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Maternal employment dynamics and childhood overweight: Evidence from Germany

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Abstract

Overweight and obesity in childhood are key indicators of child well-being that have often been linked with maternal employment because of its potential impact on children's diet and physical activity. Based on data from the German Socio-Economic Panel on children born between 2002 and 2011 and their families this study investigates how maternal employment across the first 60 months after birth affects child overweight around age 6. The analysis contributes to the existing literature by using measures that capture mothers' entire employment history instead of employment status at a particular point in time and by highlighting the analytical challenges that face studies of the effects of dynamic exposures such as maternal employment, particularly measurement of exposure histories and time-varying confounding. Overall, the results indicate that children who have experienced very different maternal employment sequences but are similar with regard to background characteristics such as maternal education, household income, and family structure show only minor and statistically insignificant disparities in the risk of overweight around age six. Only a later transition from nonemployment to part-time employment may lower the risk of overweight around age six compared to consistent nonemployment.

Key words: maternal employment, childhood overweight, Germany, dynamic exposure, sequence analysis

1. Introduction

Overweight and obesity are key indicators of child well-being, which are associated with a wide range of physical and mental health outcomes. Children who are overweight or obese are at a higher risk to develop cardiovascular problems, metabolic disorders, pulmonary complications, and gastrointestinal disorders (Daniels 2006). There is also evidence of a link to depressive symptoms resulting from teasing, bullying, and social marginalisation (Eisenberg & Neumark-Sztainer & Story 2003; Erickson et al. 2000; Strauss & Pollack 2003), which may in turn affect school performance (Helbig & Jähnen 2013). Moreover, those overweight as children and adolescents are more likely to be overweight adults facing all related health problems (Whitaker et al. 1997).

Consequently, the unprecedented global rise in childhood overweight and obesity has alarmed policy makers and researchers alike (Anderson & Butcher 2006; OECD 2010). In Germany, 10 per cent of girls and 13 per cent of boys aged 11 years reported overweight or obesity in 2009/10 (Currie et al. 2012). For children and adolescents aged 3 to 17 years, the prevalence of obesity was 6.3 per cent between 2003 and 2006, implying an increase by 100 per cent since the early 1990s (Kleiser et al. 2009).

The simultaneous expansion of mothers' labour force participation, primarily in the United States but also in a number of European countries, has turned the spotlight on maternal employment as a potential cause of children's overweight and obesity (Anderson & Butcher 2006; Gwozdz et al. 2013) as it may affect both children's energy intake and energy expenditure in various ways. Empirical evidence on the micro-level is mixed, however, with a number of studies, mainly with US data, finding a positive association between maternal work hours and self-reported height and weight (e.g., Anderson, Butcher & Levine 2003; Brown et al. 2010; Cawley & Liu 2012; Datar, Nicosia & Shier 2014; Morrissey, Dunifon & Kalil 2011; Ruhm 2008; Ziol-Guest, Dunifon & Kalil 2013). In Germany, Li et al. (2019) found that maternal work of 35 or more hours is associated with a 64 per cent increase in the odds of overweight for children aged 0 to 6 years. A study with 16 European countries, including Germany, found no association of mothers' work with objective weight measures and diary data regarding nutrition and physical activity (Gwozdz et al. 2013). Moreover, data from the German Micro Census showed that between 1991 and 2002 part-time and full-time employment rates of mothers have dropped (Kreyenfeld & Geisler 2006) and remain relatively low, particularly for full-time employment (OECD 2019, Schober & Spiess 2015). The partly absent association on the micro level and the opposing trends in maternal employment and child overweight make Germany an interesting case for replicating the relationship between mothers' work decisions and children's body weight.

In addition, most previous research has measured maternal employment at a particular point in time. But mothers may repeatedly change their labour force status after the birth of a child and the effect of maternal employment on children's development may only unfold after prolonged exposure. This calls for a measurement approach that captures maternal employment history across children's early life course. Studies that did consider complete employment histories used simple duration measures that do not capture other important aspects of employment history like timing and (in)stability (Anderson, Butcher & Levine 2003, Ruhm 2008; Ziol-Guest, Dunifon & Kalil 2013).

Moreover, studying the effects of time-varying exposures such as maternal employment poses specific analytical challenges that standard methods cannot readily address. More specifically, problems arise if time-varying confounders, for instance, maternal health, are themselves affected by earlier maternal employment.

In the present study, I investigate whether maternal employment in the first 60 months after birth affects German children's likelihood to be overweight around age 6, based on the body mass index (BMI). Although the BMI does not directly measure body fat, the International Obesity Task Force and the European Childhood Obesity Group recommend BMI for the evaluation of overweight in children, considering gender- and age-specific development (Kromeyer-Hauschild et al. 2001). I use sequence analysis to derive measures that identify typical patterns of early maternal employment in addition to duration measures used in previous research. To adequately account for time-varying confounding, I use inverse probability weighting of marginal structural models (Robins 1999; Robins & Hernán 2009), a method developed for scenarios in which the effect of maternal employment may be mediated in part by time-varying confounders like maternal health or family structure. This approach follows an emerging literature on developmental outcomes (e.g., Bacak & Kennedy 2015; Kühhirt & Klein 2018; Wodtke 2013) that aligns the empirical analysis with theoretical models that describe children's development as a dynamic process shaped by their individual characteristics and by both current and past environmental experiences (Bronfenbrenner & Morris 2006; Duncan & Raudenbush 1999; Shonkoff & Phillips 2000).

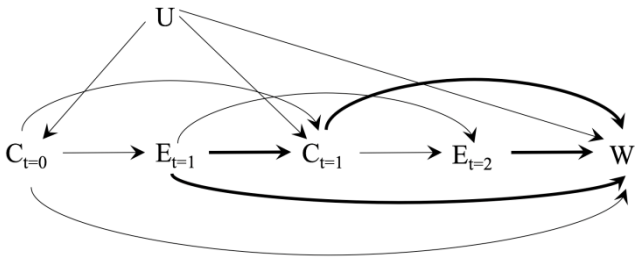
2. Theoretical background

There are competing theoretical arguments regarding the direction and nature of the empirical relation between maternal employment and childhood overweight, suggesting a positive effect, a negative effect, or a spurious relation due to confounding. On the physiological level, overweight develops when energy intake through the consumption of food consistently exceeds energy expenditure driven by the frequency and intensity of physical activity (Anderson & Butcher 2006). Theoretically, maternal employment through resulting time restrictions, financial resources, and stress may be connected to food consumption and physical activity in a number of different ways. Reduced time availability of working mothers implies a detrimental effect of maternal employment on the physiological development of children, as there is less time for fixing fresh meals (Cawley & Liu 2012) and to supervise the quality and frequency of children's food intake (Datar, Nicosia & Shier 2014; Fitzsimons & Pongiglione 2019). Less maternal supervision may impair physical activity and sleeping patterns of children as well (Fitzsimons & Pongiglione 2019; Ziol-Guest 2014). Another strand of research suggests that children's diet and physical activity may suffer also in public childcare settings (McDonnell & Doyle 2019; Story, Kaphingst & French 2006). Finally, spill-over of work-related stress into the family and resulting family conflicts may negatively affect children's eating habits and activity patterns (Frisco & Williams 2003).

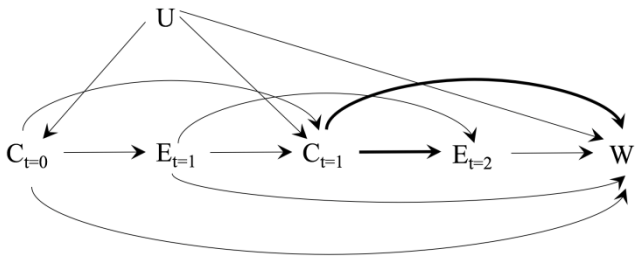
Additional income provided by mothers, in turn, may foster children's physiological development by enabling the purchase of higher quality food and by offering more active leisure opportunities and support for sports (Anderson et al., 2003; Brown et al., 2010). It also potentially provides women with the means to leave strained or abusive relationships (but see Özcan & Breen 2012), thus removing significant stressors for their children that are also linked to overeating (Pine et al. 2001). In sum, there are plausible arguments to expect both positive and negative consequences of maternal employment with regard to children's weight development.

Independent of the direction of a potential effect of maternal employment status on child body weight, to unfold any impact it needs to be sustained over a certain period of time (Bronfenbrenner & Morris 2006; Duncan & Raudenbush 1999; Shonkoff & Phillips 2000). Prior studies, however, predominately measure maternal employment at a particular point in time. Moreover, the timing of employment may matter as children go through different developmental stages in the first few years of their lives, which differ with regard to the degree of autonomy, particularly when it comes to choosing their own food, as well as to establishing daily routines (e.g., physical activity or sleeping patterns) (Heckman 2007; Ziol-Guest 2014). These arguments suggest to go beyond an investigation of the effects of maternal employment at a particular point in time and to focus on entire maternal employment histories.

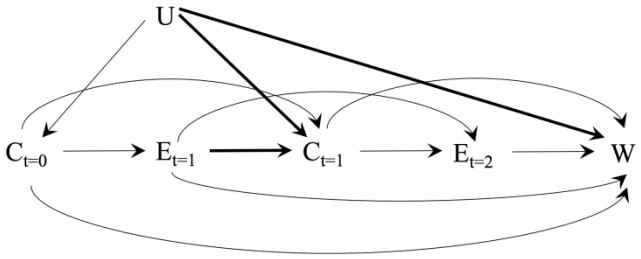
Figure 1: Theoretical causal relations between maternal employment, children's overweight, and covariates



a) Cumulative effect of maternal employment on child overweight



b) Spurious association due to confounding



c) Spurious association due to conditioning on a collider

Note: E – maternal employment, t – time point, W – child overweight around age 6, C – time-varying confounders, U – unmeasured variables, arrow – causal effect in direction of arrow

Importantly, however, any observed association between maternal employment (history) and child body weight may also be the result of confounding. Factors such as parental education, child health (at birth), the availability of (high-quality) childcare, family structure, among other things, may affect both mothers' labour market decisions and children's body weight and thus incur a spurious relation.

When focusing on the effect of employment histories, a particular problem is posed by time-varying factors such as household income, maternal health, or marital status, that potentially affect mothers' current employment status while, at the same time, being dependent on previous maternal employment (see Figure 1a). In other words, such factors then mediate parts of the effect of earlier maternal employment but also confound the effect of current maternal employment (see Figure 1b). Therefore, the analyst needs to control for variables such as family structure to uncover the effect of maternal employment. However, doing so by using standard statistical methods (e.g., by including them as control variables in a regression) controls away part of the effect of interest which is mediated by these processes. In addition (see Figure 1c), controlling for these variables may induce spurious association by conditioning on a collider variable (Elwert & Winship 2014; Robins & Hernán 2009). This requires not only careful selection of control variables but also appropriate techniques to adjust for potential time-varying confounders.

3. Data and variables

The empirical analyses use data from the Socio-Economic Panel (SOEP), an annual survey of German households conducted since 1984 (Goebel et al. 2019). Since 2003, the SOEP has featured a mother-child questionnaire that provides information on children born to female participants that go beyond the original dataset, including children's height, weight and neonatal characteristics. The ability to link these mother-child data with the rich socio-demographic information on women contained in the SOEP core data provides a good opportunity to study the relation between maternal employment dynamics and children's overweight and obesity in Germany.

Because the focus in this study is on the first six years in children's lives and the last survey wave currently available is 2017, the analysis is limited to children born between 2002 and 2011 whose mothers were aged 18 to 45 years at birth and have completed the mother-child questionnaire immediately after birth (n = 1,917). Of these children, 1,602 (84%) had no missing values on any variables at the first observation after birth. They were followed until around age six, at which time information on their height and weight was collected (n = 1,033, 64%), or until the child or their mother were lost to follow-up (n = 569). Loss to follow-up includes cases with permanent nonresponse but also those with temporary partial or complete nonresponse on any of the variables used in the analyses. Whereas measures of maternal employment dynamics and their association with children's body weight were calculated solely based on complete cases, observations with loss to follow-up contributed to estimating monthly maternal employment status and attrition.

3.1 Children's body mass index and overweight

Around age six, the mother-child questionnaire collects information on children's height and weight based on mothers' reports from which the BMI can be calculated as weight divided by height (in metres) squared. For adults, overweight is usually defined has having a BMI of 25 or higher. However, for children, age- and gender-specific differences in physiological development need to be considered. Therefore, a child is considered overweight when located in the highest decile on the BMI for that particular gender and age-group. For Germany, the resulting BMI thresholds are provided by Kromeyer-Hauschild et al. (2001). Based on these thresholds and the information on age, gender, and BMI in the data, I generate an indicator for overweight (as opposed to normal weight and underweight). This serves as the dependent variable in the main analyses.

Table 1: Control variables

Variable	Description	Reason for inclusion
	Time-constant covariates	
Child's gender	0 = female 1 = male	Gender differences in childhood health (Leiter & Rieker 2012) may also affect maternal employment (Kuhlthau & Perrin 2001; Powers 2001)
Low birth weight	0 = ≥ 2.5kg 1 = < 2.5kg	Indicator of early child health which may affect maternal employment and child weight (Datar & Jacknowitz 2009; Kuhlthau & Perrin 2001; Powers 2001)
Child's migration background	0 = no migration background 1 = migration background	Indicator of socio-economic background and discrimination (Cheng, Goodman & Committee on Pediatric Research 2015)
Pregnancy intention	0 = planned pregnancy 1= unplanned pregnancy	Indicator of family orientation which may affect maternal employment and child weight (Dagher, Hofferth & Lee 2014; Joyce, Kaestner & Korenman 2000)
Mother's age at birth	Years	Predictor of labour force status and child health (Besamusca et al. 2015; Finlay, Ozaltin & Canning 2011)
Mother's education at birth	0 = none/elementary 1 = middle vocational 2 = higher vocational 3 = tertiary	Indicator of cognitive ability, skills, and labour market prospects.
Child birth year	0 = 2002/4 1 = 2005/7 2 = 2008/11	Captures macro trends in maternal employment, availability of public childcare (Kreyenfeld & Krapf 2016), and children's overweight
	Time-varying covariates	
Mother's self-rated health status	0 = in good health 1 = not in good health	Feedback with maternal employment status and predictor of parenting (Chatterji, Markowitz & Brooks-Gunn 2013; Evans et al. 2012)
Number of siblings	0 = none 1 = one 2 = two or more	Feedback with maternal employment status and predictor of children's activities (Dunifon, Fomby & Musick 2017; Kreyenfeld & Geisler 2006)
Relationship status	0 = no partner 1 = cohabitation 2 = married	Feedback with maternal employment status and predictor of children's well-being (Özcan & Breen 2012; Ribar 2015)
Annual household income	Log(income in 1000 EURO[2011])	
Homeownership	0 = no homeownership 1 = homeownership	Employment incentives and economic resources (Bloemen & Stancanelli 2001; Richardson et al. 2017)
Availability of garden	0 = no garden 1= garden	
Residential area	0 = rural 1 = urban/suburban	May affect employment prospects and outdoor activities as well as the availability of childcare
Region	0 = East Germany 1 = West Germany	Differences in attitudes towards maternal employment and parenting (Kreyenfeld & Geisler 2006) as well as the availability of childcare (Kreyenfeld & Krapf 2016)

3.2 Maternal employment

The SOEP collects monthly information on participants' employment status through activity calendars completed retrospectively for the past year at each survey wave. These data allow distinguishing between full-time employment, part-time employment, and nonemployment for each month from birth until age five. Consequently, there are 3^{60} different potential maternal employment histories, requiring an approach for information reduction before being able to relate maternal employment history to child outcomes. One approach was to group similar maternal employment histories into clusters using sequence analysis (Aisenbrey & Fasang 2010) which yielded the following six typical patterns: (1) *mostly not employed* (2) *later part-time transition* (3) *earlier part-time transition* (4) *later full-time transition* (5) *earlier full-time transition* (6) *mixed*. I also generated variables capturing the number of (decimal) years in full-time employment and part-time employment during the first five years after birth.

3.3 Control variables

The selection of control variables is guided by theoretical considerations regarding factors and processes that affect both maternal employment status at a given time and children's physiological development. These include time-constant variables like children's sex or the parents' intention regarding pregnancy but also characteristics that may change over time such as family structure and mothers' health. Table 1 shows the full set of control variables along with the scale of measurement and the rationale for including them in the analysis.

4. Methodological approach

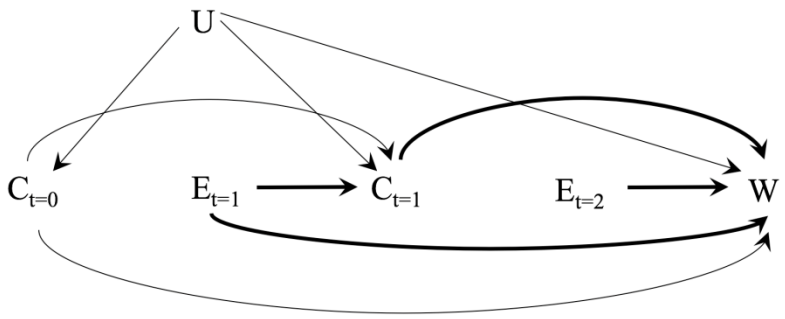
Studying how dynamic aspects of the family context, such as maternal employment, affect children's development faces at least three key methodological challenges. The first challenge lies in the measurement of complex exposure histories. Time-varying confounding and loss to follow-up pose two challenges for identifying the effects of exposure histories on developmental outcomes. The present study uses sequence analysis techniques to derive informative summary measures of maternal employment histories and inverse probability weighting to address the problems posed by time-varying confounding and loss to follow-up.

4.1 Sequence analysis

Sequence analysis combines a number of techniques to describe sequences of discrete states and to derive measures on which to group and compare individual sequences (Abbott 1995; Abbott & Tsay 2000; Aisenbrey & Fasang 2010). In this study, a sequence can consist of three possible states, namely, full-time employment, part-time employment,

and nonemployment, and stretches over the first 60 months after a child is born. One key feature of sequence analysis is the grouping of individual sequences into typical patterns based on measures of their dissimilarity or distance, which allows the derivation of a categorical group variable that can be used as a predictor of the outcome variable of interest. To group sequences in this study, I used a distance measure proposed by Elzinga and Studer (2015), which considers not only the type of states in a given sequence but also their timing and duration. The resulting distance matrix for any pair of sequences is then used in a cluster analysis (Ward 1963) which arrives at the six clusters of typical maternal employment patterns described above. The respective techniques were implemented in the freely available R-package TraMineR (Gabadinho et al. 2011).

Figure 2: Causal relations after inverse probability of treatment weighting



Notes: E – maternal employment, t – time point, W – child overweight around age 6, C – time-varying confounders, U – unmeasured variables, arrow – causal effect in direction of arrow, bold arrows – cumulative effect of maternal employment on child overweight

4.2 Inverse probability weighting

To adjust for time-varying confounding and for selective loss to follow-up I used inverse probability weighting (Fewell et al. 2004; Robins & Hernán 2009; Robins, Hernan & Brumback 2000). Instead of controlling for all covariates in an outcome regression, this approach models the probability of children's overweight around age 6, W_6, as a function of maternal employment history, $\bar{E}$, and time-constant covariates C_0:

$$P(W_6 = 1|\bar{E}, C_0) = \beta\bar{e} + C_0 \quad (1)$$

Time-varying covariates are adjusted for by weighting this linear probability model with an individual-specific stabilized treatment weight, STW,

$$STW_{60i} = \prod_{t=1}^{60} \frac{P(E_t=e_{ti}|E_{(t-12)i}, E_{0i}, C_{0i})}{P(E_t=e_{ti}|E_{(t-12)i}, E_{0i}, C_{(t-12)i}, C_{0i})}, \quad (2)$$

the ratio of the probability that the child experiences the observed maternal employment status at time t conditional on previous maternal employment status, maternal employment status at baseline and covariates at baseline and the same probability conditional also on time-variant covariates at time t-12 multiplied over months 1 to 60. Consequently, children with covariate histories overrepresented in the current maternal employment status are given less weight, whereas children with less frequent covariate histories receive a higher weight. Applying this weight, in effect, renders maternal employment status at each time point independent of prior time-varying covariates (see Figure 2). Therefore, controlling for time-varying characteristics is not necessary in the outcome models of Equation 1 to consistently estimate the causal effect of maternal employment history on childhood overweight. At the same time, controlling away the indirect effect (and inducing endogenous selection bias) can be avoided. Because both probabilities needed to construct the weight are unknown, they were estimated using multinomial logistic regression.

To additionally adjust for selective loss to follow-up the STW is multiplied with a stabilised inverse probability of attrition weight, SAW,

$$SAW_{60i} = \prod_{t=1}^{60} \frac{P(A_t=0|A_{t-1}=0, E_{(t-12)i}, E_{ti}, E_{0i}, C_{0i})}{P(A_t=0|A_{t-1}=0, E_{(t-12)i}, E_{ti}, E_{0i}, C_{(t-12)i}, C_{0i})}. \quad (3)$$

Analogous to the procedure described for IPT weighting, using the SAW renders loss to follow-up independent of measured time-variant covariates; it creates a pseudo-population in which attrition occurs at random with respect to these covariates. Again, the necessary probabilities were estimated using logistic regression models.

Under the assumption of no (substantial) unmeasured confounding and correct specification of the statistical models to estimate the weights, the regression model in equation 1, after re-weighting, provides consistent estimates of the effect of maternal employment history on childhood overweight around age 6. Compared to conventional regression analyses, IPT weighting does not require the assumption that time-variant confounders be unaffected by earlier maternal employment status. From a theoretical perspective, this is a key advantage because time-variant characteristics such as family structure, household income and health may both partially mediate the effect of maternal employment and confound the effect of subsequent maternal employment.

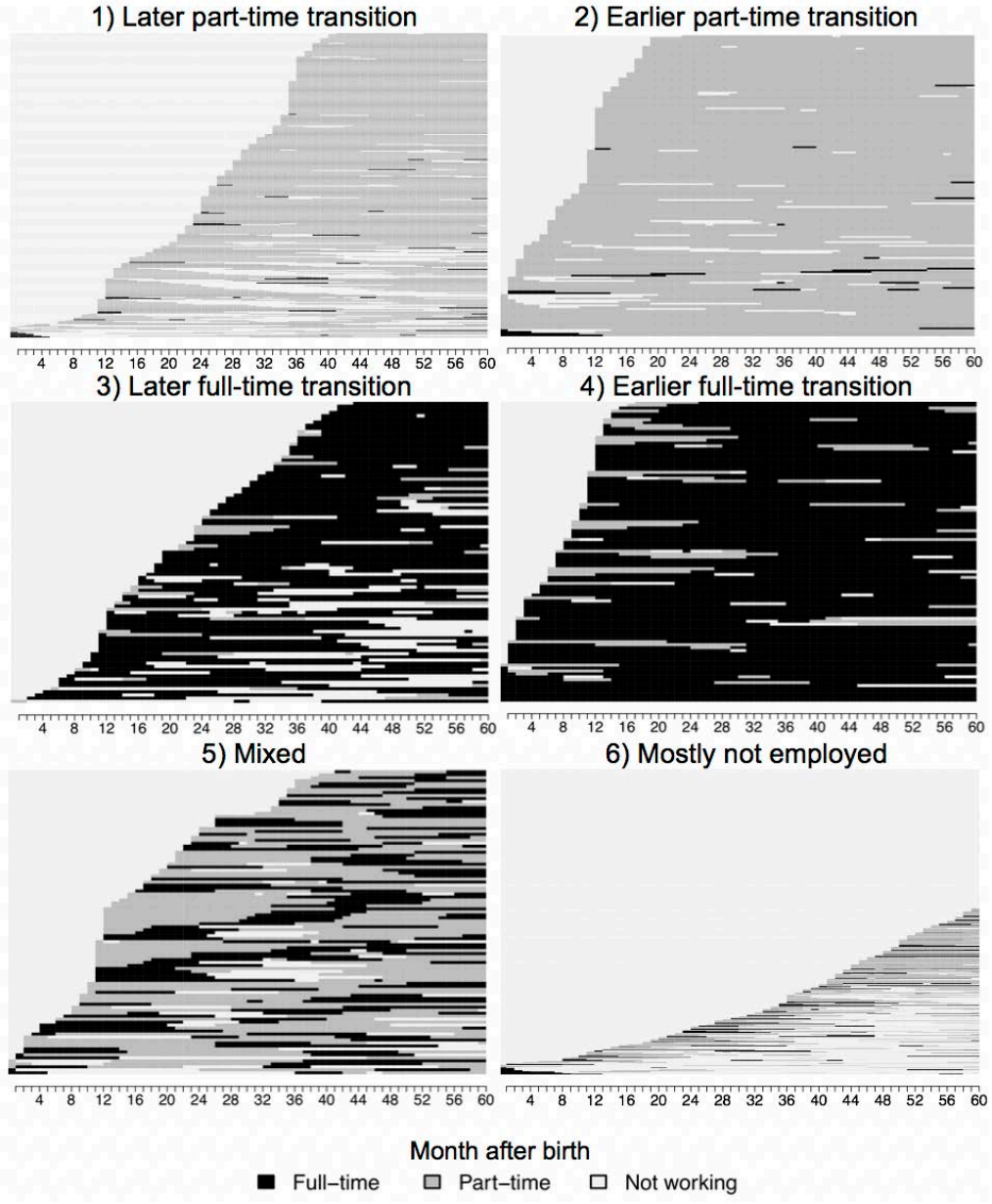
5. Results

Figure 3 displays the six clusters of typical maternal employment patterns and the individual sequences therein. The cluster “mostly not employed” includes by far the most

children (n = 401, 39%) followed by "later part-time" (n = 256, 25%) and "earlier part-time" (n = 136, 13%). The two clusters dominated by full-time employment are comparatively rare, with 84 cases ("earlier full-time") and 73 cases ("later full-time"), respectively. The last cluster, which is marked by repeated changes between different states, includes 83 cases (8%). For both full-time clusters and part-time clusters, earlier transition refers to labour market re-entry until around 12 months after birth whereas later transition clusters combine sequences with labour market re-entry after roughly one year after birth or later. Looking at the individual sequences confirms that overall substantively similar ones have been combined into the respective clusters. Nonetheless, grouping sequences in this manner necessarily includes a certain number of similar sequences that end up in different clusters.

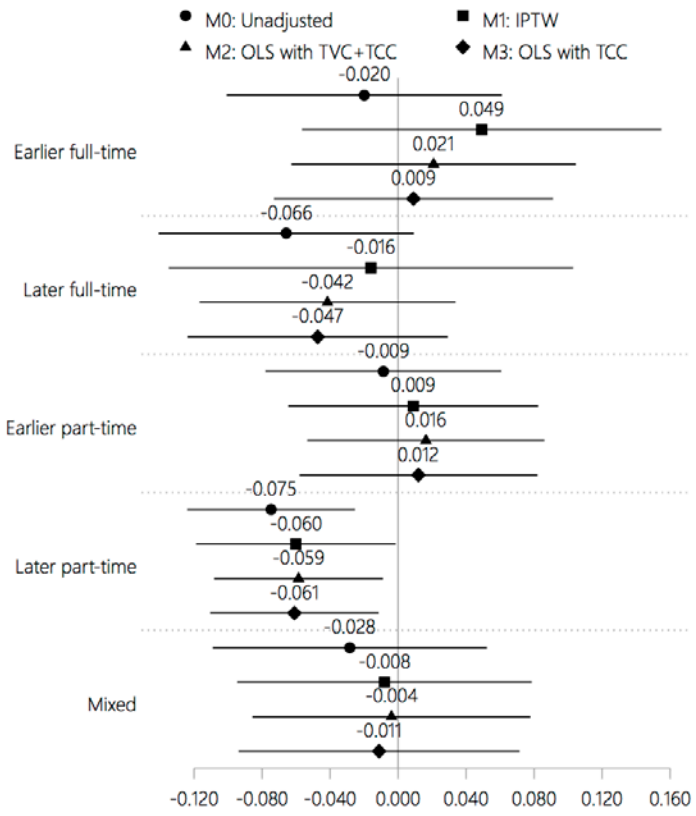
Figure 4 compares the risk of overweight around age 6 between these six clusters of maternal employment sequences with "mostly not employed" as the reference category. For each comparison, Figure 4 shows the unadjusted risk difference along with risk differences adjusting for covariates in different ways. The estimate from Model 1 is adjusted by IPT weighting, thereby accounting for time-varying confounders without controlling away any part of the effect of maternal employment potentially mediated by these factors. Model 2 explicitly controls for both time-constant and time-varying covariates (by including their mean over the first 60 months after birth) in the outcome regression. This may lead to controlling away part of the effect of maternal employment and to bias from conditioning on a collider. Finally, Model 3 only controls for covariates measured at birth and thus faces bias by time-varying confounding.

Figure 3: Clusters of similar maternal employment sequences



Source: German Socio-Economic Panel Study (SOEP), version 34 (DOI: 10.5684/soep.v34)

Figure 4: Estimated difference in risk of child overweight around the age 6 between maternal employment patterns (ref: mostly not employed)



Source: German Socio-Economic Panel Study (SOEP), version 34 (DOI: 10.5684/soep.v34), estimates from linear probability models (robust standard errors), n(children) = 1,033, all models use weights to correct for selective loss to follow-up based on measured covariates, IPTW = inverse probability of treatment weighting, TVC = time-varying covariates, TCC = time-constant covariates

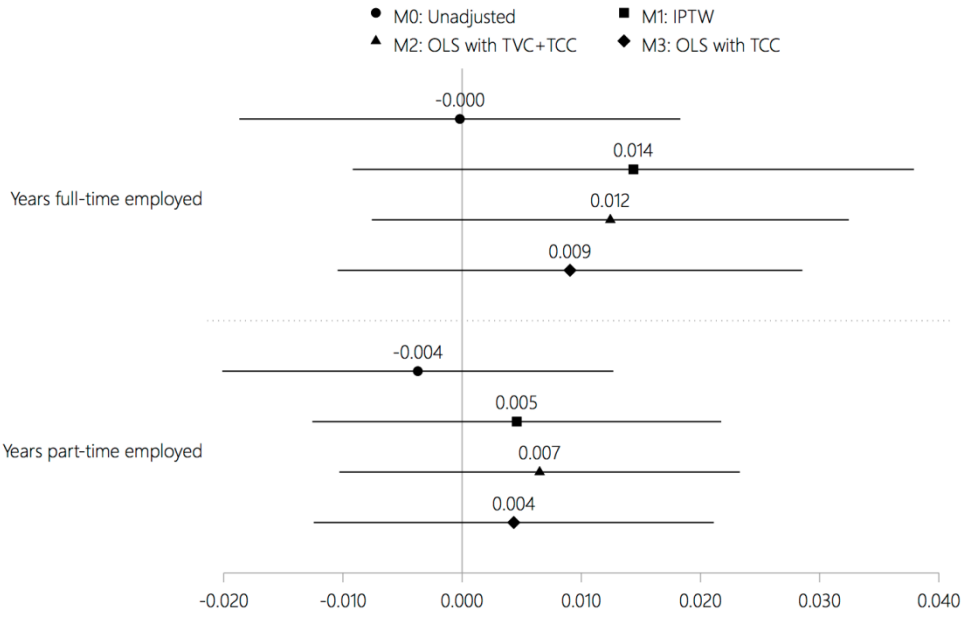
The results show that without covariate adjustment, there is no risk difference between "mostly not employed" and "earlier part-time". Children in the "earlier full-time" cluster and the "mixed" cluster are 2 percentage points and 2.8 percentage points less likely to be overweight around age 6 compared to children in the "mostly not employed" cluster. The largest risk difference relative to "mostly not employed" emerge for "later full-time" (-6.6 percentage points) and "later part-time" (-7.5 percentage points). However, only the latter difference is statistically significant on the 5%-level.

After adjusting for covariates by inverse probability weighting the differences relative to "mostly not employed" virtually disappear for "later full-time" and "mixed" whereas the

difference for "earlier part-time" remains around 0. For children in the cluster "later part-time" the difference to "mostly not employed" reduces slightly to 6 percentage points but remains statistically significant at the 5%-level. The largest change can be seen for the cluster "earlier full-time", for which the adjusted estimate now indicates a higher risk of overweight by 4.9 percentage points compared to the cluster "mostly not employed". Overall, the changes in the estimates resulting from covariate adjustment suggest that differences on covariates are particularly pronounced between "mostly not employed" and the two full-time clusters.

How to adjust for covariate differences also makes a substantive difference only for the two full-time clusters, implying that not adjusting for time-varying covariates and to explicitly control for them in the outcome regression would underestimate the true difference to the cluster "mostly not employed". In sum, the results in Figure 4 show that an earlier transition to full-time employment is associated with an increase in the risk of overweight around age 6 relative to children whose mothers are mostly not employed in the first 60 months after birth. In contrast, later part-time employment is associated with a substantively lower likelihood of child overweight around age 6. However, only the latter result is statistically significant.

Figure 5: Estimated average marginal effect of years in full-time and part-time employment on risk of child overweight around age 6



Source: German Socio-Economic Panel Study (SOEP), version 34 (DOI: 10.5684/soep.v34), estimates from linear probability models (robust standard errors), n(children) = 1,033, all models use weights to correct for selective loss to follow-up based on measured covariates, IPTW = inverse probability of treatment weighting, TVC = time-varying covariates, TCC = time-constant covariates

The estimated associations between measures of the duration of mothers' full-time employment and part-time employment with child overweight around age 6 are shown in Figure 5. These alternative measures of early maternal employment history are not associated with the risk of overweight before adjusting for covariates. After covariate adjustment, the size of the association for years of full-time employment increases similarly to the estimate for "earlier full-time employment" from before. For four years of full-time employment the estimate suggests an increases risk of overweight by 5.6 percentage points, a figure similar to that for the "earlier full-time" cluster. Again, alternative adjustment methods lead to an underestimation of the association between full-time employment and the risk of child overweight. However, neither the estimate for years in full-time employment nor the estimate for years in part-time employment are statistically significant on the 5%-level. Taken together, there is only weak evidence for an association between maternal employment history in the first 50 months after birth and child overweight around age 6 in Germany.

6. Conclusion

This study investigated the relation between maternal employment in the first 60 months after birth and child overweight around age six with data on German children born between 2002 and 2011. It relies on age- and gender-specific thresholds on the BMI to define childhood overweight as recommended by the International Obesity Task Force and the European Childhood Obesity Group. Previous research in this area has either focused on maternal employment at a particular time in children's early life or has not considered the particular analytical challenges of studying the effects of dynamic factors like maternal employment. I argued that cross-sectional measures of maternal employment do not fully capture the relation with children's developmental outcomes because the underlying causal processes may only unfold over extended periods of time and may depend on the timing of exposure. Against this background, this study contributed to the literature on maternal employment and children's overweight by using sequence analysis to derive measures of early maternal employment dynamics and by appropriately accounting for time-varying confounding and loss to follow-up.

Sequence analysis and subsequent cluster analysis resulted in six typical patterns of early maternal employment. Using the cluster of children whose mothers were mostly not employed as reference, comparing the typical maternal employment patterns provided only limited evidence for an association with child overweight around age 6 after accounting for differences in measured time-constant and time-varying covariates. Only children in the cluster "later part-time" were statistically significantly less likely to be overweight around age 6.

The main limitation of this study, like any study based on a nonexperimental research design, is that mothers select their employment status based on their individual preferences and the available opportunities and restrictions. If any of these factors also influence children's physiological development and are not accounted for in the analyses, the estimates presented here over- or underestimate the true causal effect of maternal

employment. Although such unmeasured confounding can never be ruled out empirically, using a rich set of potential time-constant and time-varying confounders reduces the risk of substantial confounding bias. Nonetheless, variables such as the availability of (high-quality) childcare may lead to biased estimates if rather crude measures such as region (East vs. West Germany), residential area, and the child's year of birth do not sufficiently capture the respective variation. However, Schober and Spiess (2015) found that in Germany the association between child care quality and maternal employment is limited to East German women with children under the age of 3 years.

Furthermore, the study is limited to children at school entry age. The mechanisms connecting maternal employment to child overweight may only fully unfold later in children lives as they gain further autonomy with regards to their diet and physical activity. Future research may therefore apply the dynamic perspective used here and elsewhere (e.g., Bacak & Kennedy 2015; Kühhirt & Klein 2018; Wodtke 2013) to later stages in children's physiological development. The approach may also be combined with the study of heterogeneity in the effect of maternal employment sequences across different social groups or across children with different initial health status. Constraints in sample size in the present study unfortunately did not allow a meaningful investigation of effect heterogeneity.

Provisionally accepting the assumption of no unmeasured confounding, the present study provides only little support for an influence of early maternal employment history on childhood overweight around age 6 in Germany. If anything, maternal part-time employment after the first 12 months after birth appears to be beneficial compared to children whose mothers are mostly not employed. Moreover, adjusting for covariates is not accompanied by substantive changes in the estimates, calling into question some of the theoretical considerations regarding the common causes of maternal employment and children's physiological development. Nonetheless, the methods used in this study appear as valuable tools to shed further light on the dynamic factors theorised to shape children's development and well-being.

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Information in German

Deutscher Titel

Mütterliche Beschäftigungsverläufe und Übergewicht im Kindesalter: Evidenz aus Deutschland

Zusammenfassung

Übergewicht im Kindesalter ist ein zentraler Indikator für das Wohlbefinden von Kindern, der häufig mit der Beschäftigung von Müttern in Verbindung gebracht wurde, da diese sich potentiell auf die Ernährung und die körperliche Aktivität von Kindern auswirkt. Basierend auf Daten des Sozio-ökonomischen Panels zu Kindern, die zwischen 2002 und 2011 geboren wurden, untersucht diese Studie, wie sich die Beschäftigung von Müttern in den ersten 60 Monaten nach der Geburt auf Übergewicht von Kindern um das sechste Lebensjahr auswirkt. Der Beitrag zur Literatur besteht in der Erfassung des gesamten Beschäftigungsverlaufs von Müttern anstelle einer Erfassung des Erwerbsstatus zu einen bestimmten Zeitpunkt und in der Darstellung der analytischen Herausforderungen, denen Studien zu den Auswirkungen dynamischer Einflussfaktoren wie der mütterlichen Erwerbstätigkeit gegenüberstehen. Insbesondere werden die Bedeutung und adäquate Kontrolle zeitveränderlicher konfundierender Variablen diskutiert. Die Ergebnisse deuten darauf hin, dass Kinder von Müttern mit sehr unterschiedlichen Beschäftigungsverläufen, die sich jedoch in Bezug auf Hintergrundmerkmale wie Bildung, Haushaltseinkommen und Familienstruktur ähneln, nur geringfügige und statistisch nicht signifikante Unterschiede im Risiko für Übergewicht um das sechste Lebensjahr aufweisen. Lediglich ein späterer Übergang von der Nichtbeschäftigung zur Teilzeitbeschäftigung ist im Vergleich zu durchgängiger Nichterwerbstätigkeit mit einem geringeren Risiko von Übergewicht verbunden.

Schlagwörter: Müttererwerbstätigkeit, Übergewicht im Kindesalter, Deutschland, dynamische Einflussfaktoren, Sequenzanalyse

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