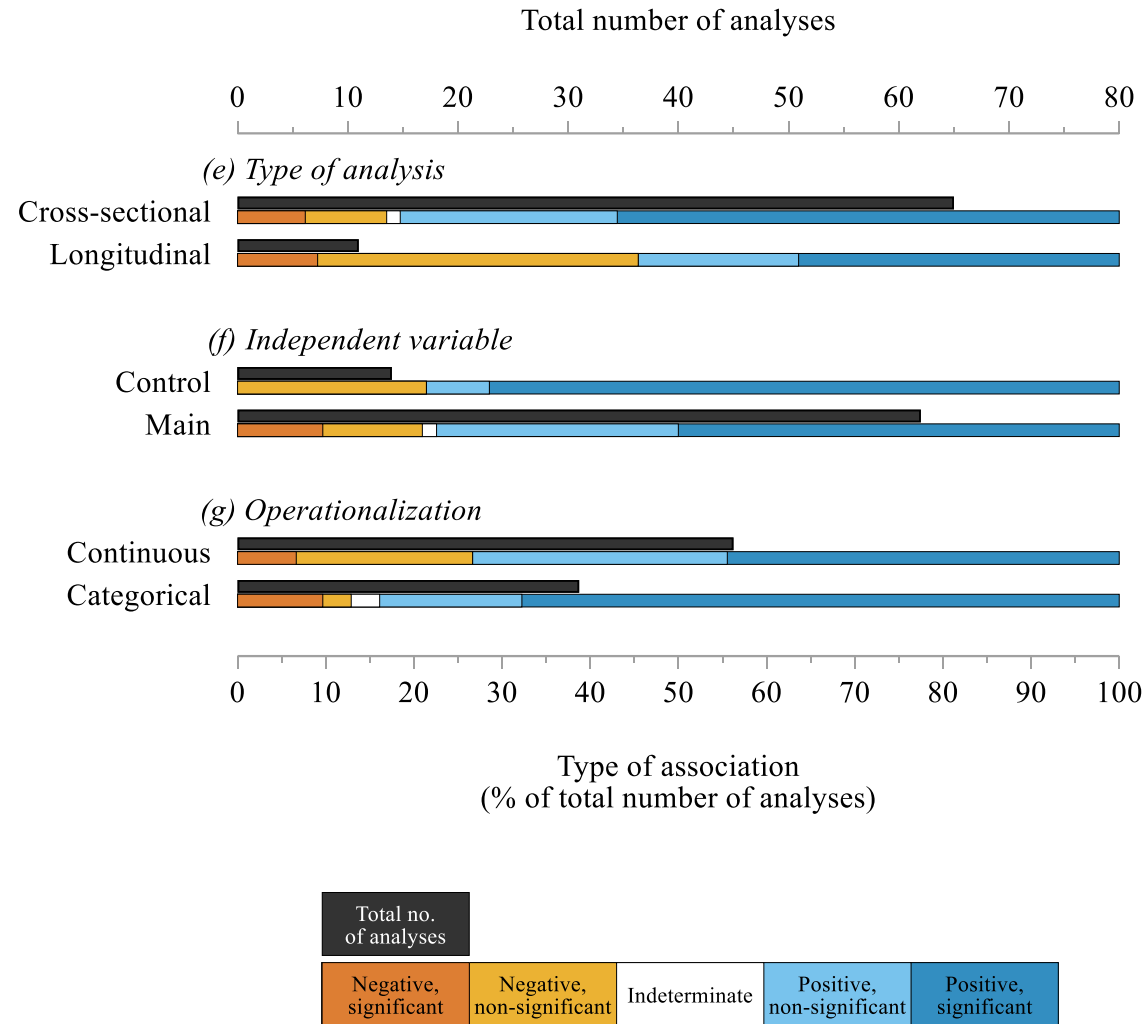
Figure 4: Parenthood and subsequent births: number of analyses, direction and significance of associations by (a) welfare state regime, (b) income reference period, (c) sample size, and (d) inclusion/exclusion of self-employed respondents



Given the larger number of analyses including children as an independent variable, we were able to explore the moderating role of additional sample characteristics. First, longitudinal analyses showed a less consistent pattern compared to cross-sectional analyses, with a smaller share of analyses returning a positive and significant association between parenthood and subsequent births and in-work poverty and a larger share of analyses reporting negative significant or negative non-significant coefficients (Figure 5e). This suggests that cross-sectional analyses might overestimate the positive association between children and in-work poverty, possibly because these analyses do not directly account for selection into parenthood. Second, Figure 5f differentiates between analyses where parenthood and subsequent births was included as a main independent rather than as a control variable. Compared to the latter case, the share of estimates indicating a positive and non-significant association was somewhat larger when the presence of children was included as a main independent variable, while the share of estimates indicating a positive and significant association was smaller. This might be expected if we assume that analyses using parenthood and subsequent births as a main independent variable accounted for all relevant confounding mechanisms between parenthood and in-work poverty. In contrast, analyses using children as a control variable might have introduced parenthood as a confounder but might have paid less attention to the question whether the association between parenthood and in-work poverty was itself confounded.

Finally, in Figure 5g, we distinguish between analyses using continuous or categorical operationalizations of parenthood and subsequent births: among the analyses using a continuous variable, around one-fourth found a negative association with in-work poverty. In contrast, a negative association was less often found among analyses using a categorical variable to capture parenthood and subsequent births. Moreover, Figure 5g indicates that the type of operationalization may also affect the level of significance. While more than 70% of analyses using a categorical variable found either a positive and significant or negative and significant association, the share of non-significant estimates was noticeably larger among analyses using a continuous variable.

Figure 5: Parenthood and subsequent births: number of analyses, direction and significance of associations by (e) type of analysis, (f) role of independent variable in the analysis, and (g) type of operationalization



4.2. *Conceptual and methodological advances in in-work poverty research*

The vast majority of analyses selected for the quantitative review were relatively homogeneous with respect to the analytical strategy and the operationalization of in-work poverty. In this part of the systematic review, we describe in more detail analyses that deviated from more conventional approaches by choosing the household as unit of analysis (section 4.2.1); relying on alternative definitions of poverty (section 4.2.2); accounting for selection into employment (section 4.2.3); and/or estimating the association between family demographic transitions and in-work poverty (section 4.2.4). Given that findings from these analyses were already included in our quantitative review, we focus here mostly on the conceptual and methodological aspects. Further, we discuss results from statistical models that estimated group-specific associations between family demographic processes and in-work poverty through the use of interaction effects (section 4.2.5).

4.2.1. *Household as unit of analysis*

Connolly (2008), Hauan, Landale, and Leicht (2000), and Wagle (2011) used the household instead of the individual as the unit of analysis. Households were considered as working in these analyses if at least one person in the household was employed at the time of the interview or for at least some time in the year before the interview. The dominant practice among these analyses was to limit the set of independent variables to a combination of the household head characteristics (e.g., race/ethnicity, education, labor market status) and variables describing the household structure (e.g., the marital/partnership status of the household head, the number of children living in the household, or a combination of the two). This approach may mask important vulnerabilities of the household that result from the specific combination of characteristics of the household members with regard to race/ethnicity, education, or labor market status. This drawback could be easily circumvented, for example by including separate variables for different household members in the analysis (e.g., the labor market status of the male and female partner). Given the theoretical importance of the

aforementioned characteristics for the association between family demographic processes and in-work poverty (Crettaz 2013), such an approach would be highly recommended. Depending on the research question, interaction effects between the variables corresponding to individual household members could also be considered.

Some individual-level analyses accounted for labor market dynamics at the household level by including an independent variable summarizing the combined work intensity of all (working-age) household members (Álvarez-Miranda 2011; García-Espejo and Gutiérrez 2011; Goerne 2011; Gutiérrez, Ibáñez, and Tejero 2011; Horemans, Marx, and Nolan 2016; Lohmann and Crettaz 2018; Tejero 2017) – in most cases as a percentage of their potential working hours. Additionally, most of these analyses adjusted for household structure (e.g., by including variables for household size/partnership status/number of adults and presence/number of children) to account for the fact that a work intensity of 100% has very different implications for the financial situation of different household types, for example single or partner households with or without children.

4.2.2. Alternative definitions of poverty

Cross-country variation in the income redistribution via taxes and transfers may exert a strong influence on the estimated association between family demographic processes and in-work poverty. For example, countries differ strongly in the extent to which individuals who live in (marital) unions or with children benefit from tax breaks or transfer payments. Most in-work poverty definitions acknowledge the importance of tax payments and/or social transfer receipts for the financial situation of households by considering household income after taxes and/or transfers. However, it would also be important to see how each step of the income redistribution process (i.e., from pre-tax/pre-transfer to post-tax/post-transfer income) contributes to the association between family demographic processes and in-work poverty.

Highlighting the role of social transfer payments in particular, Lohmann (2009) based the in-work poverty indicator in his study on post-tax/*pre-transfer* income to estimate the “counterfactual” in-work poverty risk if no transfers were paid by the state. It should be noted, however, that this kind of counterfactual analysis might be biased by assuming that individuals would not adapt their labor market behavior in the presence of more or less generous income redistribution. Nonetheless, this type of analysis provides important insights into the emergence of in-work poverty, especially if it is combined with an estimation of the probability to exit pre-transfer in-work poverty once social transfers are accounted for (Lohmann 2009).

Regardless of the income definition applied (i.e., pre-/post-tax or pre-/post-transfer), virtually all analyses selected for our systematic review used equivalence scales to account for both household needs and economies of scale. However, equivalence scales implicitly assume that household members share their financial resources equally. Peña-Casas and Ghailani (2011) challenged the equal sharing assumption by using an income definition that assumes that only common income components are (equally) shared within households. The authors calculated an individualized disposable income by splitting a household’s common income components (e.g., transfers) equally among all adult household members and adding each adult household member’s share of the common income components to their sum of individual income components (e.g., earnings). By not using an equivalence scale, the authors also considered the extreme case in which economies of scale do not exist. Using individualized disposable income has two advantages: first, both work and poverty are measured at the same level (i.e., the individual) and, second, the financial vulnerability of individuals in the case of family disruption, such as separation, is accounted for. It might be beneficial in future research to use equivalized household income (i.e., equal sharing assumption) and individualized household income (i.e., weaker version of the equal sharing assumption) to obtain a lower and an upper bound of in-work poverty risk, respectively.

4.2.3. *Accounting for selection into employment*

Employed individuals or individuals living in households with at least one employed member represent a selective group within the general population. For example, having children decreases the propensity of individuals (typically women) to be in employment (Brady et al. 2010). It could therefore be argued that the estimated effect of parenthood and subsequent births on in-work poverty in the majority of analyses under review represents the association between parenthood and poverty only among individuals who stay in employment despite having children. To alleviate this bias, some analyses accounted for selection into employment by modeling in-work poverty as a two-step process (Brady et al. 2010; Hauan et al. 2000; Maldonado et al. 2018), that is (1) being employed vs. not; (2) being poor vs. not. As a result, these analyses more closely approach the estimation of a causal effect of family demographic processes on in-work poverty by considering the causal pathway from family demography to poverty via employment.

4.2.4. *Estimating the association between family demographic transitions and in-work poverty*

Most analyses selected for the quantitative review used cross-sectional data, thereby investigating family demographic *states*. In contrast, the use of longitudinal data allows researchers to estimate the association between family demographic *transitions* and in-work poverty risk. The distinction between family demographic states and transitions is important for at least two reasons. First, the association between many family demographic states and in-work poverty may depend on the exact time when family demographic states are assessed. For instance, the effect on in-work poverty of being divorced may be especially large in the initial years after a divorce but may gradually wear off with time (Van Winkle and Leopold 2021). Second, considering the timing of family demographic transitions allows researchers to take the temporal order of events into account, for example first transitioning to parenthood and then entering in-work poverty, thereby facilitating an estimation of associations that approach a causal interpretation.

Two classes of longitudinal models were used in the analyses selected for the systematic review: (1) what we call “transition models”, where the sample is restricted to workers who were not poor at time point $t-1$, and their probability to be poor at time point t is estimated (Gutiérrez et al. 2011; Hick and Lanau 2018; Vandecasteele and Giesselmann 2018); and (2) individual-level random-effects or fixed-effects models, where time-constant unobserved heterogeneity is either removed by applying a time-demeaning approach (Van Winkle and Struffolino 2018; see below) or explicitly modelled and assumed to be uncorrelated with observed heterogeneity (Barbieri, Cutuli, and Scherer 2018; Biolcati-Rinaldi and Podestà 2008; Tejero 2017). Interestingly, not all authors have fully exploited the potential of longitudinal data to incorporate family demographic transitions. For example, while Gutiérrez et al. (2011) and Vandecasteele and Giesselmann (2018) included in their transition models variables indicating the increase/decrease in the number of children in the household between $t-1$ and t , Hick and Lanau (2018) only included a variable describing the household structure at t .

4.2.5. *Interaction effects*

The aim of most analyses selected for our systematic review was the estimation of *average* associations across individual and context characteristics (i.e., gender, age, welfare state regime, and historical time). In contrast, the analyses discussed in this subsection have drawn attention to the fact that the impact of family demographic processes on in-work poverty risk may unfold differently for men and women, at different stages of the life course, as well as across welfare state and historical contexts. Details on the publications and the specific models can be found in Table A1 in the Appendix (column 4).

- (a) *Gender and union dissolution.* Lohmann (2009) included in his models an interaction term indicating the *additional* effect of a separation/divorce on the in-work poverty risk of women

compared to men. The main effect of the separation/divorce variable was positive (indicating a positive association between separation/divorce and in-work poverty risk for men) and only marginally significant ($p < .1$). In contrast, the interaction term was positive and highly significant ($p < .001$), suggesting a gendered association between separation/divorce and in-work poverty in Europe. A word of caution is needed as in this study poverty was defined in terms of pre-transfer income (see above). However, the results are consistent with those by Van Winkle and Struffolino (2018) who used income after transfers and showed a highly gendered association between separation/divorce and in-work poverty risk in the US (see below).

(b) *Age and cohabitation.* In their analysis, Larsson and Halleröd (2011) found that the association between living in a single-adult household and in-work poverty risk was positive and significant in Sweden in 2007, especially for those 18–24 (vs. 25–64) years old. In contrast, not living in a single-adult household was associated with a similar in-work poverty risk for both younger and older respondents. These results can be interpreted as indirect evidence for a higher in-work poverty risk of parental home leaving at a very young age.

(c) *Age, gender, and family demographic transitions.* Van Winkle and Struffolino (2018) estimated fixed-effects regression models stratified by gender to assess heterogeneity over the life course in the associations between family demographic transitions and in-work poverty in the US. The authors found that the transition to parenthood increased the probability of in-work poverty for both men and women, especially in early adulthood, while the effect of the second child (vs. no children) was positive and significant into later adulthood. For men, marriage (vs. never married) reduced the in-work poverty risk, although this association was non-significant in very young adulthood. The size of the association,

however, was much smaller compared to the results for women, for whom the impact of marriage was found to always be negative and significant. Furthermore, the association for separation (vs. marriage) was negative, but rarely significant, along men's life course. For women, separation had a positive significant effect across the whole temporal window considered. Finally, parental home leaving significantly increased in-work poverty risk until age 30, but the association turned negative and non-significant beyond age 30 for both men and women. These findings are consistent with the indirect evidence reported by Larsson and Halleröd (2011) reviewed above.

(d) *Parenthood and cohabitation over time.* Pooling samples from 26 European countries and interacting indicators for the number of children and partnership status with the year of the survey (2008 and 2012, income measured in 2007 and 2011, respectively), Horemans, Marx, and Nolan (2016) observed some changes in the associations between these family demographic processes and in-work poverty over time. However, the positive association between having children and in-work poverty risk was relatively stable before and after the 2007/2008 financial crisis. If anything, the association became somewhat weaker, supporting the results of our quantitative review. In addition, the authors found the link between living in a couple household (versus single household) and in-work poverty risk to be non-significant and close to zero in both waves.

(e) *Parenthood and family services.* In his multilevel study of 20 European countries already described above, Lohmann (2009) also estimated one model including an interaction term between the number of children in the household below age 6 (continuous variable) and the level of public expenditure on family services, measured as the percentage of a country's GDP. The interaction effect was positive and significant, that is the risk of in-work poverty

in the presence of small children was higher in countries with higher spending on family services. As a possible explanation for his finding, Lohmann suggested that generous family spending pushes mothers into the labor market without tackling the problem of persistent gender/motherhood pay gaps. Indeed, Lohmann's result is consistent with the positive (though non-significant) association between parenthood and in-work poverty that we found in our quantitative review for Nordic welfare states, which have the highest expenditure on family services.

5. Discussion and conclusions

This review aimed at systematizing and summarizing the findings of empirical research on family demographic processes and in-work poverty. We concentrated on five family demographic processes that drive household resources and household needs: parental home leaving, union formation, marriage, parenthood and subsequent births, and dissolution of non-marital and marital unions. We collected ever published empirical quantitative analyses of in-work poverty in OECD and EU-28 countries to provide a systematic review. In the first part we provided a quantitative review of findings that allowed us to formulate tentative conclusions about whether and in which direction family demographic processes are associated with the risk of in-work poverty.

We found that almost 80% of analyses selected for the quantitative review reported that the risk of in-work poverty increased with parenthood and subsequent births, although around 30% of those estimates were not statistically significant. Results for union formation were mixed: around 60% of analyses indicated that being in a marital or non-marital union decreased the risk of in-work poverty, compared to not living in a union. Around 40% of those estimates were statistically insignificant. The fact that many analyses did not differentiate between marital and non-marital unions may account for our mixed findings regarding union formation, particularly if non-marital cohabitation does not provide the same protection from in-work poverty as marriage was shown to

in the quantitative review. Although few analyses reported estimates for union dissolution, the quantitative review showed that union dissolution increased the probability of in-work poverty. It is important to note that the analyses contained in our quantitative review reported associations and not causal estimates.

Overall, the findings from our quantitative review support the general hypotheses surrounding the link between family demography and in-work poverty risk (Lohmann and Crettaz 2018). The most common hypothesis is that the risk of in-work poverty increases with the transition to parenthood and subsequent births, because children increase household needs and reduce household resources, especially if one earner, usually the mother, reduces their labor supply. In contrast, forming a marital or non-marital residential union is expected to protect individuals from in-work poverty, because fixed household needs can be spread across multiple earners. However, as households dissolve, the needs of each single earner household decrease only marginally, while the resources available to the household heads are dramatically diminished. Consequently, in-work poverty risk should increase after a separation or divorce. Our review, however, is not able to speak to whether selection or causal mechanisms drive these associations.

Numerous analyses in the systematic review aimed at identifying and assessing a number of risk factors for in-work poverty. Family demographic processes just happened to be among those risk factors. Future research on in-work poverty should focus on specific risk factors, especially family demographic processes, to better theorize the link between specific family demographic states or transitions and their relationship with in-work poverty. This is a challenging task as it requires researchers to specify how union formation, for example, affects both labor market supply and household income. However, thinking through the mechanisms will help identify selection processes and mediating mechanisms that build the relationship fertility, union dynamics, and parental home leaving have with in-work poverty. In addition, conceptualizing such a causal framework will highlight important moderating factors, such as gender and race.

The first segment of the systematic review was complemented with a presentation and critical discussion of the conceptual and methodological advances for studying the relationship between family demographic processes and in-work poverty. In this part of the systematic review, we also highlighted attempts to make in-work poverty research more sensitive to context, gender, and the life course, particularly through the use of alternative in-work poverty definitions, and different analytical approaches, including the use of longitudinal data and/or interaction effects.

The analyses we reviewed varied greatly with regard to the operationalization of family demographic processes and in-work poverty. We found that analyses using a continuous measure for the number or share of children in the household were less likely to find a statistically significant association compared to analyses that used a categorical variable for parenthood and subsequent births. We recommend that researchers use a categorical variable, not to ensure statistically significant findings, but to capture non-linearities in the association between the number of children and in-work poverty. If possible, the occurrence of a birth event should also be clearly differentiated from increases and decreases in the number of children caused by other family demographic processes, such as union dissolution and the formation of step-families.

Regarding civil status, we also recommend that researchers clearly differentiate non-marital cohabitation and marriage whenever possible, because, depending on the context, these living arrangements differ in terms of legal recognition and benefit eligibility. A similar argument applies to marital and non-marital separation. In the analyses considered in the systematic review, separation from a non-marital cohabiting union was either not considered as a separate family demographic process or not clearly differentiated from marital separation or divorce. A systematic assessment of the association of non-marital separation with in-work poverty was therefore not feasible.

We remain agnostic as to which poverty measure and unit of analysis (i.e., individual or household) researchers should use, because the research question should ultimately determine this

decision. However, we find it important that, first, studies provide a clear definition of the type of income considered, for example pre-tax versus post-tax or pre-transfer versus post-transfer income, and justify why that type of income is appropriate to answer the research question. In addition, scholars should motivate their use of a relative poverty threshold similar to Eurostat or an absolute poverty threshold similar to the BLS. To facilitate greater comparability with research on European and other OECD countries, we recommend that research using US data also report results using a relative threshold. Second, the choice of the unit of analysis should be accompanied by a reflection on the appropriate variables to be included in the statistical model. Studies using the household as the unit of analysis have mostly limited the set of independent variables to characteristics of the household head, while studies using the individual as unit of analysis have only focused on *labor market* dynamics within the household. As a result, important gaps remain in the in-work poverty literature with regard to some pressing issues of the 21st century, such as the relationship of the increasing share of migrants (Guzi, Kahanec, and Ulceluse 2021) and of educationally homogamous couples (Eeckhaut and Stanfors 2019; Katriňák and Manea 2020) with income inequality in Europe. Finally, we want to raise attention to the importance of reflecting on which equivalence scale to apply when studying the relationship between family demographic processes and in-work poverty as well as conducting sensitivity analyses based on different equivalence scales.

Our review of research and the existing figures for the OECD (OECD 2009), the EU (Peña-Casas et al. 2019) and the US (U.S. Bureau of Labor Statistics 2020) on the distribution of in-work poverty risks across household types suggest that the general relationships between family demographic processes and in-work poverty risk described above hold across institutional contexts. However, there is also reason to believe that the strength and direction of the association between each family demographic process and in-work poverty vary across contexts (Lohmann and Marx 2008). For example, countries with generous social and welfare systems may be able to ameliorate the negative impact of a divorce by increasing household resources. Similarly, depending on the

institutional context, cohabitation and marriage may even increase the in-work poverty risk of individuals, for example if the childcare or tax system of a given country discourages a dual-earner model. The earnings of only one spouse may then not be sufficient to protect the household from sliding into poverty. On the other side, a tax system that privileges marital unions may ameliorate the higher in-work poverty risk of male breadwinners over single workers. Consequently, whether a given family demographic process increases or decreases the in-work poverty risk of an individual may be highly variable across institutional contexts. However, comparative research on the relationship between union dynamics and in-work poverty is nearly non-existent. A main contribution of many studies is to focus on a new context. Despite this, most research has been on European countries with only limited research on non-European countries. Interestingly, we also found relatively few quantitative analyses on the United States.

Our review relied on broad welfare state clusters to demonstrate how risk factors associated with in-work poverty vary across countries. For example, statistically significant positive relationships between fertility and in-work poverty were mostly found in analyses of continental European welfare states, followed by Southern European and liberal welfare states, with no statistically significant relationships in Nordic countries. While welfare state regimes are certainly useful in capturing broad institutional and cultural packages, they can mask important cross-national differences in policies or norms that generate differences. It is therefore promising to see that a mix of small-N comparisons of most-similar and most-different cases as well as large-N analyses within a multilevel framework is already being applied to untangle the specific policies and norms that mitigate or exacerbate family demographic risk factors. Future research should continue to work in this direction.

Family demographic processes are not only embedded in socio-historic contexts, but first and foremost in the lives of individuals. A central tenant of life course sociology underscores how the timing of events, for instance family demographic transitions, can have different meanings and

lead to different outcomes (Elder, Johnson, and Crosnoe 2003; Mayer 2009). However, we only identified one study that assessed how family demographic risk factors for in-work poverty vary across the life course and gender. Now that household panel studies in many countries have come of age, we believe that researchers should investigate the life course dynamics of family demography and in-work poverty. This is essential to design policies that effectively preempt life course risks.

In conclusion, this systematic review, which situated findings from different national contexts and different disciplines within a common analytical grid, should help guide the next wave of studies on the working poor as well as the academic debate around the conceptualization and the measurement of in-work poverty. This review shows, first, to what extent family demographic processes and poverty are associated among working individuals and households, and, second, highlights the importance of several methodological considerations when studying the link between in-work poverty and family demography, such as the choice of the appropriate unit of analysis and the individual/household characteristics to be incorporated into the statistical analysis. Both aspects cannot be disregarded, especially when the goal is to produce solid empirical knowledge to inform policies against in-work poverty and poverty in general.

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Appendix

Table A1: Studies and analyses included in the systematic review

Studies included in systematic review	No. of analyses selected	Statistical model(s) selected for quantitative review	Statistical model(s) with interaction effects
Huan et al. (2000)	1	pp. 208–9, Table 5, Model 9	—
Hong and Wernet (2007)	1	p. 367, Table 2, column 4	—
Biolcati-Rinaldi and Podestà (2008)	2	pp. 220–1, Table 8.4, columns 2–3	—
Connolly (2008)	3	pp. 243–4, Table 9.3, columns 2–4	—
Lohmann (2008)	1	pp. 59–60, Table 2.3, Model 2	—
Snel et al. (2008)	1	p. 146, Table 5.1	—
Lohmann (2009)	1	p. 497, Table 3, Model 7	p. 497, Table 3, Model 7; p. 499, Table 5, Model 9
Brady et al. (2010)	1	pp. 581–2, Appendix A, column 5	—
Álvarez-Miranda (2011)	4	p. 275, Table 12.4a, columns 2–5	—
García-Espejo and Gutiérrez (2011)	2	p. 138, Table 7.1, columns 2–3	—
Goerne (2011)	5	pp. 27–8, Table 2.2, columns 2–6	—
Gutiérrez et al. (2011)	4	pp. 197–8, Table 9.6, columns 2–5	—
Larsson and Halleröd (2011)	1	p. 127, Table 6.3, Model 4	p. 127, Table 6.3, Model 5
Peña-Casas and Ghailani (2011)	5	pp. 224–5, Table 10.10, columns 3–7	—
Wagle (2011)	2	p. 202, Table 4, column 2; p. 204, Table 5, column 2	—
Van Lancker (2012)	6	p. 100, Table 4, lines 1–6	—
Brady et al. (2013)	1	pp. 882–3, Table 1, Model 3	—
Giesselmann (2015)	1	Appendix, Table A2, Model 3	—
Halleröd et al. (2015)	1	p. 483, Table 4, Model 3	—
Horemans et al. (2016)	1	p. 10, Table 2, Model 2	p. 10, Table 2, Model 3
Babos (2017)	30	pp. 894–5, Appendix 1, all models	—
Tejero (2017)	3	p. 152, Table VI, columns 2–4	—
Barbieri et al. (2018)	1	p. 321, Table 18.6, Model 3	—
Crettaz (2018)	1	p. 100, Table 6.2, Model 1	—
Hick and Lanau (2018)	1	p. 678, Table 6, Model 1	—
Lohmann and Crettaz (2018)	1	p. 63, Table 4.2, column 4, Model 2	—
Maldonado et al. (2018)	1	pp. 414–5, Table 22A.1, column 3	—
Van Winkle and Struffolino (2018)	2	—	Figures 3–5
Vandecasteele and Giesselmann (2018)	1	p. 206, Table 11.3, column 2	—
Filandri and Struffolino (2019)	1	p. 148, Table 4, Model 5	—
Total	86		

Note: Studies are ordered by year of publication and alphabetically within each year of publication.

Table A2: Summary of operationalizations of family demographic processes encountered and criteria applied to determine whether the overall association with in-work poverty risk was significant

Family demographic process	Operationalization	Criterion for assigning a significant overall association in the systematic review	No. of analyses	Publications
Parental home leaving	one binary variable indicating whether the respondent was living with the family of origin or not	$p < .05$	2	Van Winkle and Struffolino (2018)
Formed unions	one binary variable indicating cohabitation	$p < .05$	38	Larsson and Halleröd (2011); Van Lancker (2012); Babos (2017); Filandri and Struffolino (2019)
	one categorical variable with >2 levels indicating respondent's partnership status; separate coefficient for "couple" reported; varying reference categories possible	$p < .05$	2	Horemans et al. (2016); Vandecasteele and Giesselmann (2018)
	one categorical variable with >2 levels indicating the structure of the household; separate coefficient for "couple without children" reported; reference category is "single without children"	$p < .05$	17	Connolly (2008); García-Espejo and Gutiérrez (2011); Goerne (2011); Peña-Casas and Ghailani (2011); Halleröd et al. (2015); Hick and Lanau (2018)
Marriage	one binary variable indicating marriage	$p < .05$	2	Huan et al. (2000); Hong and Wernet (2007)
	one categorical variable with >2 levels indicating respondent's partnership status; separate coefficient for "married" reported; varying reference categories possible	$p < .05$	9	Wagle (2011); Tejero (2017); Crettaz (2018); Maldonado et al. (2018); Van Winkle and Struffolino (2018)

Table A2 continued

Family demographic process	Operationalization	Criterion for assigning a significant overall association in the systematic review	No. of analyses	Publications
Parenthood and subsequent births	one binary variable indicating the recent birth of a child in the household	$p < .05$	1	Barbieri et al. (2018)
	one categorical variable with >2 levels indicating the change in the number of children in the household between two waves; separate coefficient for “increase” reported; reference category is “no change”	$p < .05$	4	Gutiérrez et al. (2011)
	one continuous variable indicating the change in the number of children in the household between two waves	$p < .05$	1	Vandecasteele and Giesselmann (2018)
	one binary variable indicating the presence of dependent children in the household	$p < .05$	8	Biolcati-Rinaldi and Podestà (2008); Álvarez-Miranda (2011); Brady et al. (2013); Giesselmann (2015)
	one categorical variable with >2 levels indicating the number of children in the household (e.g., “1 child”, “2+ children”)	$p < .05$ for at least one regression coefficient	10	Van Lancker (2012); Horemans et al. (2016); Van Winkle and Struffolino (2018); Filandri and Struffolino (2019)
	one continuous variable indicating the number of children in the household	$p < .05$	38	Hauan et al. (2000); Hong and Wernet (2007); Snel et al. (2008); Brady et al. (2010); Halleröd et al. (2015); Babos (2017); Tejero (2017)
	one or multiple continuous variables indicating the number/share of children of different age groups in the household (e.g., “number of children aged 0–2”, “number of children aged 3–5”)	$p < .05$ for at least one regression coefficient	6	Lohmann (2008); Lohmann (2009); Wagle (2011); Lohmann and Crettaz (2018); Maldonado et al. (2018)
	one categorical variable with >2 levels indicating the structure of the household; one coefficient “couple with children” or multiple coefficients (e.g., “couple with 1 child”, “couple with 2+ children”) reported; reference category is “couple without children”	$p < .05$ for at least one regression coefficient	10	Connolly (2008); García-Espejo and Gutiérrez (2011); Goerne (2011)
Dissolved unions	one binary variable indicating separation or divorce	$p < .05$	3	Lohmann (2008); Lohmann (2009); Lohmann and Crettaz (2018)
	one categorical variable with >2 levels indicating respondent’s partnership status; separate coefficient for “separated/divorced” or “separated/divorced/widowed” reported; varying reference categories possible	$p < .05$	9	Wagle (2011); Tejero (2017); Maldonado et al. (2018); Van Winkle and Struffolino (2018); Vandecasteele and Giesselmann (2018)
	one categorical variable with >2 levels indicating respondent’s partnership status; separate coefficients for “separated” and “divorced” reported; varying reference categories possible	$p < .05$ for at least one regression coefficient	1	Crettaz (2018)
	one categorical variable with >2 levels indicating the structure of the household; separate coefficient for “single parenthood” reported; reference category is “couple with children”	$p < .05$	1	Snel et al. (2008)

Note: If multiple operationalizations of the same family demographic process were used in one analysis, operationalizations appearing closer to the top of the table were given consideration over operationalizations appearing closer to the bottom of the table. Studies in the last column are ordered by year of publication and alphabetically within each year of publication.

Online Supplementary Materials

Table B1: Studies excluded for “other reasons” or because unreported regression coefficients were not obtained from authors

Studies	Reasons for exclusion/non-inclusion
Toji and Johnson (1992)	unable to retrieve full text of the publication
Slack (2010)	unable to obtain unreported regression coefficients
Crettaz and Bonoli (2011)	regression model does not include important socio-demographic variables, such as gender or education
Lohmann (2011)	methodological paper; explores consequences of using different income data (self-reported versus register-based)
Sabia and Nielsen (2015)	unable to obtain unreported regression coefficients
Thiede et al. (2015)	methodological paper; explores consequences of using different definitions of in-work poverty
Fritsch and Verwiebe (2018)	unable to obtain unreported regression coefficients
Thiede et al. (2018)	unable to obtain unreported regression coefficients

Note: Studies are ordered by year of publication and alphabetically within each year of publication.

Table B2: Coding decisions for missing or ambiguous variable operationalizations or analysis characteristics

Studies	Employment definition: ambiguities	Employment definition: coding decision	Poverty definition: ambiguities	Poverty definition: coding decision	Other ambiguities	Other ambiguities: coding decision
Hauan et al. (2000)	—	—	income before or after taxes	pre-tax/post-transfer income	—	—
Hong and Wernet (2007)	—	—	income before or after taxes	pre-tax/post-transfer income	—	—
Biolcati-Rinaldi and Podestà (2008)	—	—	income before or after taxes	post-tax/post-transfer income	—	—
Connolly (2008)	—	—	income before or after taxes	post-tax/post-transfer income	—	—
Lohmann (2008)	—	—	income reference period	annual income from the previous year	—	—
Brady et al. (2010)	—	—	income reference period	annual income from the previous year	—	—
Álvarez-Miranda (2011)	current employment status considered?	yes	—	—	—	—
García-Espejo and Gutiérrez (2011)	current employment status considered?	yes	—	—	—	—
Goerne (2011)	current employment status considered?	yes	—	—	—	—
Gutiérrez et al. (2011)	employment status at t considered?	yes	—	—	Poland, UK: observation period	2005–2007
Larsson and Halleröd (2011)	current employment status considered?	yes	—	—	—	—
Wagle (2011)	—	—	income reference period	annual income from the previous year	—	—
Van Lancker (2012)	reference period	current employment	income reference period; income before or after taxes	annual income from the previous year; post-tax/post-transfer income	—	—
Brady et al. (2013)	—	—	income reference period	annual income from the previous year	—	—
Giesselmann (2015)	—	—	income before or after taxes	post-tax/post-transfer income	—	—
Halleröd et al. (2015)	—	—	equivalence scale	modified OECD equivalence scale	—	—
Babos (2017)	work intensity; current employment status considered?	≥ 7 months in the previous year; yes	income before or after taxes; equivalized or non-equivalized income	post-tax/post-transfer income; modified OECD equivalence scale	—	—
Tejero (2017)	current employment status considered?	yes	income before or after taxes	post-tax/post-transfer income	—	—
Barbieri et al. (2018)	—	—	—	—	sample size	no decision possible
Crettaz (2018)	working age	18–64	income reference period; equivalence scale	annual income from the previous year; modified OECD equivalence scale	sample size	no decision possible
Hick and Lanau (2018)	—	—	income reference period; income before or after taxes; equivalence scale	annual income from the previous year; post-tax/post-transfer income; modified OECD equivalence scale	—	—
Vandecasteele and Giesselmann (2018)	—	—	income reference period	monthly income	—	—

Note: Only studies with missing or ambiguous variable operationalizations or analysis characteristics are reported here and ordered by year of publication and alphabetically within each year of publication.