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Fathers' Childcare: The Differences Between Participation and Amount of Time

Nora Reich

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Abstract The main research question of this article was whether and how predictors of fathers' participation in childcare, defined as zero versus more than zero minutes of childcare, differed from predictors of participating fathers' amount of time on childcare, measured as minutes on the survey day. The sample was drawn from the Multinational Time Use Study (MTUS) and covered surveys from ten industrialised countries from 1987 to 2005. Results showed that there were some similarities, but also remarkable differences between factors influencing participation in childcare and factors affecting participating fathers' time spent with children. Thus they call for caution regarding findings from existing studies not distinguishing participation from participating fathers' childcare minutes.

Keywords Childcare · Fatherhood · Time use · Censoring

Introduction

Fathers' involvement in childcare has increasingly attracted attention from researchers in various fields of the social sciences. Firstly, as mothers' labour market participation has risen in most industrialised countries over the course of the last few decades, the question arose whether and how this had an effect on fathers' involvement in childcare. Secondly, numerous studies have suggested that fathers' engagement with their children has positive effects on children's health, well-being and cognitive development (Benson and Mokhtari 2011; Carlson and McLanahan 2004; Palkovitz 2002; You and Davis 2011).

For the measurement of fathers' childcare time, time-use data, generated by respondents taking notes throughout the survey day, are more appropriate than data based on retrospective questions, as the latter are subject to a social desirability bias. Moreover, it is expected that parents spend at least a few minutes with their children every day. However, when fathers' childcare time is analysed using minutes of childcare on the survey day, this variable typically shows a large number of zeros. Zeros arise when fathers report not having spent any time on childcare during the day surveyed. Two reasons could theoretically account for this finding. Firstly, these fathers might usually be involved in childcare but missed doing so accidentally for several reasons, such as having had an unusually long work day. Consequently, non-participation would be a data artifact. Secondly, some non-participants might really be uninvolved in childcare. For example, in couples with a traditional specialisation between paid work and unpaid work (including childcare), fathers might not be involved in childcare at all (Pacholok and Gauthier 2010).

In the majority of previous studies, the first reason was assumed. These analyses featured Tobit and other models for censored data with a large number of zeros to explain fathers' childcare time, implying that the "non-participants," that is, fathers having reported zero minutes of childcare, usually spent some time on childcare, but did not do so purely by chance during the survey period (e.g., Chalasani 2007; Kalenkoski and Foster 2008; Kalenkoski et al. 2009; Romano and Bruzzese 2007; Sayer et al. 2004a; Wang and Bianchi 2009). In other words, non-participants were therefore ignored or treated as an artifact

N. Reich (✉)
Hamburg Institute of International Economics, University of Hamburg, Heimhuder Strasse 71, 20148 Hamburg, Germany
e-mail: reich@hwwi.org; reich.nora@googlemail.com
URL: www.hwwi.org

of the data and hence included in regressions for minutes of childcare as the dependent variable (Pacholok and Gauthier 2010).

Pacholok and Gauthier (2010) took a closer look at fathers' participation in childcare. As a method, a multinomial logistic regression model distinguishing between no/low/medium/high participation was applied. The results supported the view that some cases of non-participation were caused by chance, as fathers or children were absent from home on the diary day more often among non-participants than participants. Nevertheless, non-participants differed substantially from participants in terms of their social, economic, and demographic characteristics. Hence, some of the fathers having reported zero minutes of childcare on the survey day were "real" non-participants, that is, were generally not involved in childcare. These findings were based on Canadian data for one diary day at one point in time.

The article at hand goes beyond Pacholok and Gauthier's (2010) work in several ways. Here, participation in childcare is clearly contrasted with all participants' childcare time. The main research question was whether and how predictors of fathers' participation in childcare, defined as zero versus more than zero minutes of childcare, differed from predictors of participating fathers' amount of time on childcare, measured as minutes on the survey day. If there were truly non-involved fathers among the non-participants, predictors would differ between these dependent variables. I employed Probit models for participation in childcare and OLS models as well as generalised linear models (glm) for participating fathers' minutes of childcare for investigating the differences between fathers' participation in and amount of time spent on childcare in a more detailed way. These models are not subject to the so-called parallel regression assumption demanded by multinomial logistic models, which is frequently violated by important regressors (Long and Freese 2001; see also Oshio et al. 2012). In addition, the generalised linear model accounts for the fact that the dependent variable can only have positive values and that its distribution is right-skewed in the samples under study. I enlarged the geographic scope by looking at ten industrialised countries. The purpose here was not a detailed comparison between the effects of single predictors among countries. Instead, firstly, descriptive comparisons of fathers' childcare participation and participants' time across countries have not been conducted so far. I carried out this comparison and interpreted the findings against the background of common welfare state categorisations, because the societal acceptance of active fathering as well as the framework for the reconciliation of work and family life set by social policies varies between these categories. Secondly, I wanted to find out whether differences between predictors for fathers' participation in childcare on the one hand and participating fathers' childcare time on the other hand, if found in one country, also hold in other countries. In other words, the question is whether there is a general pattern regarding predictors of the two dependent variables across industrialised countries. Furthermore, for some countries, two surveys were available from the last 25 years, so that changes over time from the same country are revealed. Due to the influx of women into the labour market in the course of the last decade, one could expect a rise in fathers' participation in childcare as well as their childcare time in turn. Similarly to the differences in the cross-country view, the longitudinal development is probably subject to the institutional framework, which influences the direction and pace of the development.

In addition, time diaries for more than one day were available for some of the countries, allowing checking as to whether the results hold for a larger reference period. The findings of this article contribute to the empirical literature on fathers' childcare time and to the discussion on appropriate estimation techniques for its measurement. Moreover, the practical application of different indicators of fathers' involvement in childcare time was debated. The sample was drawn from the Multinational Time Use Study 2010. The selected countries were Canada, Finland, France, Germany, Italy, the Netherlands, Norway, Sweden, the United Kingdom, and the United States.

This article is structured as follows. In the next section, economic and sociological theories on fathers' childcare time and their application in empirical time-use studies are discussed. The section "Predictors of fathers' childcare participation and time" presents a review of empirical literature on this topic. Then, the data, sample, model and variables are described in the following sections. After that, descriptive findings and the results of the models for childcare participation and participants' childcare time are presented and discussed. Finally, the last section concludes.

Childcare Participation and Amount of Time: Theoretical Background and Application with Time-Use Data

Economic and sociological theories provide different frameworks for the explanation on the time allocation of family members. In this section, they are discussed within the context of participation and amount of time spent on childcare.

One of the most prominent economic theories on parents' allocation of time is Becker's New Home

Economics (Becker 1981, 1985). According to this theory, spouses maximise a joint utility function. Utility is maximised if one spouse completely specialises in paid labour, whereas the other spouse specialises in household tasks, including childcare. In other words, one spouse would be involved in childcare while the other one—who works in the market—would not be involved in childcare. Specialisation—and hence involvement—is basically determined by education and experience: The spouse with the higher educational level and more work experience, that is, the higher marketable human capital, can achieve a higher income in the market (potential wage) and thus devotes his/her time to market work. Besides human capital, a spouse's sex does play a role in Becker's model, since he assumed that women have a "biological advantage" (Becker 1981, p. 21) for raising children. To sum up, this approach is useful for predicting participation and non-participation on a diary day depending on relative human capital parameters (educational level, work experience, work status, potential wage), and the spouse's sex.

Other theoretical approaches are less "extreme" than Becker's theory, as complete specialisation is viewed as only one possibility of maximised utility of the spouses. In these models, specialisation is not ruled out, but the focus is on explaining which parent does *more* and which one does *less* unpaid work.

According to the bargaining theory (e.g., Ott 1992), spouses bargain over time allocation regarding paid and unpaid work (including childcare). The spouse endowed with higher human capital does more market work and less unpaid work, while the other one focuses on unpaid work and works less in the market. Again, relative human capital would be the main predictor of each spouse's allocation of time.

A third economic model, developed by Akerlof and Kranton (2000), incorporates the sociological view that individuals' time use is influenced by social norms into a formal framework. According to this theory, time allocation depends on "identity." Acting out of line with prevailing norms and views in society implicates a loss of identity. Therefore, men aim at displaying masculine behaviour, while women aim at living up to the ideals of what is seen to make them "good women." Being endowed with less human capital and thus the lower (potential) wage than his female partner would harm a man's identity. As a consequence, and contrary to the results of the two theories presented above, he would avoid doing "women's" work, like childcare and housework, in order to compensate for his loss of identity. The related sociological approach is referred to as "doing gender" theory (West and Zimmermann 1987). A given spouse's relative human capital would have the opposite effect on childcare time compared to the bargaining and the New Home Economics approaches.

Sociologists also provide reasoning explaining differences in time use between men (instead of between spouses). It is argued that egalitarian views are more prevalent among highly educated men than among their less-educated counterparts (Blossfeld and Drobnič 2001). Thus, highly educated fathers would be more inclined to participate in childcare due to their egalitarian values.

In short, economists and sociologists provide a variety of theoretical approaches for fathers' childcare participation and fathers' time for childcare. However, apart from Becker's model, which clearly refers to involvement versus non-involvement, most theories treat childcare time as a continuous variable, referring to less and more childcare. Accordingly, existing empirical studies have ignored fathers' non-participation in childcare and treated it as an artefact, arguing that they constitute very few cases or that these non-participants are similar to participants (Pacholok and Gauthier 2010). Indeed, there are several reasons why fathers who did not participate in childcare during the survey period are not "real" non-participants. Parents are much more a selected group today than even a few decades ago. The spread and increasing reliability of contraceptive devices have made parenting more voluntary, and the lower number of children per family could make each child more precious in the eyes of the parents (Sayer et al. 2004a). In addition, changes in leisure activities over time and increased concerns about children's safety could result in parents spending more time accompanying their children today than in earlier times. Moreover, the father's role is changing in many societies, increasing the pressure on fathers to be a "good parent," that is, to practise active fathering (Romano and Bruzzese 2007). All of these developments lead to the assumption that all fathers normally spend at least a few minutes per day with their children. Zero minutes of childcare could only occur if fathers face severe time constraints or if the child is not available (due to school or other activities) when the father is at home. In other words, relatively few fathers would report having spent zero minutes of childcare on the diary day(s), and fathers' employment and whether the data refer to a weekday or a weekend day would be the sole predictors of fathers' childcare participation.

Existing studies did not support the assumption that all fathers are usually involved in childcare. Firstly, not only a few fathers but a considerable number of them reported zero minutes of childcare on the diary day in numerous industrialised countries. The share of non-participants lay between 32 % in Sweden and 76 % in Latvia according to MTUS data for 16 countries around the year 2000. Secondly, in Canada at least, some fathers could legitimately be labelled as non-participants. In this case, not time

constraints (e.g., weekend versus weekday, work hours) but demographic and socio-economic factors were the main predictors of a father's participation in childcare (Pacholok and Gauthier 2010). In line with this result, I hypothesised that in the countries analysed in this study, fathers participating in childcare are distinct from those not participating, so that, indeed, demographic and socio-economic differences could explain childcare participation, while childcare time should be dependent on time availability, mainly determined by the day of the week and work status.

Regarding the data at hand, for some countries surveys were available at two different points in time, more specifically, around 1990 and around 2000. Several reasons could lead to differences between these points in time with respect to fathers' childcare participation and time. Firstly, women's labour market participation has risen in many countries over the course of this decade (Eurostat 2012). Secondly, many countries had changed family policy legislation during the 1990s (e.g., Gauthier 2011; Institute for Child and Family Policy 2012). Thirdly, as explained above, having children is more voluntary today than it used to be, and fathers' role in society is changing. Thus, I expected that participation in childcare has risen over time. I also hypothesised that fathers' amount of childcare minutes has risen, although the expansion of public day-care facilities and the trend towards all-day schools in some countries could have shifted some childcare responsibilities from the family (both parents) to public institutions. Regarding cross-national comparisons, I expected that fathers' participation and participants' minutes of childcare is higher among countries generally labelled as "social-democratic" countries, lower in "conservative" countries, and somewhat in between in "liberal" countries, due to the different macro-level institutions supporting fathers' active involvement with their children and related empirical research. As cross-country comparisons of (participating and non-participating) fathers' average childcare time revealed, it is indeed high in some social-democratic countries (Denmark, Norway, Sweden), medium to high in liberal countries (Australia, Canada, United Kingdom, United States) and medium to low in some conservative welfare states (France, Italy, Germany, Spain) (Craig and Mullan 2010; García-Mainar et al. 2011; Stancanelli 2003; Sullivan et al. 2009)

Predictors of Fathers' Childcare Participation and Time

Empirical research widely demonstrated an increase in fathers' time for childcare during the course of the last decades (Chalasani 2007; Hall 2005; Maume 2011; Sandberg and Hofferth 2001; Sayer et al. 2004a; Sullivan et al. 2009). In the United States at least, this increase was shown to be the result of both an increase in the share of participants and participants' minutes per day (Chalasani 2007; Sayer et al. 2004a).

In spite of these findings, most multivariate analyses of fathers' involvement with their children focused on the amount of time spent, not on fathers' participation in childcare. A notable exception is the recent article by Pacholok and Gauthier (2010), who applied a multinomial logit model to compare non-participants with fathers reporting low, medium and high amounts of childcare time using Canadian data from 2005. They found that having a high educational level increased the likelihood of being in the participants' categories as opposed to the non-participant category, and argued that parenting and gender roles were the driving forces behind this result. Compared to the non-participants, the diary day being a weekend day increased the likelihood of spending a high amount of time on childcare, but fathers with low and medium childcare time actually had a lower likelihood of having filled the diary on a weekend day. This result further supported the assumption that non-participation was not solely a data artifact. In addition, for some categories, a positive effect was found for the number of children, the presence of a young child, few weekly working hours, and the female partner's employment. A negative impact for at least two categories of childcare participation was found for step-parent families and long work hours.

As to predictors of fathers' childcare time, in estimations that lumped participating and non-participating fathers together, a clear positive impact was seen from fathers' time for housework, his female partners' time for childcare as well as being married instead of cohabiting, and being employed in the public sector (Aldous et al. 1998; Gottmann 1994; Hook 2006; Stancanelli 2003; Sullivan et al. 2009; Volling and Belsky 1991).[1] Numerous studies also reported that the educational level has a positive effect in many countries (e.g., Cooksey and Fondell 1996; Marsiglio 1991; Sayer et al. 2004a; Sayer et al. 2004b).[2] Furthermore, a recent study suggested that an increase in the partner's wage had a positive effect on fathers' involvement, at least on passive childcare (Kalenkoski et al. 2009).

A negative effect on fathers' time for childcare was found for their level of involvement in market work, measured as the number of work hours or the employment status (full-time, part-time, no employment) (Aldous et al. 1998; Ishii-Kuntz and Coltrane 1992; Pleck 2007; Sayer

[1] For an overview on social and economic determinants of fathers' and mothers' time for their children see also the review of Monna and Gauthier (2008).

[2] The educational level did not appear to be significant in Norway (Haas and Hwang 2008; Sayer et al. 2004b).

et al. 2004a; Sayer et al. 2004b; Stancanelli 2003; Yeung et al. 2001), as well as evening work hours (Rapoport and Bourdais 2008), but their wages did not seem to have a strong impact (Kalenkoski et al. 2009). Moreover, the age of the youngest child, the square of the father's age, high costs and low availability of non-parental care as well as the presence of other adults in the household had a negative impact (Averett et al. 2000; Cooksey and Fondell 1996; Sayer et al. 2004a; Sayer et al. 2004b).

Mixed results were found for the father's age, the number of children, and the child's sex (Cooksey and Fondell 1996; Ishii-Kuntz and Coltrane 1992; Sayer et al. 2004a; Snarey 1993; Stancanelli 2003).[3]

To sum up, the existing empirical literature gives insights into predictors of fathers' childcare involvement. Nonetheless, several questions remain unanswered. Firstly, most studies focused on the predictors of participating fathers' time for childcare. Yet, as argued in the previous sections, predictors for participation in childcare can be very different from predictors for the amount of time. Secondly, fathers' participation and participating fathers' amount of time for childcare have not been analysed systematically across different countries. Thirdly, changes over time in fathers' childcare participation in a particular country have not been assessed in detail so far.

Data and Sample

This study was based on data from the Multinational Time Use Study (MTUS) 2010, versions 5.52, 5.53 and 5.80 (Gershuny and Fisher 2010). The MTUS provided harmonised diary data with representative samples of individuals from 20 countries from the 1960s until the 2000s. The analysis was restricted to countries which feature the main variables that affect fathers' involvement in childcare according to related empirical literature. In particular, the variable "partner's employment status" considerably reduced the number of surveys available for analysing the research question. The following surveys were included: Canada (1992, 1998), Finland (1987, 1999), France (1998), Italy (1989, 2001), Germany (1991, 2001), Netherlands (2000, 2005), Norway (1990, 2005), Sweden (1991, 2001), United Kingdom (2000) and United States (2003). In most countries only one day had been surveyed, hence one 24-hour diary was available. For five countries, two, three or seven diary days were recorded. For reasons of comparison, one diary day per person was randomly selected for all countries in order to make the results comparable. The mode of data collection and the time intervals varied slightly between countries and surveys. Diaries were filled out during the day as activities take place, at the end of the day, or on the next day.[4] Required time intervals ranged from free intervals of at least one minute to 15-min-intervals. Biases arising from these differences were assumed to be rather small due to the relatively small intervals compared to the amount of time many fathers spend on childcare. In addition, successful cross-national comparisons had been carried out with these data before (Craig 2007; Hook 2010; Sayer and Gornick 2011; Sullivan et al. 2009).

The sample consisted of fathers who were married or cohabiting, were between 20 and 55 years old and had at least one child below the age of 18 in the household. While the sample size was below 4,000 cases in eight of the ten countries, it was around 10,000 in Italy and the United States. As *p*-values become extremely small in very large samples, indicating significance even if the small size of the coefficients suggest little practical relevance, random subsamples of 3,500 cases were drawn from the Italian and the American samples for reasons of comparison. Thus, the final size of the samples used for the analyses ranged between 426 in the Netherlands to 3,915 in Germany.

Models and Variables

The two dependent variables of interest were participation in childcare, defined as zero versus more than zero minutes of childcare on the survey day, and minutes of childcare on the survey day. Of the sixty-nine different main activities that were recorded in the MTUS data, "childcare" was the one covering time with children. This was the activity from which the dependent variables were derived. It included the following activities with or for children: preparing meals, feeding them, putting them to bed, medical and body care of the child, looking after them, helping them with homework, reading something to them, playing with and talking to them. Thus, all kinds of activities primarily done for or with a child were considered to be childcare.

For participation, I apply a Probit model as empirical strategy (e.g., Long and Freese 2001). *Participation in childcare* is a binary variable, denoted as Y. The probability of participation in childcare, that is, that Y equals 1, is assumed to be a function of k explanatory variables $X_1, \ldots, X_k$:

$$\Pr(Y = 1|X) = F(\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k) \quad (1)$$

The β_i-coefficients represent the effects of the variables $X_1, \ldots, X_k$. The standard Probit model assumes that the function $F(.)$ follows a normal cumulative distribution, thus

[3] Recently, some researchers have pooled data from several countries to investigate the impact of macro-level factors on fathers' participation in domestic work, e.g., family policy. But as this paper focuses on individual-level data, I refrain from reviewing literature on macro-level predictors in this article. For an overview of some of these factors for fathers' childcare see Reich et al. (2012).

[4] For matters of simplification, the terms "diary day" and "survey day" are used interchangeably for the day to which the diary refers.

$$\Pr(Y = 1|X) = \Phi(X) = \int_{-\infty}^{X} \phi(z)dx, \quad (2)$$

where $\varphi(z)$ is the normal density function of the standard normal distribution,

$$\phi(z) = \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-z^2}{2}\right). \quad (3)$$

For minutes of childcare, as stated above, many existing studies were based on Tobit models for all fathers regardless whether they participate in childcare or not. In contrast, in my analysis, the sample of participating fathers should be representative for the population of participating fathers only. In the first step, I estimated an ordinary least square (OLS) model, the standard linear model for metric dependent variables. The OLS model takes the form

$$Y_i = \beta_0 + \sum_{i=1}^{p} x_{ik}\beta_k + \varepsilon_i = X\beta + \varepsilon \quad (4)$$

with Y as the dependent variable, x_i the independent variables, $\beta_0, \ldots \beta_k$ the parameters to be estimated, ε the error term and $i = 1, \ldots n$ the individual cases in the data. The error terms are expected to be normally distributed and have a homogenous variance (homoscedasticity). In order to meet these constraints, Y has to be normally distributed as well. Graphical and analytical investigation of the normality and homoscedasticity assumptions showed that these were not fulfilled in the estimations.[5] Both the dependent variable and the error terms were right-skewed in the samples for all countries under study. Moreover, the OLS models can predict negative values, but minutes of childcare are limited to positive values. Thus, I transformed the dependent variable to its natural logarithm. This way, both the dependent variable and the error terms became normally distributed, and the error terms had a constant variance. Moreover, the log of childcare minutes predicts only positive values.

Then, a third possibility was explored in order to account for the right-skewed distribution of the number of childcare minutes. A generalised linear model (glm) for gamma-distributed dependent variables (gamma "family") is suited for such right-skewed continuous and positive response variables (Hardin and Hilbe 2007). While the covariates in the OLS model are related to the expected value of Y such that

$$E(y) = \mu \quad (5)$$

and

$$\mu = X\beta, \quad (6)$$

the glm models relax the assumptions of constant variance and normality of residuals and support different "families" of exponential distributions of dependent variables. The linear predictor is linked to the expected value of the dependent variable (μ) through the following functions:

$$\eta = X\beta \quad (7)$$

$$\eta = g(\mu), \quad (8)$$

where the latter is called the link function. This function specifies the relation between the dependent variable and the covariates. For duration data in the gamma family, the identity link is appropriate, assuming there is a one-to-one relationship between μ and η. Still, several link options have been compared, using the Akaike's information criterion (AIC) and the Bayesian information criterion (BIC), and the identity link was indeed the one to prefer, although the difference to the log link was very small. As the OLS model for minutes of childcare can be replicated within the glm framework choosing the Gaussian family and the identity link, and the OLS model for the natural log of childcare minutes can be estimated using the glm model with the Gaussian family and the log link, these models could be directly compared to the glm gamma models, using the AIC and the BIC, for example (Hardin and Hilbe 2007). The comparison showed that the gamma model with the identity link has the smallest AIC and BIC, and should be preferred among these three options (although the difference is very tiny). Thus, this model is presented as the main model in the results section. The other specifications are used as robustness checks.

All estimations have been conducted using Stata, a standard software programme designed for econometric research in economics and other sciences (Baum 2006). Detailed information on how to conduct glm estimations can be found in the monograph by Hardin and Hilbe (2007).

The choice of independent variables was made according to related theoretical and empirical literature on fathers' time for childcare. Moreover, it was limited to the availability in the MTUS of all countries under study. The models accounted for the age, the number of children, the age of the father and its square, his educational level, his employment status, his partner's employment status, weekday versus weekend day, and a dummy for the survey year if more than one survey of a certain country is considered. In addition, participation in housework, defined as zero minutes versus more than zero minutes of housework on the survey day, was included in the participation model, while the number of housework minutes was included as an independent variable in the model for minutes of childcare.

The age of the child was used in three categories (0–4 years, 5–12 years, 13–17 years), as most countries provided only these three categories instead of the years. The number of children was defined as the number of children under the age of 18 in the household according to the MTUS

[5] Regression diagnostics have been carried out using the instructions of the Stata Web Book, Chapter 2 (Institute for Digital Research and Education (IDRE) at UCLA 2012).

codebook. Age of the father was also available in years, and the square of the age has been calculated additionally. Educational level was available in the MTUS data in three categories: lower than completed secondary education (not completed ISCED[6] level 3), completed secondary education (ISCED level 3 or 4), and post-secondary education (ISCED level 5 or higher). As to both parents' employment status, the MTUS provides a distinction between not employed, part-time employment, full-time employment and employment with unknown work hours. This last category was only included in some of the surveys, and presumably covers mostly self-employed workers whose work hours show a lot of variation. Besides unemployed fathers, the group of fathers stated as being "not employed" included those who were not working for any other reason, as students, retirees and homemakers, for instance.[7] Employment status referred to the usual work arrangement, not to the number of hours on the survey day. The dummy variable "weekend" indicated whether the diary refers to a weekend day or a weekday. Housework was constructed using the MTUS activity codes for "routine housework" (e.g., washing clothes, vacuum cleaning, but not shopping, gardening) and "cooking" (including food preparation, baking, setting table, etc.). With regard to housework participation, following Becker's (1981, 1985) theory of specialisation, it was expected that socio-economic factors affect men's participation in unpaid work in general, and, thus, in childcare and housework at the same time. As to minutes of childcare and housework, the economic and sociological theories dealing with more or less unpaid work also lumped childcare and housework time together, suggesting a positive relation between these variables. This is reasonable, since these activities can easily and efficiently be combined. For example, a parent who prepares a meal for a baby can do the dishes (for the whole family) while the baby food is heated on the stove.

Summary statistics for all fathers and participating fathers are presented in Tables 5 and 6 in the Appendix. They indicate the minimum and maximum value of each variable, the range of the values for the mean and the standard deviations between the countries. Table 5 also includes a detailed definition of all variables used in this study.

Descriptive Findings on Fathers' Childcare Participation and Minutes

In the following paragraphs, fathers' raw childcare participation rates and average minutes spent on childcare are presented for the countries analysed. For countries with two surveys at different points in time, calculations were conducted for each survey year separately, in order to assess time trends of fathers' childcare participation and minutes. The MTUS provided representative data for the countries analysed, but the share of diaries having been filled on weekdays or weekend days varied between 28 % in France and 51 % in the United States. Moreover, fathers' childcare time had been shown to differ between weekdays and weekend days (Maume 2011; Yeung et al. 2001). This could make comparisons of samples with different shares of weekend and weekday diaries questionable, so that the overall values as well as those for weekdays only and weekend days only are presented.

Great variation in fathers' raw childcare participation rates and minutes spent on childcare was found between the countries analysed and between different survey years of countries for which two surveys were available.[8] The participation rate ranged from 27.7 % in Italy in 1989 to 59.7 % in Sweden in 1991 (Fig. 1). Sweden, Norway and Germany (1991) were the countries with the highest participation rates, while Finland, France and Italy showed the lowest rates.

In Norway, the Netherlands, Canada, Finland and Italy, the participation rate increased from the first survey made around 1990 to the second survey made around 2000. This is in line with earlier findings on the development of the share of male participants in childcare in the United States (Chalasani 2007; Sayer et al. 2004a). However, in Germany, fewer fathers participated in childcare on the survey day in 2001 than in 1991. One reason for the decrease in fathers' childcare participation might be the expansion of the duration of parental leave during the 1980s and 1990s. At the same time, mothers markedly reduced their hours of market work (Federal Statistical Office 2013), which could have had an impact on the gendered specialisation in unpaid labour at home.

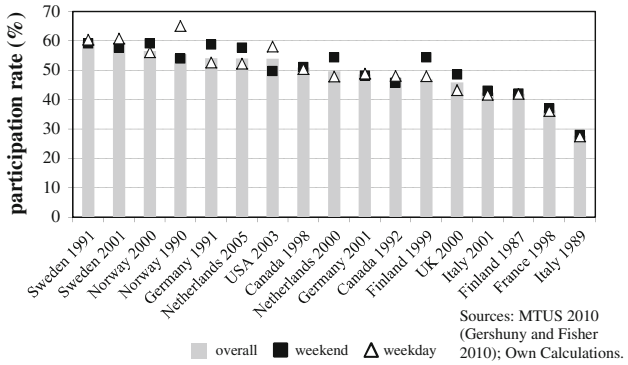
In Norway and Sweden, participation rates were high in both surveys—1990/1991 and 2000/2001—and they differed less than one percentage point from one another. Participation rates on weekdays and weekends did not differ substantially in most countries and broadly support the overall order of surveys.

For the detection of an underlying structure of this distribution, it was evaluated against common classifications of countries. Researchers had grouped countries according to welfare state regimes, in terms of their general political institutions (Esping-Andersen 1990), family policy (Gauthier and Hatzius 1997; Korpi 2000; Mischke 2011), paid and

[6] International Standard Classification of Education.

[7] If students are working, they are not classified as not working, but belong to the other groups (part-time or full-time employment or employment with unknown work hours). The share of students in the category "not employed" is below 12% in all countries but Finland (23.9%) and Norway (21.4%).

[8] The exploration of confidence intervals shows that the differences in participation rates and average minutes are significant at the 95% level between the countries with lowest values and those with highest values. Tables and figures with confidence intervals for the participation rate and the average number of minutes are available from the author upon request.



	country	overall	weekend	weekday
1	Sweden 1991	59.72	59.09	60.38
2	Sweden 2001	59.43	57.69	60.81
3	Norway 2000	56.56	59.12	56.09
4	Norway 1990	55.46	54.01	65.09
5	Germany 1991	54.10	58.78	52.61
6	Netherlands 2005	53.99	57.65	52.25
7	USA 2003	53.97	49.74	58.05
8	Canada 1998	50.89	51.09	50.41
9	Netherlands 2000	49.70	54.35	47.9
10	Germany 2001	48.60	48.12	48.88
11	Canada 1992	47.41	45.76	48.08
12	Finland 1999	46.99	54.34	47.99
13	UK 2000	45.89	48.58	43.26
14	Italy 2001	42.36	43	41.71
15	Finland 1987	41.99	42.09	41.96
16	France 1998	36.38	36.98	36.14
17	Italy 1989	27.73	28	27.46

Fig. 1 Fathers' average participation rate of childcare on the diary day in ten industrialised countries 1987–2005

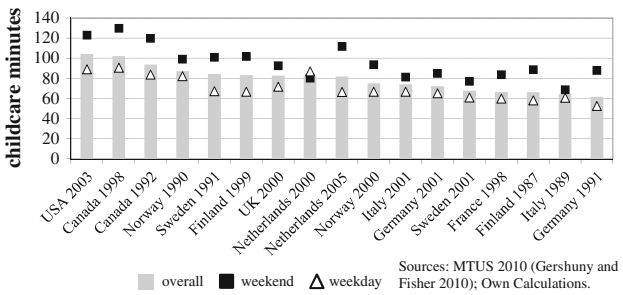
unpaid work (Gornick and Meyers 2004) as well as gender relations (Galvez-Munoz et al. 2011; Korpi 2000). Generally, the Scandinavian countries are classified as social democratic welfare states, Germany, Italy and France (and other continental European countries) are referred to as conservative welfare states, and the United Kingdom, the United States and Canada belong to the liberal welfare states. The Netherlands is a hybrid case, sometimes referred to as a social democratic, sometimes as a conservative welfare state.[9] Here, it is regarded separately from the country clusters. In terms of these categories, there seemed to be a division of social-democratic countries between Sweden and Norway on the one hand and Finland on the other hand. The liberal welfare states (United States, the United Kingdom and Canada) as well as the Netherlands, exhibited medium participation rates. France, Germany and Italy—conservative welfare states—showed medium and low participation rates.

Looking at the average number of minutes of participating fathers on the survey day, the order of countries turned out to be somewhat different from the order of participation rates (Fig. 2). The number of childcare minutes ranged from 62 min in Germany in 1991 to over 104 min in the United States.

[9] See discussion in Mischke (2011).

Canadian fathers (1998, 1992) showed the second and third highest number of minutes, followed by Norway in 1990 and Sweden in 1991. Germany (1991), Italy (1989) and Finland (1987) showed the lowest number of minutes of between 62 and 66. In Canada, Finland, Italy and Germany, the number of minutes was higher in the latest survey than in the earlier survey. In contrast, in Norway, the Netherlands, and Sweden, it was lower around the year 2000 than around 1990. One reason for the decrease in the amount of time Norwegian fathers spent with their children may be the extension of public childcare facilities, as Kitterod and Petterson (2006) have suggested for their country; and the situation might have been similar in Sweden. In contrast to the participation rates, countries belonging to the liberal welfare states showed overall a comparatively high number of fathers' childcare minutes. The social democratic countries and the Netherlands had medium, the conservative welfare states medium to low average daily minutes of childcare.

The average number of childcare minutes was considerably larger on weekend days than on weekdays in many countries. Participating Canadian (1998) and American (2003) fathers took the lead both on weekend days and on weekdays, spending on average more than 100 min of childcare on weekend days and about 90 min on weekdays. Swedish (2001) and Italian (1989) fathers showed the smallest values (less than 80 min) on weekend days. Finish (1987) and German (1991) fathers were at the bottom end regarding average minutes on weekdays (less than 59 min).



	country	overall	weekend	weekday
1	USA 2003	104.45	123.1	89.06
2	Canada 1998	102.10	129.94	90.55
3	Canada 1992	93.93	119.98	83.81
4	Norway 1990	87.17	99.12	82.11
5	Sweden 1991	84.45	100.97	67.4
6	Finland 1999	83.45	101.91	66.65
7	UK 2000	82.77	92.79	71.71
8	Netherlands 2000	82.32	80.26	87
9	Netherlands 2005	82.08	111.73	66.45
10	Norway 2000	75.36	93.64	66.67
11	Italy 2001	74.19	81.48	66.62
12	Germany 2001	72.25	85.07	65.05
13	Sweden 2001	68.00	77.26	61.06
14	France 1998	66.65	83.72	59.93
15	Finland 1987	66.35	88.8	58.16
16	Italy 1989	64.72	68.75	60.64
17	Germany 1991	61.89	87.83	52.69

Fig. 2 Average number of childcare minutes on the diary day of participating fathers in ten industrialised countries 1987–2005

In the Netherlands (2005), Canada (1998, 1992) and Finland (1999), participating fathers spent on average more than 35 min more with their children on weekend days than on weekdays. Consequently, in contrast to participation rates, the average number of childcare minutes differed substantially between weekend days and weekdays. Nevertheless, the broad picture that childcare minutes were relatively high in liberal welfare states, medium in social democratic welfare states and the Netherlands, and comparatively low in conservative welfare states is supported by the separate analysis of weekdays and weekend days.

Comparing fathers' average participation and minutes across countries, one could not conclude that high participation by fathers in childcare resulted in a larger amount of time spent on childcare by participating fathers. For example, the Norwegian survey from 2000 showed the third-highest participation rate, but only a medium number of minutes. In contrast, participation was quite high in Germany in 1991, but the amount of time was the lowest. These contrasts between participation and amount of time within one country, as well as the differences regarding weekday/weekend day averages between participation and minutes, lead to the question whether predictors for participation in and minutes of childcare are distinct as well.

Results on Fathers' Childcare Participation and Time

Participation in Childcare

Table 1 displays the marginal effects for the Probit equation for fathers' participation in childcare in the countries analysed in this study. According to these results, the age of the youngest child was the only variable with a consistent negative effect across all countries. If the youngest child was between 5 and 12 years old instead of younger than 5 years, the likelihood of fathers participating in childcare was significantly reduced by between 15 % (Italy) and 36 % (Sweden). If the child was between 13 and 17 years old, the likelihood of participation was reduced by between 31 % (Italy) and 58 % (Netherlands, Norway).

Negative effects also arose from the fathers' employment, but only in four of the ten countries analysed. In the United States, participation was reduced significantly by 11 % through part-time work as compared with no employment. Full-time employment reduced participation in Canada, France, Norway and the United States; the effect ranged from 7 % in the United States to 17 % in Canada. Employment falling under the category "unknown work hours" reduced the likelihood of fathers participating in childcare by about 10 % in France. Fathers' childcare time was independent from the work status in Finland, Germany, Italy, the Netherlands, Sweden and the United Kingdom.

Fathers participated less in childcare on weekend days than on weekdays in Canada, Sweden and the United States, while there was no significant difference in the other seven countries. For countries with two surveys, the likelihood of fathers' childcare participation was lower in the older survey in Canada, Finland and Italy, while there was no difference in Germany, Norway and Sweden.

In all countries but Norway and the United Kingdom, a high educational level compared to a low level positively affected fathers' childcare participation, the impact ranging from almost 5 % in Germany to 26 % in the United States. Even fathers with a medium educational level had a higher likelihood of childcare participation than their lesser-educated counterparts in five of the ten countries analysed (Canada, Finland, Italy, Sweden, United States).

The employment status of the female partner affected fathers' childcare participation in four countries only. In Sweden and the United States, the likelihood of participation was significantly increased if the partner was working part-time, in France, the Netherlands and Sweden if she was working full-time instead of not working.

A consistent positive correlation was found for fathers' participation in housework. Participation in housework increased the likelihood of childcare participation by about 17 % in Italy and by almost 30 % in the Netherlands. But contrary to the interpretation of the other variables, this finding might not reflect a causal relationship of housework participation affecting childcare participation. Firstly, the relationship can be spurious, if another factor (e.g., family-orientation) affects participation in both types of unpaid work positively, as suggested by economic and sociological theories. Secondly, it is likely that housework can be a result of childcare, as, for example, rooms in which children have played need to be tidied up.[10]

Finally, each additional child increased the likelihood of fathers participating in childcare by about 4 % in the United States.

If childcare participation were only an artifact, and non-participants did not differ in terms of socio-economic characteristics, time availability—best captured by the dummy "weekend"—would have been the sole predictor of fathers' participation. However, results from these estimates showed that the survey day falling on a weekend day had no influence on fathers' participation in childcare in seven of the ten countries, and affected it negatively in three of them. Even fathers' work status, which could also be interpreted as a time-availability indicator, had rather limited effects. Instead, firstly, the age of the youngest child was a strong predictor, indicating that fathers' participation depended on the overall amount of childcare needed by a child, as this declines with increasing age.

[10] Sensitivity analyses have shown that the exclusion of this variable does not change the qualitative effect of the other covariates.

Table 1 Probit estimates of fathers' participation in childcare

Dependent variable: childcare participation					
	CA ($N = 2,241$) (1992, 1998)	FI ($N = 1,344$) (1987, 1999)	FR ($N = 2,169$) (1998)	GE ($N = 3,915$) (1991, 2001)	IT ($N = 3,483$) (1989, 2001)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−0.269*** (0.026)	−0.320*** (0.032)	−0.235*** (0.025)	−0.271*** (0.021)	−0.147*** (0.022)
13–17	−0.551*** (0.018)	−0.500*** (0.025)	−0.371*** (0.022)	−0.541*** (0.019)	−0.307*** (0.022)
No. of children	0.019 (0.015)	0.007 (0.020)	0.001 (0.013)	−0.011 (0.012)	0.016 (0.013)
Father's age	0.021 (0.017)	−0.017 (0.022)	0.016 (0.016)	0.009 (0.014)	−0.003 (0.015)
Father's age squared	−0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)	−0.000 (0.000)	−0.000** (0.000)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	0.139*** (0.037)	0.121*** (0.038)	0.037 (0.033)	−0.045† (0.025)	0.115*** (0.024)
High	0.189*** (0.031)	0.141*** (0.041)	0.141*** (0.036)	0.046† (0.024)	0.195*** (0.036)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	0.224* (0.087)	0.038 (0.141)	−0.105 (0.067)	−0.009 (0.071)	0.033 (0.059)
Full-time	−0.169† (0.039)	−0.024 (0.067)	−0.098* (0.043)	−0.048 (0.038)	−0.027 (0.041)
Unknown work hours	0.124 (0.147)	0.020 (0.089)	−0.100* (0.045)	0.118 (0.011)	−0.066 (0.043)
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	−0.033 (0.035)	–	0.020 (0.031)	0.010 (0.021)	0.018 (0.035)
Full-time	0.021 (0.027)	–	0.058* (0.029)	0.011 (0.025)	0.038 (0.026)
Unknown work hours	–	0.018 (0.043)	0.034 (0.043)	0.044 (0.035)	0.008 (0.038)
Day of the week					
Weekday	Ref.	Ref.	Ref.	Ref.	Ref.
Weekend	−0.044† (0.026)	0.010 (0.033)	−0.011 (0.024)	0.004 (0.020)	0.003 (0.017)
Housework participation	0.227*** (0.023)	0.180*** (0.031)	0.193*** (0.022)	0.211*** (0.019)	0.166*** (0.018)
Time of the survey					
Wave 1	−0.055* (0.024)	−0.125** (0.042)	–	0.025 (0.022)	−0.101*** (0.028)
Wave 2	Ref.	Ref.	–	Ref.	Ref.
Pseudo R2	0.2106	0.2409	0.1681	0.1927	0.1401
	NL ($N = 426$) (2000, 2005)	NO ($N = 930$) (1990, 2000)	SW ($N = 1,164$) (1991, 2000)	UK ($N = 1,110$) (2000)	USA ($N = 3,500$) (2003)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−0.339*** (0.063)	−0.330*** (0.045)	−0.362*** (0.040)	−0.337*** (0.035)	−0.192*** (0.021)
13–17	−0.583*** (0.048)	−0.584*** (0.042)	−0.562*** (0.040)	−0.556*** (0.025)	−0.438*** (0.024)
No. of children	0.059 (0.037)	0.034 (0.026)	0.023 (0.021)	−0.007 (0.019)	0.035*** (0.011)
Father's age	−0.021 (0.047)	−0.030 (0.027)	0.002 (0.023)	0.022 (0.021)	0.032** (0.011)
Father's age squared	0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)	−0.000 (0.000)	−0.000** (0.000)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	0.051 (0.082)	−0.065 (0.065)	0.068† (0.040)	0.013 (0.040)	0.101** (0.033)
High	0.140† (0.079)	0.035 (0.068)	0.130** (0.041)	0.026 (0.045)	0.264*** (0.030)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.

Table 1 continued

	NL ($N = 426$) (2000, 2005)	NO ($N = 930$) (1990, 2000)	SW ($N = 1{,}164$) (1991, 2000)	UK ($N = 1{,}110$) (2000)	USA ($N = 3{,}500$) (2003)
Part-time	−0.059 (0.168)	−0.049 (0.119)	0.026 (0.115)	−0.015 (0.116)	−0.113† (0.060)
Full-time	−0.100 (0.107)	−0.131† (0.071)	0.008 (0.052)	−0.088 (0.063)	−0.067† (0.036)
Unknown work hours	–	–	–	–	–
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	0.038 (0.061)	0.032 (0.054)	0.106* (0.044)	0.031 (0.041)	0.081** (0.024)
Full-time	0.170† (0.094)	−0.045 (0.055)	0.078† (0.045)	−0.069 (0.045)	0.023 (0.021)
Unknown work hours	–	–	–	–	–
Day of the week					
Weekday	Ref.	Ref.	Ref.	Ref.	Ref.
Weekend	0.072 (0.062)	−0.048 (0.041)	−0.065* (0.032)	0.031 (0.033)	−0.113*** (0.018)
Housework participation	0.298*** (0.054)	0.260*** (0.044)	0.253*** (0.040)	0.245*** (0.035)	0.218*** (0.018)
Time of the survey					
Wave 1	–	0.001 (0.040)	−0.001 (0.034)	–	–
Wave 2	–	Ref.	Ref.	–	–
Pseudo R2	0.2578	0.2756	0.2284	0.2328	0.1487

Participation equation, marginal effects, standard errors in parentheses

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

No dummy indicating survey years for the Netherlands due to the small sample size

Secondly, the educational level had a strong effect in most countries, supporting the assumption that highly educated fathers were the forerunners of modern gender roles.

In the models presented above, all variables referred to differences between fathers. However, economic theories predicted that parents' allocation of time depends on resources relative to their partners'. Therefore, estimates have been carried out replacing father's work status and partner's work status by father's work status in relation to his partner's.[11] The following four categories were accounted for:

1. both not employed or part-time employment (reference)
2. father full-time or unknown work hours, partner not
3. partner full-time or unknown work hours, father not
4. both full-time or unknown work hours

Descriptive findings showed that there was a difference of up to 48 percentage points in fathers' childcare participation across these four categories. Fathers' participation was highest in category 1 or 3 in most countries, and lowest in category 4 in four of the ten countries. However, the multivariate results did not show significant differences in most countries, as seen from Table 2. In Canada, France and the United Kingdom, the likelihood of fathers' childcare participation was smaller if only the father worked full-time or had unknown work hours, but the partner not (i.e., she was employed part-time or not employed), compared to the reference category. British fathers were less inclined to participate in childcare if only the mother worked full-time or had unknown work hours. If both worked full-time or unknown work hours, the likelihood of fathers participating in childcare was significantly lower in Norway and the United Kingdom. Hence fathers' childcare participation was independent from their work status in relation to their spouses' in six of the ten countries analysed (Finland, Germany, Italy, the Netherlands, Sweden, the United States). This is in line with the assumption that time availability generally has a minor impact on fathers' childcare participation.

Several tests for the robustness of the results have been conducted for all countries. For Germany, as an example, the results of this sensitivity analysis for fathers' childcare participation are displayed in Table 7 in the Appendix. As the literature suggested that predictors of fathers' childcare time are different on weekdays than on weekend days (Maume 2011; Yeung et al. 2001), sensitivity analyses have been carried out, first using only diaries from weekdays and then only diaries from weekends. The results for all countries turned out to be very similar to the ones presented in Table 1. The only major

[11] Inclusion of all variables - father's work status, partner's work status, and interaction effects of both - was not possible in all countries due to perfect multicollinearity in some countries. In particular, the group of couples in which the partner works full-time or has unknown work hours, but the father not, was very small (Table 5).

Table 2 Probit estimates of fathers' participation in childcare—relative work status

Dependent variable: childcare participation											
	CA ($N = 2,241$) (1992, 1998)	FI ($N = 1,344$) (1987, 1999)	FR ($N = 2,169$) −1998	GE ($N = 3,915$) (1991, 2001)	IT ($N = 1,483$) (1989, 2001)	NL ($N = 426$) (2000, 2005)	NO ($N = 930$) (1990, 2000)	SW ($N = 1,164$) (1991, 2000)	UK ($N = 1,110$) (2000)	USA ($N = 3,500$) (2003)
Reference: both not employed or part−time employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Father full-time or unknown work hours, partner not	−0.083* (0.041)	−0.054 (0.068)	−0.079† 80.042)	−0.028 (0.041)	−0.000 (0.037)	−0.109 (0.110)	−0.106 (0.069)	−0.050 (0.080)	−0.105† (0.060)	0.014 (0.043)
Partner full-time or unknown work hours, father not	0.056 (0.068)	−0.059 (0.098)	0.010 (0.075)	0.043 (0.064)	0.121 (0.089)	0.046 (0.158)	−0.057 (0.112)	−0.080 (0.145)	−0.197† (0.096)	0.063 (0.056)
Both full-time or unknown work hours	−0.055 (0.043)	−0.025 (0.070)	−0.342 (0.437)	−0.015 (0.043)	0.020 (0.032)	−0.022 (0.145)	−0.162* (0.072)	−0.042 (0.083)	−0.173** (0.060)	−0.006 (0.043)
Pseudeo R2	0.2102	0.2459	0.1672	0.1929	0.1403	0.2550	0.2706	0.2224	0.2302	0.1462

Participation equation, marginal effects, standard errors in parentheses

Control variables: age of the youngest child, no. of children, father's age, after's age squared, educational level, day of the week, housework participation, time of survey. No dummy indicating survey years for the Netherlands due to the small sample size

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

difference was that the negative effect of the fathers' work status was slightly more pronounced in the regressions from weekday diaries, and vanished for weekend dairies, concluding that time availability only played a role for fathers' childcare participation on weekdays in some of the countries analysed. In addition, for those countries for which two or more diary days are available, fathers' average childcare participation per day in this time span had been analysed as well, with negligible differences in the results compared to the analysis based on 24-h diaries presented above.

For countries for which two surveys were available, one around 1990 and another around the year 2000, fathers' childcare participation was estimated for each survey separately.[12] The results for the earlier surveys were largely the same as those of the newer surveys, but two points are worth reporting. Firstly, the number of children was nonsignificant in Canada in 1992 and in Italy in 1989, but had a positive impact in both countries in the more recent surveys. Secondly, in four countries (Finland, Germany, Italy, Sweden) the educational level had a strong effect on fathers' participation in childcare in the earlier survey, but not in the more recent survey.

Time for Childcare

The results for the predictors of fathers' minutes spent on childcare per day are displayed in Table 3. For all countries, a consistent positive effect on fathers' childcare time was the "weekend." On weekends, fathers spent between 11 min (Italy) and 30 min (Netherlands) more with their children than on weekdays. A positive correlation was also found for the number of housework minutes in seven countries. Again, I refrain from interpreting this as a true causal relationship.

The number of children had a significant and positive impact only in Norway, but a negative impact in Germany. Mixed effects were also found for the survey year. In Finland, Germany and Italy, fathers' childcare time was significantly lower around 1990 than at the turn of the millennium. In Norway and Sweden, in contrast, participating fathers spent significantly more time with their children in the earlier than in the later survey. No significant difference between the surveys was found in Canada.

Contrary to the expectations derived from the results of studies that include participating and non-participating fathers in the minute estimation, the level of education did not have a universal impact on fathers' childcare time. Only in Italy and Norway did fathers with a medium level of education spend significantly more time with their children than those with low education. And in Canada,

[12] These estimates have been carried out for Canada, Finland, Germany, Italy, Norway and Sweden, but not for the Netherlands due to the small sample size.

Table 3 GLM estimates of participating fathers' minutes of childcare

Dependent variable: minutes of childcare					
	CA ($N = 1{,}113$) (1992, 1998)	FI ($N = 577$) (1987, 1999)	FR ($N = 789$) (1998)	G ($N = 2{,}027$) (1991, 2001)	IT ($N = 1{,}224$) (1989, 2001)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−29.39*** (4.78)	−36.24*** (5.35)	−16.16*** (4.36)	−21.79*** (2.89)	−12.12** (4.30)
13–17	−43.04 (11.54)	−49.57*** (7.69)	−19.72** (7.52)	−29.34*** (4.00)	−32.1*** (5.60)
No. of children	3.16 (2.71)	−2.85 (2.60)	−1.03 (2.07)	−3.12† (1.52)	3.21 (2.45)
Father's age	−2.56 (3.04)	6.59* (3.04)	−0.83 (2.99)	1.56 (2.00)	−3.24 (3.04)
Father's age squared	0.04 (0.04)	−0.09* (0.04)	0.01 (0.04)	−0.02 (0.02)	0.03 (0.04)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	4.14 (6.79)	7.18 (4.84)	8.07 (6.08)	0.26 (3.33)	9.62* (4.07)
High	11.40† (09.05)	3.43 (5.67)	13.42* (5.44)	−0.86 (3.05)	23.79*** (6.65)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	−11.14 (15.40)	1.66 (23.34)	−26.90* (14.38)	−7.55 (11.22)	8.26 (12.24)
Full-time	−19.82† (7.96)	−11.08 (11.94)	−24.72** (8.54)	−15.87* (6.75)	−2.40 (8.07)
Unknown work hours	−0.59 (26.86)	−12.42 (13.81)	−30.81*** (9.32)	−27.76† (14.82)	−13.36 (8.71)
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	−3.00 (6.38)	–	−8.03 (5.10)	−0.82 (2.79)	−10.26† (5.91)
Full-time	−2.16 (4.72)	–	−2.57 (4.79)	−0.85 (3.39)	−3.72 (4.86)
Unknown work hours	–	0.48 (5.68)	−11.78† (5.89)	−0.03 (5.10)	−2.95 (6.75)
Day of the week					
Weekday	Ref.	Ref.	Ref.	Ref.	Ref.
Weekend	26.52*** (5.74)	20.13*** (5.83)	18.77*** (4.85)	19.06*** (3.35)	11.03*** (3.16)
Housework minutes	0.13*** (0.04)	0.10† (0.06)	0.12** (0.04)	0.15*** (0.03)	0.06 (0.04)
Time of the survey					
Wave 1	−0.82 (4.22)	−11.50† (6.58)	–	−11.24*** (3.74)	−9.32† (4.82)
Wave 2	Ref.	Ref.	–	Ref.	Ref.
Constant	138.54* (78.68)	−28.88 (56.72)	103.12† (57.86)	66.57† (39.02)	149.72** (60.94)

Table 3 continued

	NL ($N = 222$) (2000, 2005)	NO ($N = 517$) (1990, 2000)	SW ($N = 693$) (1991, 2000)	UK ($N = 506$) (2000)	USA ($N = 1{,}861$) (2003)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−28.06** (9.89)	−24.68*** (6.65)	−22.59*** (6.31)	−36.65*** (7.25)	−36.69*** (5.29)
13–17	−10.47 (21.08)	−35.58*** (10.94)	−28.21** (9.00)	−35.58* (15.15)	−73.39*** (8.34)
No. of children	6.87 (5.22)	5.77† (3.18)	3.79 (2.93)	−2.20 (2.92)	2.38 (2.67)
Father's age	2.70 (5.71)	−0.10 (3.46)	1.13 (3.27)	0.22 (4.28)	1.82 (2.82)
Father's age squared	−0.04 (0.07)	−0.01 (0.04)	−0.02 (0.04)	0.00 (0.05)	−0.01 (0.04)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	6.09 (10.68)	12.43† (7.50)	6.05 (5.87)	2.02 (7.06)	9.08 (8.86)
High	9.78 (10.72)	13.43* (8.37)	8.12 (6.58)	13.79 (8.66)	8.95 (8.44)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	23.96 (26.64)	1.72 (17.45)	−1.67 (18.72)	−34.49 (23.77)	−26.43 (16.56)
Full-time	−2.11 (15.92)	−19.63 (11.26)	−6.80 (8.66)	−50.00*** (15.77)	−31.86** (11.12)
Unknown work hours	–	–	–	–	–
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	7.14 (8.17)	−6.97 (7.09)	−9.05 (7.71)	1.47 (7.69)	1.00 (5.85)
Full-time	−2.01 (12.39)	−3.87 (7.30)	−4.43 (7.88)	6.10 (8.69)	4.13 (5.23)
Unknown work hours	–	–	–	–	–
Day of the week					
Weekday	Ref.	Ref.	Ref.	Ref.	Ref.
Weekend	29.93*** (9.92)	14.08* (6.12)	19.07*** (5.47)	19.54*** (7.32)	29.65*** (4.73)
Housework minutes	0.31*** (0.11)	0.12* (0.05)	0.11* (0.05)	0.02 (0.04)	−0.01 (0.02)
Time of the survey					
Wave 1	–	13.55** (5.36)	8.82† (5.08)	–	–
Wave 2	–	Ref.	Ref.	–	–
Constant	−2.60 (113.86)	82.88 (65.32)	44.36 (64.50)	129.89 (81.87)	77.36 (56.23)

Beta-coefficients, standard errors in parentheses

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

France, Italy and Norway did fathers with high levels of education spend significantly more time with their children than their lesser-educated counterparts. The impact ranged between 11 min in Canada and 24 min in Italy. In other words, the father's educational level did not have an effect on childcare time in Finland, Germany, the Netherlands, Sweden, the United Kingdom and the United States.

Full-time employment and employment with unknown work hours seemed to be major obstacles for spending time with children in several countries. Full-time employment instead of no employment reduced childcare time in Canada (−20 min), France (−25 min), Germany (−16 min), the United Kingdom (−50 min) and the United States (−32 min). Unknown work hours had a negative impact on fathers' childcare time in France and Germany, but not in Canada, Finland and Italy (this category is missing in the Netherlands, Norway, Sweden, the United Kingdom and United States). The female partners' employment status did not have an effect on fathers' childcare time in any of the countries analysed but Italy: Here, fathers spent about 10 min less on childcare if the mothers were part-time employed instead of not employed.

Again, models were re-estimated to include father's work status in relation to his partner's. Descriptive comparisons showed that the differences between father's average childcare minutes across the four categories lay between 13 and 47 min. The average number of childcare minutes was highest in category 1 (both not employed or part-time employed) in seven countries, and highest in category 3 (partner full-time or unknown work hours, father not) in three other countries. The values were lowest in category 4 (both full-time or unknown work hours) or 2 (father full-time or unknown work hours, partner not) in seven of the ten countries. Thus, significant differences among these categories for the prediction of fathers' childcare time were expected. The findings from the regressions are presented in Table 4. Contrary to the results for childcare participation, the relative work status mattered for fathers' childcare time in all countries but Italy, Norway and Sweden. In five countries, fathers' minutes spent on childcare were significantly lower for couples in which only the father had a full-time job or had unknown work hours, compared to couples in which both worked part-time or did not work at all. Finnish fathers reported significantly more childcare minutes only if their partners worked full-time or had unknown work hours. Results were not significant in the other countries.[13] If either parents worked full-time or had unknown work hours, fathers' childcare minutes were significantly lower in five

Table 4 GLM estimates of participating fathers' minutes of childcare—relative work status

Dependent variable: minutes of childcare											
	CA ($N = 1{,}113$) (1992, 1998)	FI ($N = 577$) (1987, 1999)	FR ($N = 789$) −1998	GE ($N = 2{,}027$) (1991, 2001)	IT ($N = 1{,}224$) (1989, 2001)	NL ($N = 426$) (2000, 2005)	NO ($N = 578$) (1990, 2000)	SW ($N = 697$) (1991, 2000)	UK ($N = 513$) (2000)	USA ($N = 1{,}861$) (2003)
Reference: both not employed or part-time employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Father full-time or unknown work hours, partner not	−11.90	8.68	−16.76†	−0.22*	−9.60	−25.58	−24.05*	−13.26	−43.59***	−30.44*
	(7.62)	(8.90)	(8.21)	(0.09)	(7.70)	(19.07)	(10.85)	(13.41)	(12.91)	(13.72)
Partner full-time or unknown work hours, father not	21.27	36.08*	12.36	−0.05	−14.92	−31.49	−5.25	−8.03	−30.87	5.05
	(14.27)	(19.13)	(17.24)	(11.52)	(12.94)	(24.52)	(17.30)	(23.33)	(26.27)	(17.00)
Both full-time or unknown work hours	−12.84†	6.41	−18.45**	−0.21*	−8.47	−31.49	−21.97†	−10.69	−37.57**	−26.98
	(7.80)	(9.11)	(8.34)	(0.10)	(6.85)	(24.52)	(11.62)	(13.77)	(13.78)	(13.70)

Beta-coefficients, standard errors in parentheses

Control variables: age of the youngest child, no. of children, father's age, after's age squared, educational level, day of the week, housework participation, time of survey. No dummy indicating survey years for the Netherlands due to the small sample siz

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

[13] Apart from content-related reasons, this could also be caused by the low share of couples in this category which ranges between 2% and 7% (Table 5 in Appendix).

countries: Canada, France, Germany, Norway and the United Kingdom. In sum, parents' relative work status did matter for fathers' childcare time in seven of the ten countries analysed.

Sensitivity analyses on the robustness of the results have been conducted for all countries, with regard to the sample as well as the type of model chosen. The results for Germany as an example are displayed in Tables 8 and 9 in the Appendix. Across the ten countries analysed, the day of the week had a major influence on fathers' childcare time, it is worth analysing predictors separately for weekdays and weekends. Results showed a similar pattern on weekdays and weekend days. Small differences led to conclude that fathers' employment status mattered more on weekdays than weekend days, and that the positive correlation between childcare time and housework time was stronger on weekdays than weekend days. One interpretation for the latter finding could be that fathers who spent a comparatively large amount of time with their children during the week were generally more inclined to do unpaid work at home, while fathers who were generally less involved in household chores used the spare time on the weekend to spend some of it with their children.

Next, the comparison of the results for the average number of childcare minutes of all diary days from the countries where between 2 and 7 days were available did not reveal noticeable deviations from the results of the main model presented above. In other words, the results held even if more than 1 day (and up to 7 days) in the fathers' lives was observed.

In addition, for the six countries with two surveys and a sufficient sample size, it has been explored whether predictors of fathers' childcare minutes differed between two points in time in the same country. Similar to the results for fathers' childcare participation, the impact of the number of children had changed in Canada and Finland, from not significant in the first survey to a positive effect in the second survey. The impact of the educational level changed from not significant to positively significant in Canada and Norway, while education seemed to have lost importance for participating fathers' minutes of childcare in Italy. The negative impact of the work status on fathers' childcare minutes seemed to have become stronger in Canada, Norway and Germany from the first to the second survey. In conclusion, predictors for fathers' childcare minutes differed somewhat between points in time in several countries.

Then, the robustness of the results was checked against several model specifications. The main model was a gamma model for a right skewed distribution of the dependent variable that takes only positive values. This was compared to the OLS model, estimated as glm with the Gaussian family and the identity link. Moreover, it was compared to the OLS model for the natural log of the number of childcare minutes, because with this transformation the OLS assumptions of normal distribution and homogenous variance of the error terms was fulfilled. Finally, it was checked whether the combination of the gamma distribution and the log link function reveals similar results. All four models yielded qualitatively very similar results. In other words, the results presented in Table 3 are robust across several model specifications for fathers' minutes of childcare.

Conclusion

This paper deals with the differences between fathers' participation in childcare, defined as zero minutes of childcare on the survey day, and the amount of time participating fathers spent with their children, measured in minutes on the survey day. It was expected that predictors of participation would differ from predictors of participants' childcare time, because a recent article by Pacholok and Gauthier (2010) suggested that some of the fathers not participating in childcare on the diary day were generally uninvolved in childcare. Cross-country descriptive and multivariate analyses were conducted for fathers' childcare participation and participating fathers' minutes of childcare. Therefore, this article contributes to the empirical literature on fathers' involvement in childcare and promotes the discussion about appropriate target variables in empirical research. Moreover, the cross-national scope highlighted differences as well as similarities regarding the two different childcare measurements. In addition, changes over time have been accounted for. Time-use data from the Multinational Time Use Survey featuring surveys from ten industrialised countries from the last 25 years were used to test the hypotheses.

Descriptive analysis revealed that childcare participation and amount of time spent varied considerably between countries and survey years. As expected, in the majority of countries with two surveys at different points in time, participation and the number of minutes had increased. Moreover, countries exhibiting high participation rates did not necessarily show a large average number of minutes. The hypothesis that social democratic welfare states exhibit highest participation rates and average number of minutes was not fully supported. The share of participating fathers was highest in Sweden and Norway, medium in liberal welfare states and the Netherlands, and low in conservative countries as well as Finland. Broadly speaking, the average number of minutes of participating fathers was found to be highest in liberal welfare states, medium in social democratic states and the Netherlands, and medium to low in conservative states.

Regression results showed that, firstly, predictors for both dependent variables differed between *countries*. For example, with regards to fathers' participation in childcare, the female partners' full-time employment (reference "no employment") had a positive impact only in three of the ten countries analysed. Regarding participating fathers' childcare time, the number of children had a positive impact in the United States, but not in the other countries.

Secondly, the impact of certain variables varied *over time*, as sensitivity analysis revealed. Regarding participation, the importance of the number of children seemed to have become stronger, while the importance of the educational level seemed to diminish over time in several countries. As to participants' childcare minutes, the impact of the number of children, the work status, and the educational level had a stronger impact in the recent than in the earlier survey.

Most importantly, while the age of the youngest child affected both participation and participants' minutes of childcare, other *predictors of fathers' childcare participation differed from predictors of participating fathers' childcare minutes*. Results for the regression of fathers' participation in childcare showed that, instead of variables indicating time availability (weekday/weekend day, work status, partner's work status, relative work status), the age of the youngest child, the fathers' educational level, and his participation in housework were the main predictors. For this last variable, however, there are reasons for not interpreting this as a causal relationship. For example, a fathers' general family-orientation could influence the dedication in both childcare and housework. Interpreting the effect of the youngest child's age, fathers' participation was affected by the total time children need care, which decreased as children become older. Concerning the strong impact of the educational level, several reasons might account for this finding, e.g., highly educated fathers might be more aware of the positive impact of fathers' (and mothers') time with their children. This effect could also be interpreted as the prevalence of modern gender roles among highly educated fathers (Blossfeld and Drobnič 2001). The negative effect of the youngest child's age and the positive effect of the educational level were in line with the results of Pacholok and Gauthier (2010).

Regarding participating fathers' time with their children, time availability seemed to play a major role, as participants spent much more time with their children on weekend days than on weekdays. In addition, the employment status had an effect in several countries, also in comparison to their partners'. Given that the relative employment status reflects relative wages, the results supported the bargaining theory but not Becker's approach, as the relative work status had an effect on more or less childcare time, not on participation in childcare. The impact of the day of the week and the employment status was consistent with the findings of other studies using Tobit models to assess (participating and non-participating) fathers' childcare time. However, the current analysis showed that the educational level did not have a major effect, in contrast to what these models suggested.

To sum up, apart from the negative effect of the youngest child's age, predictors for fathers' childcare participation and minutes were mostly not the same. Thus, the hypothesis that some non-participants are generally not involved in childcare, and that they differ from participants with regard to socio-economic characteristics (here, the educational level in particular), was supported. While both fathers' participation and amount of time depended on the children's needs, I conclude that participating in childcare is primarily driven by the educational level, whereas the amount of time they spend with their children depends on time restrictions primarily set by their work hours. Consequently, these findings call for caution regarding the results of existing studies not distinguishing participation in childcare from participating fathers' childcare minutes.

Regarding practical applications, while an increase in fathers' participation rates can be interpreted as a sign indicating higher gender similarity in unpaid work, it remains unclear whether a decrease in their childcare time is a step backwards or is a result of the extension of public childcare facilities, school days and extracurricular activities among children. For example, in Norway and Sweden fathers were found to spend less time with their children around 2000 than around 1990, and at the same time, all-day public childcare facilities expanded in these countries. As children and parents (as well as the economy as a whole) would probably profit most if both parents take part in childcare but also participate in the labour market, that is, if they follow a dual-earner/dual-carer strategy, the assumption "the more, the better" childcare no longer holds, because this might not reflect a balance between childcare and paid work. In this sense, participation is probably superior to the number of minutes. Another indicator would be fathers' childcare time relative to their partners' childcare time. Hall and MacDermid (2009) showed that, among dual-earner couples, fathers' childcare time in relation to their partners' varied considerably across the five types of dual-earner couples they identified.

Furthermore, the variable "participation in childcare" as indicator of "father's involvement" is worth discussing. The present analysis suggests that there are indeed fathers who are not involved in childcare, and who differ from involved fathers in terms of socio-demographic characteristics. However, a major shortcoming of this analysis is that the data at hand are limited to primary activities, and childcare is the only variable available related to time with or for children. Thus, fathers not participating in childcare

(as accounted for in the data) could still be involved with their children (Folbre and Yoon 2007; Monna and Gauthier 2008; Moro-Egido 2012). Firstly, childcare can be a secondary (or passive) activity. For instance, parents can go shopping and drop their children off at a friend's house on the way, or mow the lawn while looking after them playing in the yard. Secondly, parents do certain activities for children without the children being present. For example, they attend parent-teacher conferences and buy birthday presents. Thirdly, a parent can be responsible for a child even if the child is not directly present, for example, when the parent watches TV and the child is sleeping in another room. Consequently, more research on participation and participants' amount of time as dependent variables for different definitions of father-child time could allow deeper insights into the topic of fathers' involvement with their children. Moreover, the range of independent variables as possible predictors of childcare in the MTUS data of the countries under study was limited. It would be interesting to explore the effect of further factors (e.g., income, children's sex, partner's childcare participation and minutes) on fathers' childcare participation and minutes. In sum, both the dependent variables and the independent variables used in this study have their limitations, giving rise to avenues for further research.

On the whole, researchers and policy makers have to bear in mind that parents' engagement with their children can be measured in many different ways. This knowledge is important for the identification of the most appropriate indicator for the particular background in which they would like to use it.

Appendix

For Appendix see Tables 5, 6, 7, 8, and 9.

Table 5 Summary statistics, range of all countries, all fathers

	Mean		Std. dev.		Min.	Max.
	Min.	Max.	Min.	Max.		
Childcare participation	0.35 (IT)	0.60 (SW)	0.49 (SW)	0.5	0	1
Childcare minutes	24.25 (FR)	57.27 (US)	48.07 (FR)	93.50 (US)	0	870 (US)
Age of the youngest child 0–4	0.19 (IT)	0.55 (SW)	0.39 (IT)	0.50 (CA, NO, SW, US)	0	1
Age of the youngest child 5–12	0.27 (SW)	0.55 (IT)	0.45 (SW)	0.50 (IT)	0	1
Age of the youngest child 13–17	0.15 (CA, US)	0.26 (IT)	0.36 (CA, US)	0.44 (IT)	0	1
No. of children	1.63 (IT)	1.97 (US)	0.95 (US)	0.81 (GE)	1	10 (FR)
Father's age	37.72 (CA)	41.56 (IT)	6.43 (NL)	7.54 (US)	20	55
Father's age squared	1,470 (CA)	1,769 (IT)	400 (FR)	598 (UK)	400	3,025
Educational level: low	0.10 (NO, US)	0.58 (FI)	0.30 (NO, US)	0.49 (FI, IT)	0	1
Educational level: medium	0.23 (CA, FI)	0.56 (NO)	0.42 (CA, FI)	0.50 (FR, IT, NO, SW)	0	1
Educational level: high	0.09 (IT)	0.64 (US)	0.28 (IT)	0.50 (NL)	0	1
Father's work: not working	0.04 (SW)	0.11 (CA)	0.20 (SW)	0.31 (CA)	0	1
Father's work: part-time	0.02 (FI, FR, CA, GE)	0.04 (IT, NL, NO)	0.13 (CA, FI)	0.20 (IT, NL, NO)	0	1
Father's work: full-time	0.74 (FR)	0.91 (GE)	0.28 (GE)	0.44 (FR)	0	1
Father's work: unknown work hours	0.00 (NO, UK, US)	0.15 (FR, IT)	0.00 (NO, UK, US)	0.36 (FR, IT)	0	1
Partner's work: not working	0.18 (SW)	0.42 (CA)	0.39 (SW)	0.49 (CA)	0	0
Partner's work: part-time	0.00 (FI)	0.52 (NL)	0.00 (FI)	0.50 (NL)	0	1
Partner's work: full-time	0.00 (FI)	0.57 (IT)	0.00 (FI)	0.50 (IT, US)	0	1
Partner's work: unknown work hours	0.00 (NO, UK, US)	0.83 (FI)	0.00 (UK, US)	0.37 (FI)	0	1
Both not employed or part-time employed	0.04 (FI)	0.12 (CA, UK)	0.20 (FI)	0.33 (CA, UK)	0	1
Father full-time or unknown work hours, partner not	0.29 (FI, IT)	0.79 (NL)	0.41 (NL)	0.50 (CA, FR, SW, US)	0	1
Partner full-time or unknown work hours, father not	0.01 (IT)	0.05 (NL, US)	0.11 (IT)	0.23 (NL)	0	1

Table 5 continued

	Mean		Std. dev.		Min.	Max.
	Min.	Max.	Min.	Max.		
Both full-time or unknown work hours	0.09 (NL)	0.63 (FI)	0.28 (NL)	0.49 (FR, IT, SW)	0	1
Weekend	0.28 (FR)	0.51 (US)	0.41 (SW, UK)	0.54 (NO)	0	1
Housework participation	0.39 (IT)	0.79 (SW)	0.42 (NO)	0.50 (FR, US)	0	1
Minutes of housework	23.94 (IT)	60.72 (UK)	47.94 (NL)	89.95 (US)	0	800 (US)
Older survey	0.43 (NO)	0.62 (FI)	0.49 (NO)	0.5 (IT, SW)	0	1

Definition of the variables: childcare participation: 0 min = no = 0, >0 min = yes = 1; childcare minutes: minutes of childcare (MTUS activity code ac11) on the survey day); age of the youngest child: 0–4 years, 5–12 years, 13–17 years; number of children; number of children under the age of 18 in the family; father's age: age of the father in years; father's age squared: square of the age of the father; educational level: low (below ISCED 3), medium: (ISCED 3 or 4), high (ISCED 5 or higher); father's employment = fathers general work status: full-time employment, part-time employment, unknown work hours, not employed partner's employment = female partner's general work status: full-time employment, part-time employment, unknown work hours not employed; weekend: survey on a weekday (=0) or weekend day (=1); housework participation: Participation in housework (MTUS activity codes av6 and av7) on the survey day, 0 min = no = 0, > 0 min = yes = 1; minutes of housework: minutes of housework (MTUS activity codes av6 and av7) on the survey day; time of the survey: dummy for 1st (earlier) survey if 2 surveys are available

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

Table 6 Summary statistics, range of all countries, participating fathers

	Mean		Std. dev.		Min.	Max.
	Min.	Max.	Min.	Max.		
Childcare minutes	66.05 (GE)	104.46 (US)	59.39 (FR)	105.23 (US)	0	870 (US)
Age of the youngest child 0–4	0.32 (IT)	0.74 (SW)	0.44 (SW)	0.50 (GE, US)	0	1
Age of the youngest child 5–12	0.20 (SW)	0.59 (IT)	0.40 (SW)	0.49 (IT)	0	1
Age of the youngest child 13–17	0.02 (CA)	0.10 (IT)	0.15 (CA)	0.30 (IT)	0	1
No. of children	1.72 (IT)	2.05 (NL, US)	0.68 (IT)	0.96 (UK)	1	10 (FR)
Father's age	35.80(CA)	39.57(IT)	5.96(NL)	7.14(US)	20	55
Father's age squared	1,321 (CA)	1,602 (IT)	461 (CA)	513 (SW)	400	3,025
Educational level: low	0.07 (US)	0.49 (FI)	0.25 (US)	0.50 (FI)	0	1
Educational level: medium	0.21 (US)	0.62 (IT)	0.41 (US)	0.50 (FR, UK)	0	1
Educational level: high	0.12 (IT)	0.72 (US)	0.32 (IT)	0.50 (NL)	0	1
Father's work: not working	0.05 (IT, SW)	0.12 (CA)	0.21 (IT)	0.32 (CA)	0	1
Father's work: part-time	0.02 (CA, FI, FR, SW)	0.05 (NL, NO)	0.14 (FI)	0.23 (NL)	0	1
Father's work: full-time	0.75 (IT)	0.91 (GE)	0.29 (GE)	0.43 (FR)	0	1
Father's work: unknown work hours	0.00 (NL NO, UK, US)	0.16 (IT)	0.00 (NO, UK, US)	0.37 (IT)	0	1
Partner's work: not working	0.20 (SW)	0.44 (CA)	0.42 (NO)	0.50 (CA)	0	0
Partner's work: part-time	0.00 (FI)	0.54 (NL)	0.00 (FI)	0.50 (NL, NO, SW)	0	1
Partner's work: full-time	0.00 (FI)	0.53 (IT)	0.00 (FI)	0.50 (IT)	0	1
Partner's work: unknown work hours	0.00 (NO, UK, US)	0.79 (FI)	0.00 (UK, US)	0.41 (FI)	0	1
Both not employed or part-time employed	0.05 (FI, GE, US)	0.14 (UK)	0.21 (US)	0.35 (UK)	0	1
Father full-time or unknown work hours, partner not	0.32 (FI)	0.77 (NL)	0.42 (NL)	0.50 (CA, FR, US)	0	1
Partner full-time or unknown work hours, father not	0.02 (IT, SW, UK)	0.07 (NL)	0.13 (IT)	0.25 (NL)	0	1
Both full-time or unknown work hours	0.09 (NL)	0.59 (FI)	0.29 (NL)	0.49 (FI, FR, IT)	0	1

Table 6 continued

	Mean		Std. dev.		Min.	Max.
	Min.	Max.	Min.	Max.		
Weekend	0.28 (FR)	0.52 (UK)	0.45 (CA, FR)	0.50 (IT, SW, UK, US)	0	1
Housework participation	0.53 (IT)	0.84 (UK)	0.37 (NO)	0.50 (IT)	0	1
Minutes of housework	29.50 (IT)	74.34 (UK)	49.20 (NL)	85.23 (UK)	0	800
Older survey	0.39 (IT)	0.60 (FI, GE)	0.49	0.49 (FI, GE, IT, NO, SW)	0	1

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

Table 7 Sensitivity analysis of fathers' participation in childcare in Germany

Dependent variable: childcare participation	1991 ($N = 2,245$)	2001 ($N = 1,670$)	Participation on 2 days ($N = 3,915$)	Weekdays ($N = 2,769$)	Weekend days ($N = 1,146$)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−0.238*** (0.028)	−0.317*** (0.034)	−0.265*** (0.022)	−0.259*** (0.025)	−0.308*** (0.040)
13–17	−0.505*** (0.027)	−0.575*** (0.026)	−0.625*** (0.022)	−0.533*** (0.022)	−0.571*** (0.034)
No. of children	0.006 (0.015)	−0.031 (0.020)	−0.027* (0.011)	−0.017 (0.014)	0.012 (0.023)
Father's age	0.021 (0.017)	−0.000 (0.000)	0.019 (0.013)	0.015 (0.016)	−0.002 (0.028)
Father's age squared	−0.000 (0.000)	0.000 (0.000)	−0.000† (0.000)	−0.000 (0.000)	−0.000 (0.000)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	−0.055† (0.030)	−0.056 (0.057)	−0.006 (0.023)	−0.038 (0.025)	−0.061 (0.048)
High	0.057* (0.027)	0.016 (0.057)	0.071*** (0.021)	0.062* (0.028)	−0.004 (0.047)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	−0.150 (0.104)	0.086 (0.095)	0.029 (0.063)	−0.066 (0.084)	0.092 (0.024)
Full-time	−0.081 (0.052)	−0.012 (0.057)	0.004 (0.035)	−0.131** (0.046)	0.114† (0.068)
Unknown work hours	–	0.153 (0.118)	0.161† (0.071)	0.077 (0.155)	0.222 (0.143)
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	0.011 (0. 028)	0.011 (0.034)	−0.004 (0.020)	0.008 (0.025)	0.023 (0.041)
Full-time	0.020 (0.031)	0.030 (0.043)	−0.021 (0.023)	0.022 (0.029)	−0.052 (0.059)
Unknown work hours	–	0.051 (0.039)	0.016 (0.032)	0.107* (0.043)	0.018 (0.024)
Day of the week					
Weekday	Ref.	Ref.	Ref.	Ref.	Ref.
Weekend	0.036 (0.027)	−0.025 (0.028)	−0.004 (0.018)	0.004 (0.020)	−0.000 (0.011)
Housework participation	0.223*** (0.024)	0.195*** (0.028)	0.1717*** (0.018)	0.197*** (0.021)	0.246*** (0.038)
Time of the survey					
Wave 1	–	–	−0.057** (0.020)	0.028 (0.027)	0.017 (0.040)
Wave 2	–	–	Ref.	Ref.	Ref.
Pseudo R2	0.2024	0.1825	0.2334	0.1850	0.2269

Probit model, marginal effects, standard errors in parentheses

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8 Sensitivity analysis of participating fathers' minutes of childcare in Germany

Dependent variable: minutes of childcare					
	1991 ($N = 1{,}214$)	2001 ($N = 808$)	Minutes on 2 days ($N = 2{,}021$)	Weekdays ($N = 1{,}415$)	Weekend days ($N = 607$)
Age of the youngest child					
0–4	Ref.	Ref.	Ref.	Ref.	Ref.
5–12	−20.46*** (3.60)	−22.55*** (5.23)	−27.49*** (2.33)	−15.77*** (3.07)	−52.30*** (6.53)
13–17	−28.08*** (4.94)	−30.82*** (7.43)	−38.55*** (2.92)	−25.06*** (4.23)	−47.62*** (8.96)
No. of children	−2.45 (2.06)	−3.79 (3.61)	−2.74* (1.09)	−3.84* (1.58)	4.93 (3.66)
Father's age	0.72 (2.57)	3.13 (4.37)	1.90 (1.48)	1.38 (2.24)	3.11 (4.28)
Father's age squared	−0.01 (0.03)	−0.04 (0.05)	−0.03† (0.02)	−0.02 (0.03)	−0.05 (0.05)
Educational level					
Low	Ref.	Ref.	Ref.	Ref.	Ref.
Medium	2.88 (4.22)	−5.54 (8.94)	−0.48 (3.30)	4.40 (3.79)	−6.95 (7.05)
High	−1.93 (3.54)	−2.57 (8.81)	1.92 (2.26)	−0.10 (3.27)	4.08 (6.65)
Father's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	6.13 (16.39)	−24.93 (16.54)	−1.07 (9.81)	−17.62 (11.98)	46.00 (29.43)
Full-time	−6.29 (7.96)	−32.14** (11.93)	−19.85*** (5.27)	−21.20** (8.85)	11.41 (7.72)
Unknown work hours	–	−39.47* (16.93)	−18.52 (11.82)	−25.62 (21.38)	−11.12 (16.26)
Partner's employment					
Not employed	Ref.	Ref.	Ref.	Ref.	Ref.
Part-time	0.32 (3.54)	−2.06 (5.01)	−1.73 (2.06)	−2.59 (3.05)	15.23** (5.85)
Full-time	0.69 (4.16)	−0.19 (6.63)	−3.26 (4.42)	−0.32 (3.76)	0.73 (6.53)
Unknown work hours	–	0.35 (5.59)	−4.65 (3.92)	−4.51 (5.74)	21.95* (10.70)
Day of the week					
Weekday	Ref.	Ref.	Ref.	–	–
Weekend	20.86*** (4.77)	17.51*** (4.62)	4.14* (2.07)	–	–
Housework minutes	0.19*** (0.47)	0.11* (0.05)	0.10*** (0.02)	0.16*** (0.04)	0.11* (0.05)
Time of the survey					
Wave 1	–	–	−7.68*** (2.31)	−10.87** (3.72)	−18.80** (5.76)
Wave 2	–	–	–	Ref.	Ref.
Constant	61.54 (58.74)	59.43 (90.60)	66.01* (29.11)	71.73 (44.17)	36.73 (86.06)

Generalised linear model, beta-coefficients, standard errors in parentheses

Significance levels: $^{\dagger}p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations

Table 9 Sensitivity analysis of participating fathers' minutes of childcare in Germany

	Family: gamma, link: identity	Family: Gaussian, link: identity	Family: gamma, link: log	Family: Gaussian, link: log
	Dependent variable: minutes of childcare		Dependent variable: log of minutes	
Age of the youngest child				
0–4	Ref.	Ref.	Ref.	Ref.
5–12	−21.79*** (2.89)	−26.82*** (3.13)	−0.40*** (0.05)	−0.44*** (0.05)
13–17	−29.34*** (4.00)	−35.27*** (4.53)	−0.61*** (0.09)	−0.61*** (0.12)
No. of children	−3.12† (1.52)	−3.31* (1.57)	−0.04 (0.03)	−0.04 (0.03)
Father's age	1.56 (2.00)	2.94 (1.91)	0.03 (0.03)	0.05 (0.03)
Father's age squared	−0.02 (0.02)	−0.04 (0.02)	−0.00 (0.00)	−0.00 (0.00)

Table 9 continued

	Family: gamma, link: identity	Family: Gaussian, link: identity	Family: gamma, link: log	Family: Gaussian, link: log
	Dependent variable: minutes of childcare		Dependent variable: log of minutes	
Educational level				
Low	Ref.	Ref.	Ref.	Ref.
Medium	0.26 (3.33)	−1.40 (3.73)	0.00 (0.06)	0.04 (0.06)
High	−0.86 (3.05)	3.66 (3.43)	0.03 (0.05)	0.07 (0.05)
Father's employment				
Not employed	Ref.	Ref.	Ref.	Ref.
Part-time	−7.55 (11.22)	−2.05 (12.52)	−0.13 (0.15)	0.08 (0.11)
Full-time	−15.87* (6.75)	−14.34* (6.71)	−0.23** (0.09)	−0.18** (0.07)
Unknown work hours	−27.76† (14.82)	−27.65 (21.20)	−0.40 (0.26)	−0.44 (0.31)
Partner's employment				
Not employed	Ref.	Ref.	Ref.	Ref.
Part-time	−0.82 (2.79)	−1.72 (3.16)	−0.00 (0.05)	−0.05 (0.05)
Full-time	−0.85 (3.39)	−1.57 (3.82)	0.06 (0.06)	−0.06 (0.06)
Unknown work hours	−0.03 (5.10)	−0.21 (5.27)	−0.00 (0.08)	−0.01 (0.07)
Day of the week				
Weekday	Ref.	Ref.	Ref.	Ref.
Weekend	19.06*** (3.35)	22.13*** (3.40)	0.31*** (0.05)	0.34*** (0.04)
Housework minutes	0.15*** (0.03)	0.15***(0.03)	0.002*** (0.00)	0.001*** (0.00)
Time of the survey				
Wave 1	−11.24*** (3.74)	−10.15** (3.74)	−0.13** (0.05)	−0.13** (0.05)
Wave 2	Ref.	Ref.	Ref.	Ref.
Constant	66.57† (39.02)	39.80 (38.37)	3.99*** (0.62)	3.59*** (0.60)
AIC	10.26	10.99	10.26	10.99
BIC	−13744	6899490	−13751	6862517

Generalised linear model, beta-coefficients, standard errors in parentheses

Unknown work hours minutes. The coefficients of the models with identity link can be interpreted in minutes, the coefficients of the log link models in percentage

Note: The model with Gaussian family and identity link resembles the OLS model for childcare minutes

The model with Gaussian family and log link resembles the OLS model for the log of childcare

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.\ 0\ 01$

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Author Biography

Nora Reich is a researcher at the Hamburg Institute of International Economics (HWWI) in Hamburg, Germany. She received her PhD in economics at the University of Hamburg. She has been a guest researcher at the National Institute of Demographic Studies (INED) in Paris, France, and at the German Institute for Japanese Studies (DIJ) in Tokyo, Japan. Among her current areas of research are the gendered division of paid and unpaid labour, labour market and family policies, as well as fertility.