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Mothers', Fathers' and Siblings' Housework Time Within Family Households

Objective: To investigate time use of housework for all members of family households, especially focusing on how time allocation varied by siblings' gender composition.

Background: Three knowledge gaps were addressed: the allocation of housework time between all family members; children's contributions to housework, focusing on the relevance of sibling structure; and the differences in time allocation of housework by parental education within family households. The study contributes to the understanding of the family as the primary socialization environment and the foundations of gender inequality of unpaid work time in the life course and in society.

Methods: 478 four-person households were sampled from the German Time Use Study from 2001/2002 and 2012/2013. Using information from 3,743 time diaries, absolute and relative time use for total housework on Mondays

through Fridays was analyzed according to siblings' gender composition, applying linear regression.

Results: Mothers and daughters spent more time on housework in shared family households than fathers and sons. Total housework time was lowest in households with two sons and highest in households with two daughters. Older daughters spent more time on housework than younger daughters, and sons with a sister spent more time on housework than sons with a brother, regardless of the birth order. Parents' education had no impact on the time allocation in this sample.

Conclusion: Children's gender plays a role in their interaction with their parents, and both gender identity at the individual level and the dyadic gender compositions of families must be considered when explaining the household allocation of housework.

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Key Words: children, family relations, gender, parent education, parent-child relationships, socialization.

For decades, gender inequality and conceptualizations of gender as a multilevel structure have been prominent topics in family research. In these discussions, the division of housework within families has been one of the most promising applications for the study of women's and men's behavior and its interplay in the household and in society. Comprehensive research has provided profound knowledge about the gender-specific division of labor as well as the causes and consequences of this phenomenon in Western societies (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010).

Countless international studies have documented that women were involved in unpaid

labor and especially in housework much more than men. At the same time, studies have shown indications of gender convergence, that is, a reduction in the gender gap between adult women's and men's housework time (Leopold et al., 2018; Sullivan et al., 2018). But this has not changed the fact that women in society still do the lion's share of housework, and to an even greater extent in adult couples of different gender, especially in family households with children (Bianchi et al., 2000; Leopold et al., 2018).

Looking beyond adult women and men, mothers and fathers, research on children and adolescents in several western countries, such as Denmark, Germany, Italy, or the United States, found essentially the same patterns of gender inequality: Girls contribute to housework chores to a much greater extent than boys, and the gender gap is already present in very young children and becomes even more pronounced as children grow older (Bonke, 2010; Dotti Sani, 2016; Lee et al., 2003; Schulz, 2020). These findings fueled the theoretical narrative of an intergenerational transmission of gender roles and gendered behavior within family households (Cordero-Coma & Esping-Andersen, 2018; Cunningham, 2001; Gimenez-Nadal et al., 2017; Hu, 2015; Schulz, 2020). These processes of gendered socialization and, hence, the children's allocation of time should depend on parental education (Bonke, 2010), because, for example, more highly educated parents attach more importance to the time children spend on educational or social activities than on housework, as suggested by the notion of "concerted cultivation" (Lareau, 2011), or economic reasoning (Bonke, 2010).

This article addresses three hitherto under-researched issues in the field of housework. First, taking the concept of socialization within family households seriously, the study uses a pinpoint sample that allows us to get a picture of the allocation of housework time among all family members in shared households, extending earlier work from Australia (Craig et al., 2015; Craig & Powell, 2018) and the United States (Manke et al., 1994). Second, the study discusses the possible influence of parental education on children's housework patterns through processes of intergenerational transmission, extending earlier work from Germany, Spain, China, or the United States (Cordero-Coma & Esping-Andersen, 2018;

Cunningham, 2001; Gimenez-Nadal et al., 2017; Hu, 2015; Schulz, 2020). Third, the study analyzes how the presence of siblings with same or different gender influences children's housework behavior, extending earlier work from the United States (McHale et al., 1999; McHale et al., 2012; Steelman et al., 2002). Through the latter two objectives, the study contributes to our understanding of housework participation in early stages of the life course (Cordero-Coma & Esping-Andersen, 2018; Larson & Verma, 1999), for which is still far less known compared to the extensive literature on adult women and men.

Dealing with these knowledge gaps enhances our understanding of gender and housework inequality, because, first, children not only cause housework (as it is usually assumed in research on adults' housework performance), but also do housework themselves and are relevant actors in the process of home production (Gager et al., 1999; Larson & Verma, 1999). Second, research has identified the family as a crucial context for young people's gender development and household productivity (Crouter et al., 1995; McHale et al., 1999). Therefore, the study of children in their primary socialization environments adds to our understanding of the basis of the gender division of housework among adults (Cordero-Coma & Esping-Andersen, 2018). On the one hand, this is because parents' and children's life courses are inherently linked and influence each other in their time commitments, their flexibility in everyday life, and their work-life balance. On the other hand, this is due to the fact that parental educational can strongly impact children's opportunities, gender roles, patterns of time allocation, and overall the likelihood that traditional gender inequalities will persist over the life course (Bonke, 2010; Lareau, 2011). In addition, children are connected to their siblings, and the sibling configuration is associated with the gender-specific housework behavior of girls and boys (Blair, 1992b; Goldscheider & Waite, 1991) as well as with the parental gender-typing of children's housework activities (Brody & Steelman, 1985).

Using time use data from Germany for the years 2001/2002 and 2012/2013, the present study contributes to the large corpus of housework literature in three ways. First, it presents new data on children's contributions to housework, complementing the existing literature on

other Western countries, such as Australia (Craig et al., 2015; Craig & Powell, 2018) or the United States (Blair, 1992a, 1992b; Crouter et al., 2001; Manke et al., 1994). Second, it aims to highlight the allocation of housework time between all members of family households. Applying a rigorous household design that samples only four-person households (two parents of different gender and two children), the study assesses the absolute and relative time use of fathers, mothers, and two children within their households. This selection resulted in a comparably small sample, mainly due to the age range of the children selected: 3,743 diaries of 478 households, representing only a small proportion of all German households with underage children. Yet, with this sample of rigorously reduced heterogeneity, each position within the household – mother, father, older, and younger child – and their respective roles in the allocation process of housework time can be clearly identified and analyzed. Third, drawing on the literature on fraternal influences on children's gendered socialization and behavior (McHale et al., 1999; McHale et al., 2012; Steelman et al., 2002), the study examines how housework time and its division among all family members varies according to the gender composition of children. The selected German time use data are particularly suitable for the study of children in the family, because they contain first-hand time diary information from all household members aged 10 years and older, which is necessary for this kind of differentiation.

BACKGROUND

Gender Inequality in Housework

The well-documented gender inequality in housework is particularly relevant to the context of the present study, as German society is characterized by a moderate separate spheres model with prevailing traditional gender ideologies and gender-specific behavior patterns in the family. Although Germany has experienced remarkable changes in gendered time use patterns (Leopold et al., 2018; Skopek & Leopold, 2018) and gender role attitudes (Ebner et al., 2020) over decades and cohorts, women still do much more housework than men and are generally held responsible for this kind of labor. This notion of separate spheres is also reflected in a gender-typed segregation of housework tasks, as

women are more involved in routine housework tasks, such as cooking, cleaning, and doing the laundry, while men are more inclined to refrain from these activities and are more likely to perform non-routine chores, such as repairs or administrative paperwork (Blair, 1992a; Goldscheider & Waite, 1991).

In Germany, as in virtually every other Western country, studies have shown a general decline in the number of hours worked in the household in recent decades (Altintas & Sullivan, 2016; Sullivan et al., 2018). This process has been driven by considerable reductions of women's housework time combined with rather constant or only slightly increased time budgets of men (Leopold et al., 2018; Skopek & Leopold, 2018). There are similar findings for underage children in Germany, who apparently showed similar patterns of gender convergence between 1991 and 2013 that were closely related to their parents' behavior (Schulz, 2020; Wirth, 2017).

Previous Studies on the Household Allocation of Housework Time

Previous studies focusing on the housework time of parents and children in shared family households (Blair, 1992a; Goldscheider & Waite, 1991; Manke et al., 1994) have highlighted the importance of "conceptualizing the family economy as three-cornered – involving mothers, fathers, and children" (Manke et al., 1994, p. 667). Craig and Powell (2018) were the first to use large-scale time use data from Australia to examine the relative housework contributions of coresident parents and young people aged 15–34 years. They found that mothers are the primary agents of domestic labor, all the more so when it comes to routine chores and the work for the household. Together with the comparatively small contribution of fathers, the time spent by parents far outweighs that of their children, suggesting that children play a rather additive role within the family economy, a notion which is in line with the findings from the United States (Manke et al., 1994). Nevertheless, it was found that Australian children did slightly more housework for themselves than for the household. These findings are consistent with those of Craig et al. (2015), who concluded that the time spent by young Australians (aged 15–34) on housework does compensate for the time spent by parents on the same chores,

suggesting that the more children do housework, the higher the households' total housework time.

A major methodological difference from the present study is that none of the previous studies included each individual household member in their analysis, but instead combined all children's contributions to housework into aggregate measures of offspring support, controlled for other children in the household for which no information was available, or did not treat the gender composition of children as a relevant predictor (Blair, 1992a; Craig et al., 2015; Craig & Powell, 2018; Manke et al., 1994).

Theoretical Considerations

It has been argued that processes of gender, time-availability, specialization, and intra-family bargaining maintain the gendered patterns of adult women's and men's time use along the traditional lines of separate spheres, even despite developments in gender convergence, attitudinal change, and increasing human capital investments and bargaining power of women (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010).

The gender perspective emphasizes the importance of symbolic exchange for the division of labor in the household (Berk, 1985; West & Zimmerman, 1987). In the context of housework, "doing gender" refers to the performance of specific activities that confirm traditional women's or men's identities and is seen as an important factor in the allocation of time between women and men that is largely independent of other processes, such as relative productivities or labor market arrangements. Because housework can still be considered an essential component of women's doing gender, women are more attached to housework than men, and this difference is most pronounced in middle adulthood (Leopold et al., 2018, for Germany), especially in the case of parenthood (Kühhirt, 2012, for Germany).

Although grounded on a different mechanism, the predicted empirical outcome of this concept is consistent with gender-neutral bargaining or economic specialization models, such as Becker's (1991) approach, which usually assume higher domestic productivity of women compared to men or use resource exchange or dependency mechanisms to explain traditional patterns of housework sharing. In

fact, time availability and relative resource approaches have been particularly effective in explaining the division of domestic labor in modern societies. The basic assumptions are that spending more time for paid labor reduces the time available for unpaid labor and that gains from labor market participation increase the resources to bargain out of housework. Even though both mechanisms are in principle gender neutral, gender inequality in labor market participation and outcomes is still reflected in the household arrangements where women do most of the housework and men devote considerably less time to housework, and, if so, mainly to non-routine chores (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010).

Most explanations for children's contributions to housework have been framed in terms of "need or socialization" (Blair, 1992a; Bonke, 2010; Cordero-Coma & Esping-Andersen, 2018). The demand approach argues that children have to do housework because of parental time constraints, for example because of maternal employment. The socialization perspective postulates that parents transmit patterns of housework to their children while they live together in a shared household. When girls and boys grow up, they develop a sense of gender roles, gender-appropriate behavior, and sense of fairness by observing and imitating their parents, who more or less consciously act as role models or may tend to rather actively gender-type children's household labor (Blair, 1992b; Cordero-Coma & Esping-Andersen, 2018; Hu, 2015). This is especially true for housework, because the intra-household time allocation between women and men is still an important reference for doing and displaying gender in modern societies. Overall, the socialization approach has received considerable empirical support, especially in the longitudinal literature on children's housework performance (Cordero-Coma & Esping-Andersen, 2018; Cunningham, 2001; Gupta, 2006), and for other but Western contexts, such as China (Hu, 2015). There, it was found that parents' and children's housework times are generally positively correlated and that this observation is more pronounced among same-gender parent-child dyads.

A broader view of the family as the main socialization environment for children's housework participation must necessarily include siblings, and especially the gender composition

of children (Steelman et al., 2002). This is, first, because children make learning experiences in direct everyday interactions with their siblings of the same or different gender, just as they do with their parents of the same or different gender (McHale et al., 1999). Second, “[s]iblings also indirectly influence each other by virtue of their impact on the roles and relationship dynamics of the larger family system” (McHale et al., 2003, p. 140). The latter can, under certain conditions, lead to parental gender-typing of children’s housework contributions (Blair, 1992b; Brody & Steelman, 1985; Crouter et al., 2001).

Empirical research on the influence of sibling’s gender composition on housework behavior is rare and not entirely conclusive (Cordero-Coma & Esping-Andersen, 2018; McHale et al., 2003). Nevertheless, studies from the United States have provided some evidence of “gender-differential socialization” when parents follow a traditional model and children have siblings of different gender (Crouter et al., 1995). McHale et al. (1999) added that younger sisters of older brothers are more involved in housework in families with traditional fathers, but also that younger boys behaved similarly in the same contexts. Furthermore, Crouter et al. (2001) found the strongest patterns of traditional housework division in families with older girl/younger boy dyads and mothers with high work demands. In families where fathers faced high work demands, older brothers were found to spend more time on housework than their younger sisters.

Given the persistence of the traditional separate spheres model, it has been expected that both mechanisms – social learning and parental gender-typing – will contribute to the reproduction of gendered housework performances among children. This view has been supported by economic literature, which focused on the relationship between parents’ and children’s contributions to housework and identified child gender as an important predictor of time allocation (Akerlof & Kranton, 2000; Bonke, 2010; Gimenez-Nadal et al., 2017; Lundberg, 2005; Lundberg et al., 2008). First, Akerlof and Kranton (2000) argued that deviating from the predominant patterns of gender in society can lead to disutility, because it would result in individual dissonance regarding the process of gendered identity formation. Consequently, this implies a reproduction of traditional

housework behavior, with mothers doing more housework than fathers and girls doing more housework than boys, as proposed by the sociological gender perspective (Berk, 1985; West & Zimmerman, 1987).

Second, it has been argued that parental time allocation depends on children’s gender, through parental preferences for interactions with children of the same gender, which may “result from the enjoyment of time spent with the child who is most like you, perhaps engaged in familiar and gender-typical activities, or from the belief that you are a more effective, productive parent with this child” (Lundberg, 2005, p. 349; Lundberg et al., 2008). Studies from the United States (as reviewed in Lundberg, 2005) pointed to higher parental involvement in children of the same gender despite increasing heterogeneity in recent years. Together with the finding that especially same-gender parents’ behavior was particularly predictive of the German girls’ and boys’ housework participation (Schulz, 2020), this supported the view of an “intergenerational transmission” of housework through gendered socialization.

Beyond the basic mechanisms, the division of housework will probably be influenced by the parents’ educational level. Bonke (2010) argued from an economic perspective that it is an empirical question whether both highly educated parents and their children spend more or less time on housework than their less educated counterparts. On the one hand, higher education increases labor market productivity as well as the returns from other kinds of unpaid labor, such as childcare, which implies less available time and less attachment to housework. On the other hand, higher education could mean greater participation in housework, especially by men and fathers, as higher education has been found to correlate with a more liberal approach to gender role attitudes, which in the long term should add to the process of gender convergence and reduce gender inequality in housework (Skopek & Leopold, 2018).

As far as children are concerned, gendered socialization should vary according to the parenting style, which depends on parent’s education. Lareau (2011) argued that higher educated parents are much more involved in their children’s lives than less educated parents and regardless of parental labor supply, in order to actively support their children’s skill development early on. This implies empirically

open predictions, as highly educated parents can either relieve their children of housework in order to free up their capacities so that they can invest in education, for example, or regard housework itself as an educational activity that promotes responsibility and provides guidance for growing up (Lee et al., 2003). Basically, highly educated parents can transmit their more liberal approach to gender role attitudes to their children, which can at least reduce gender inequality in housework between daughters and sons. All of these arguments concerning the influence of education should be most pronounced in case of educational homogamy, especially if both parents have completed tertiary education. In this case, parents are said to share similar "liberal" attitudes toward gender roles, a lower propensity to specialize, and a similar sense of fairness concerning the distribution of work and time use (Bonke & Esping-Andersen, 2011; Greenstein, 1996). This might affect gendered socialization relative to gender composition of sibships and might translate into less gendered patterns of children's housework contributions, as parents then would transmit their sense of equality of equity to their children.

HYPOTHESES

The present study was designed (a) to describe the allocation of housework time between all members of four-person households, (b) to assess the impact siblings' gender composition, and (c) to evaluate differences in the allocation of housework time by parental education based on the theoretical arguments outlined earlier. The empirical analysis of German time use data is guided by the following hypotheses, which combine expectations from theory and previous literature to draw a picture of absolute and relative time use in shared family households.

Based on the gender perspective and the sheer bulk of previous literature on parents', but also on children's housework time, it is expected that mothers and daughters spend considerably more time on housework than fathers and sons. Based on Craig and Powell's (2018) findings, parents are expected do most of the housework. Therefore, parents' housework time should be independent of the gender composition of their offspring, so that differences in total housework time between households are induced by

the children's contributions. Accordingly, total housework time should be lowest in households with two sons and highest in households with two daughters.

Because the patterns of absolute time use logically translate into relative proportions of mothers, fathers, sons, and daughters within family households, the proportions of mothers are likely to be lowest in households with two daughters and highest in households with two sons. Empirical results will show how the fathers' shares compare to those of their children: If processes of gender exceed the generally higher participation of parents in housework, daughters' shares should be higher than those of their fathers.

When the children's housework participation is emphasized, siblings of the same gender are expected to divide the children's total time devoted to housework fairly evenly, because there is no gender criterion that could decide on a division into separate spheres. In families with siblings of mixed gender, daughters are expected to have the larger share compared to their brothers. Converted to individual contributions, sons are expected to do less housework if they have a sister compared to a brother, and daughters are expected to do more housework if they have a brother compared to a sister. Adding another aspect drawn from the literature, older siblings are expected to do more housework than younger siblings, simply because of greater maturity, or in the case of girls, a possibly further developed gender identity (Bonke, 2010; Dotti Sani, 2016; Gager et al., 1999).

Regarding the association between parents' education and children's participation in housework, this relationship will be tested in detail to provide empirical evidence for any of the theoretical possibilities. Parental education will be of special interest as a moderator of sibling composition to assess the idea that parental consistency in more "liberal" beliefs translate into less gendered housework patterns.

METHODS

Data and Sample

The present study used data from the two most recent surveys of the German Time Use Study, which were conducted in 2001/2002 (<https://doi.org/10.21242/63911.2002.00.00.3.1.0>; Ehling et al., 2001) and in 2012/2013 (<https://doi.org/10>

.21242/63911.2013.00.00.3.1.0; Maier, 2014), and which were provided by the "German Research Data Centers of the Statistical Offices of the Federation and the Federal States." Each of the two surveys quota-sampled around 5,000 households to portray the German population for all days of the week and all months of the year. Compared to a (hypothetical) random sample, households with children in particular were oversampled, which guarantees sufficient case numbers for the analyses of this study.

Time use data were collected using a diary approach, accompanied by separate questionnaires for each respondent and each household. The use of time diaries is seen as a valid approach to capture time use patterns (Gershuny et al., 2020), even superior compared to other methods, such as stylized survey questions on time use (Kan & Pudney, 2008), especially when children are the target population (Ben-Arieh & Ofir, 2002).

In both 2001/2002 and 2012/2013, each household member aged 10 years or older kept a diary on 2 weekdays and 1 weekend day, recording all activities at 10-minute intervals. The openly recorded activities were then coded according to the 2008 Guidelines for Harmonized European Time Use Surveys (Ehling et al., 2001; Maier, 2014). Providing first-hand information about all household members, that is, parents and children, is an advantage of this data, as it has proven to be error-prone to report on the time use of others besides yourself (Kamo, 2000).

The present study was based on a particular narrow definition of family households, each consisting of two parents of different gender (both aged 60 or younger) and two children (aged 10–17 years), without further restrictions. The final sample comprised 478 households (Table S1 in the supplement). Information on time use was derived from a total of 3,743 time diaries of all household members.

The main advantage of this small sample is its very low heterogeneity. It basically represents the classical notion of the nuclear family, and it allows to treat each person separately without too much complexity. The price for this narrow sample is a small number of cases, which is associated with larger confidence intervals and, eventually, with a lower statistical power (see remarks on sensitivity analyses and discussion later).

Outcome Measures

This study analyzed the absolute and relative contributions of all members of family households to housework. All measures were derived from time use data obtained as first-hand diary information from fathers, mothers, and children in shared households. The first outcome variable was fathers', mothers', older, and younger child's time use for housework activities in minutes per day. Parents', children's, and households' total time budgets for housework were calculated as the sum of the respective household members.

The study focused on total housework time on Mondays to Fridays, including time spent on activities in the kitchen, cleaning and laundry, grocery shopping, repairs, car maintenance, and doing administrative paperwork. As the time budgets for the latter three "non-routine chores" were comparably small, especially for children, the measure of total housework does not differ much from a narrower cut of "routine chores." The time budgets for all activities included primary and secondary activities (no differences if only primary activities were included); diary slots for which more than one housework activity was recorded were counted only once.

The second outcome variable was relative housework time of each of the four household members. Thus, fathers', mothers', and each child's housework time were divided by the total housework time of the household. Compared to previous studies (Craig et al., 2015; Craig & Powell, 2018), each child was treated as a separate unit of analysis in the context of siblings' gender composition.

Variables

The main independent variable in this study was the gender composition of the two children in the households, captured with four categories: two boys; older boy and younger girl; older girl and younger boy; two girls. The older of the siblings was always listed first. In (rare) cases of same age, one child was randomly assigned to be the older one.

To operationalize the education argument, interaction terms of children's gender composition with parental education were included in the models. Parental education was measured as a binary, indicating whether both parents had a university degree, compared to households

where only one or no parent had completed tertiary education. Separate variables for education (fathers' or mothers' university degree; at least one university degree in the household), and other indicators of social status (household income, working class) were tested, but did not change the conclusions. It should be noted that households with a low level of education (compulsory education only) are practically nonexistent in the sample of the present study, making it impossible to differentiate the results for more than two educational categories, which will be of importance when evaluating the results.

All models used to estimate the household allocation of time and to assess the education argument included several controls: parents' employment situation (both parents working full-time; father working full-time and mother working part-time; father working full-time and mother not working; father not working full-time; adopted from Craig & Powell, 2018); age of the older child (from which 10 is subtracted to rescale the variable to 0–7); age difference between older and younger child (in years, between 0 and 7); region (East vs. West Germany); and survey year (2001/2002 vs. 2012/2013). The models used to estimate relative time use additionally included the total time spent by households on housework (divided by 100). The marital status of adult partners was not included in the models because there was only little variance in this variable.

The models used to estimate the differences between siblings in more detail included variables for birth order (older vs. younger sibling), sibling's gender (sister vs. brother), an interaction term of these two variables (to assess if the combination yields any behavioral differences), and the mean time spent by mothers and fathers on housework, the latter two divided by 100 (Table 1, and Tables S2, S3 in the supplement).

Plan of the Analyses and Notes on Sensitivity

Because fathers, mothers, and children in the German Time Use Study did not necessarily keep their diaries on the same days, the diary data for the household analyses (Table 2, Figure 1) were compiled as one record for each household, which includes the average time budgets of all household members for housework activities on weekdays. Households were

only included in the estimations if all members recorded valid time use information.

For the more detailed analyses of children (Table 3), the data were rearranged and each child was recorded as a separate unit of analysis. The analyses for children were performed separately for girls and boys, correcting for clustered standard errors in cases of households with two girls or two boys.

Both the absolute time use and the relative shares of housework time were estimated using ordinary least squares regression models, separately for each household member (Tables S6–S8 in the supplement). For Figure 1, the predicted minutes per day and the predicted shares were calculated from these models as margins at the means (Williams, 2012), which were adjusted by setting all covariates to the sample means (Tables S4, S5 in the supplement).

Sensitivity analyses included, for example, children up to the age of 25 years, time use on Saturdays and Sundays, and data from the first survey of the German Time Use Study from 1991/1992 (see <https://doi.org/10.31219/osf.io/4exzs> for details). These analyses showed similar findings for the household allocation of time (children were not studied in detail there), creating confidence that the overall interpretations of this present study were plausible, even despite the small sample. In the present study, the 1991/1992 data were not used because of harmonization issues: the time diaries used different time slots (5 instead of 10-minute intervals) in its diaries and did not include children aged 10–11. Further sensitivity analyses of children's time use for housework on weekends and for older children revealed similar, but not entirely identical results (see <https://doi.org/10.17605/osf.io/fq2h3> for details). This is presumably due to the fact that the rhythmic structure and the time binds on Saturdays and Sundays is different from Mondays to Fridays, and that adolescents' and young adults' gendered identities and behavior are different from minor children, even if they still live in their parents' households.

RESULTS

The Household Perspective

Figure 1 (plotted from Tables S4, S5 in the supplement) shows the results for the absolute (upper panel A) and relative (lower panel B) time use for housework of all four members of shared family households for weekdays

Table 1. Descriptives of the Household and Children Estimation Samples

	Household sample	Children sample	
		Girls	Boys
Number of households	478	357	358
Number of diaries	3,743	934	938
Gender composition of siblings			
Two boys	0.25		
Older boy and younger girl	0.23		
Older girl and younger boy	0.26		
Two girls	0.25		
Birth order of siblings			
Younger sibling		0.48	0.52
Older sibling		0.52	0.48
Sibling's gender			
Boy		0.50	0.50
Girl		0.50	0.50
Employment of parents			
Both full-time	0.13		
Father full-time, mother part-time	0.59		
Father full-time, mother not employed	0.20		
Father not full-time ^a	0.09		
Both parents have university degree	0.18	0.18	0.17
Age of older child ^b	14.62 (1.64)	14.71 (1.62)	14.53 (1.66)
Age difference (older–younger)	2.60 (1.26)	2.65 (1.26)	2.54 (1.26)
East Germany	0.18	0.17	0.19
Survey year			
2001/2002	0.58	0.58	0.58
2012/2013	0.42	0.42	0.42

Notes. ^aOf the 41 households in which fathers are not working full time, 10 mothers are working full time, 18 mothers are working part time, and 13 mothers are not employed; ^bfor the regression models, this variable is transformed by subtracting the minimum age of 10 years; see Tables S2, S3 in the supplement for complete descriptions of valid and missing cases for each independent/dependent variable. German Time Use Study, 2001/2002, and 2012/2013, own calculations. Case numbers, means, standard deviations in parentheses (if applicable); rounding differences to 1 may apply.

by gender composition of the two children. As expected, mothers' time budget for total housework was by far the highest, regardless of their husbands and children. For example, mothers spent an average of 208–216 minutes per normal weekday on total housework, which is about three times the time spent by fathers (62–70 minutes). Overall, parents' time for total housework ranged from 272 to 280 minutes per normal weekday. The regression models (Tables S6, S7 in the supplement) showed that the parents' allocation of time for housework was significantly associated with parents' paid labor arrangements, hinting toward the theoretical mechanisms suggested by time availability or relative resources.

Further in line with the expectations, girls spent more time on total housework than

boys. Although older boys devoted about 27 minutes to housework on normal weekdays, their younger sisters spent about 29 minutes, older girls about 44 minutes, and their younger brothers about 28 minutes on total housework. In households with two sons, boys spent about 18 (older child) and 17 (younger child) minutes per weekday on housework. In households with two daughters, the respective time budget was about 48 and 42 minutes. In sum, both children's time for total housework ranged from 35 (two boys) to 89 (two girls) minutes per normal weekday. Thus, the total number of housework hours was highest in families with two girls and lowest in families with two boys. Furthermore, in households with two daughters, both girls together spent about 1.25 times more time on housework than their fathers.

Table 2. Ordinary Least Squares Regression of Housework Time and Shares for Each Household Member (Selected Variables Only)

	Time				Shares			
	Father	Mother	Older children	Younger children	Father	Mother	Older children	Younger children
Children's gender composition ^a								
Two boys	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Boy/girl	0.43 (9.63)	-5.07 (14.01)	7.24 (7.01)	13.67* (6.05)	-1.98 (2.45)	-3.04 (3.11)	1.11 (1.60)	3.91** (1.41)
Girl/boy	8.40 (9.21)	-3.74 (13.39)	24.51*** (6.70)	11.11† (5.78)	-0.34 (2.35)	-7.52* (2.98)	5.82*** (1.53)	2.04 (1.36)
Two girls	7.41 (9.34)	-4.37 (13.59)	28.27*** (6.80)	23.11*** (5.87)	-2.05 (2.39)	-7.04* (3.04)	4.97** (1.56)	4.20** (1.38)
Both parents have university degree								
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	-1.02 (16.32)	-45.15† (23.74)	-6.24 (11.88)	1.75 (10.25)	5.23 (4.16)	-7.08 (5.27)	-1.00 (2.71)	2.93 (2.40)
Interactions								
Boy/girl * uni ^b	4.34 (22.58)	67.06* (32.85)	11.09 (16.44)	-9.78 (14.18)	-2.95 (5.75)	7.12 (7.30)	2.25 (3.75)	-6.41† (3.32)
Girl/boy * uni ^b	-3.13 (22.85)	15.55 (33.24)	8.18 (16.63)	-4.66 (14.35)	0.15 (5.81)	-2.75 (7.37)	4.24 (3.79)	-1.54 (3.35)
Two girls * uni ^b	-2.35 (22.58)	18.34 (32.84)	11.26 (16.43)	6.89 (14.18)	-2.53 (2.95)	-0.01 (7.12)	2.47 (2.25)	0.02 (-6.41†)
Controls ^c								
Constant	64.47*** (14.96)	159.01*** (21.76)	7.20 (10.89)	24.12* (9.40)	21.80*** (4.04)	70.65*** (5.13)	1.00 (2.64)	6.51** (2.33)
R ²	478	478	478	478	478	478	478	478
N (households)	0.127	0.252	0.087	0.057	0.160	0.181	0.125	0.098

Notes. Complete regression tables are documented in Table S4 (time) and Table S5 (shares) in the supplement. ^aThe older sibling is listed first; ^b“uni” “both parents have a university degree”; ^ccontrols include parental working arrangements, region, age of older child, age difference of siblings, survey year, and household's total housework time (models for shares only). Regression coefficients, standard errors in parentheses; levels of significance: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$. German Time Use Study, 2001/2002, 2012/2013, own calculations.

As expected, the mothers' relative contributions to total housework on weekdays were clearly higher than those of other household members and accounted for about 59–67% of total housework time in all four household types. In households with two daughters, the children's combined share in total housework activities slightly exceeded that of fathers by three percentage points, that is, almost 20%. The mothers' shares in households with two girls were not significantly lower than in the other households, which, because of the small sample, could be due to relatively large confidence intervals of all estimates.

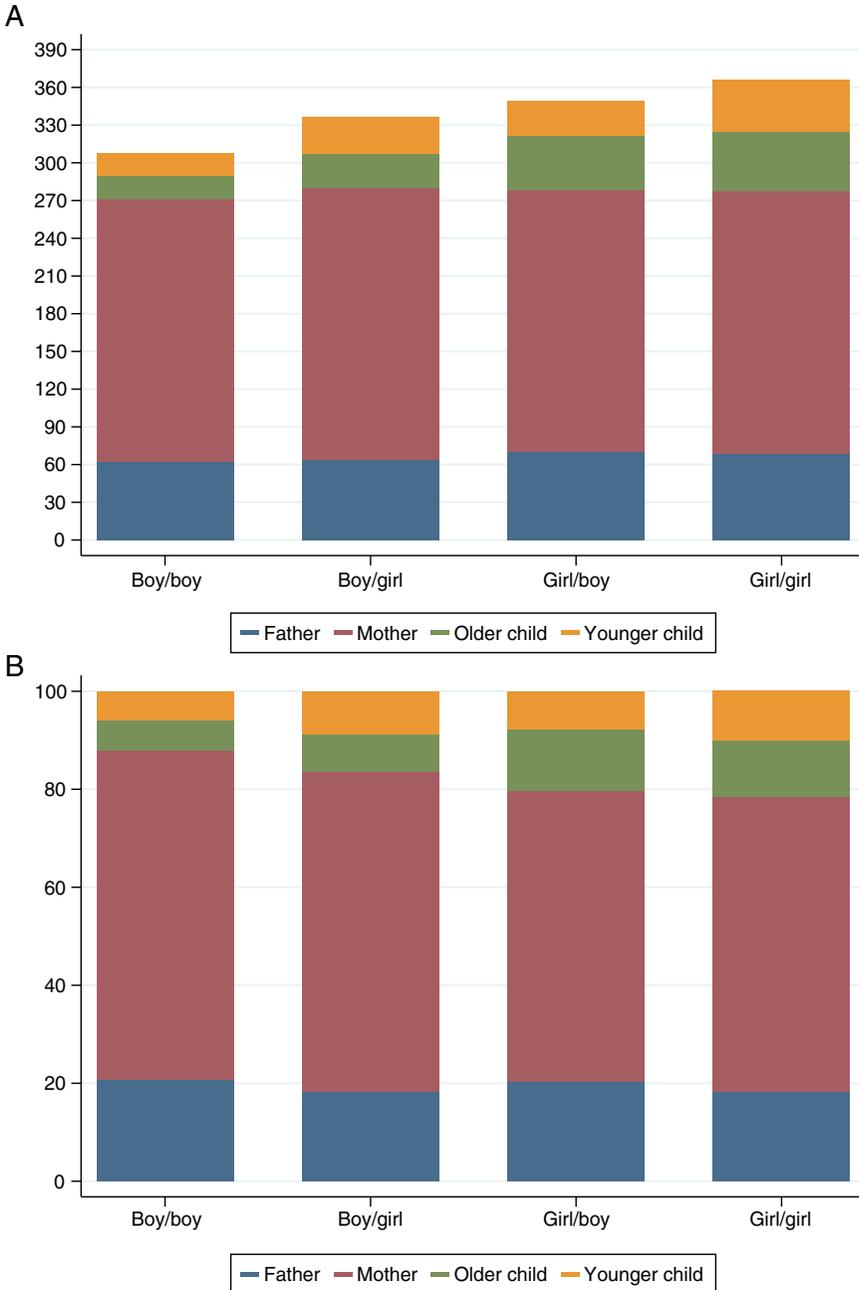
In households with two boys, each child accounted for about 50% of the children's total housework time. In households with two girls,

the older girls' share was slightly over 50%. In households with older boys and younger girls, girls reported only slightly more time spent on housework, but this difference was rather small compared to households with older girls and younger boys, where the gender gap was about 16 minutes, in which girls spend more time on housework (Figure 1, Tables S4, S5 in the supplement).

The Education Perspective

Table 2 is an excerpt from the complete regression models for households and shows only those variables that are necessary to assess the education arguments (Tables S6, S7 in the supplement). The pooled and separate models

FIGURE 1. TIME USE FOR HOUSEWORK AND RELATIVE SHARES OF HOUSEWORK TIME OF ALL HOUSEHOLD MEMBERS, BY GENDER COMPOSITION OF CHILDREN. (A) TIME USE FOR TOTAL HOUSEWORK ON WEEKDAYS (IN MINUTES PER DAY). (B) SHARES OF TOTAL HOUSEWORK TIME ON WEEKDAYS (IN PERCENT).



Notes. The Older Sibling Appears First in the Labels on the x-Axis. Predicted Minutes per Weekday and Shares for Weekdays Are Plotted from Tables S4, S5 in the Supplement, Which Are Based on Estimation Results in Tables S6, S7 in the Supplement. German Time Use Study, 2001/2002, and 2012/2013, Own Calculations.

Table 3. Ordinary Least Squares Regression of Children's Housework Time (Selected Variables Only)

	Girls	Boys
Birth order		
Younger sibling	Ref.	Ref.
Older sibling	13.73* (6.22)	-0.50 (3.96)
Sibling's gender		
Boy	Ref.	Ref.
Girl	9.95†† (5.55)	9.72* (4.88)
Interaction		
Older sibling * Sibling's gender = girl	-6.44 (7.79)	-0.16 (6.46)
Controls ^a		
Constant	0.90 (10.08)	11.81 (8.01)
R ²	0.075	0.036
N (children)	477	479

Notes. Complete regression tables are documented in Table S8 in the supplement. ^aControls include parents' education (both have university degree), region, age of older child, age difference of siblings, survey year, father's and mother's housework time. Regression coefficients, standard errors in parentheses; levels of significance: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$. German Time Use Study, 2001/2002, 2012/2013, own calculations.

for each survey year (Tables S6, S7 in the supplement) revealed that the main coefficients of parents' education were not statistically significant, albeit with one minor exception. The models for mothers included a barely significant ($p < .1$) negative coefficient, indicating that mothers did almost 45 minutes less housework, if both parents had completed tertiary education. This negative association was offset by a positive coefficient of the interaction with children's gender composition, but only in households with an older boy and a younger girl.

The coefficients of the other interaction terms of parents' education and children's gender composition were not significant in the models, suggesting that homogamy of higher education of parents did not moderate gender socialization of children relative to gender composition of sibships. In sum, the analyses concerning the education argument supplied an unexpected "null finding" regarding the proposed theoretical mechanisms.

The Children Perspective

Table 3 is an extract of the complete regression models (Table S8 in the supplement) of children's housework behavior in view of the gender composition of the sibships. The model for girls revealed that older girls were associated with significantly higher time budgets for housework compared to younger girls. Having a sister instead of a brother also meant more time for housework for girls ($p < .1$). The interaction coefficient, which was included to distinguish the influence of birth order for a given gender composition (here: older vs. younger sister of a daughter), was negative but not significant.

The model for boys showed that the birth order was not significantly related to the time use for housework. But having a sister was associated with a larger time budget for housework compared to having a brother.

All regression models were based on comparably low case numbers. The separate estimation of the same models for each survey year (Table S8 in the supplement) did not necessarily yield the same levels of significance than the pooled models. Nevertheless, the behavior of the models in different estimation settings suggested that the associations mentioned – more time of older girls and more time of brothers of a sister – will persist if the number of cases was increased. This also applies to the associations between parents' and children's time use for housework, which were included in the models (Table S8 in the supplement). The regressions did not show consistently positive significant associations, as they were reported by Schulz (2020) with a different and larger sample of the German Time Use Study. This again suggests that the statistically insignificant findings are probably the result of the comparatively low case numbers of the analytically rigorous sample. It should further be noted that all models controlled for children's age within the selected age range of 10–17. This connects to the idea that gender identities are said to be more salient when children grow older and get more and more independent from their parents, which may be of special importance in households with particular compositions.

DISCUSSION

Despite long-term changes, the division of housework is still one of the main causes and consequences of gender inequality in modern societies. Traditional social forces and

persistent patterns of doing and displaying gender continue to reproduce housework primarily as “women’s work,” retaining a now at least moderate separate spheres model as a remarkable societal invariant for decades. In this study, two domains of housework research were investigated that have not yet been explored in great detail: the children’s supply of housework, and the allocation of housework time among all members of shared family households, further adding an education perspective that was meaningful from the context studied. Using data from the German Time Use Study of 2001/2002 and 2012/2013, the present study provided an analysis in which the housework time of mothers, fathers, and two children in four-person family households were put in relation to each other. The main independent variable in this study was the gender composition of the two children in the household, which turned out to be an important determinant of children’s housework participation.

Three findings surfaced in this analysis. First, although parents and children are usually involved in housework during their normal daily lives, mothers are undoubtedly the main suppliers of housework. Consequently, this study supports the picture that women do the majority of total housework in family households, while fathers and children play a rather additive or sometimes substitutive role in the allocation process of domestic labor (Blair, 1992a; Craig et al., 2015; Craig & Powell, 2018; Goldscheider & Waite, 1991; Manke et al., 1994). This general and well-documented gendered assessment also applies to children, as it was found that daughters devoted more time to housework than sons. In this context, Wirth (2017) showed that housework differentials between girls and boys remained unchanged when controlling for other daily activities, such as education or leisure. Parents’ allocation of housework time was significantly related to their working arrangements. The latter finding supported the theoretical arguments of time availability and relative resources for mothers and fathers, well known for adults from other studies (reviewed in Coltrane, 2000; Lachance-Grzela & Bouchard, 2010).

From a household perspective, this gendered behavior resulted in significantly different total housework times between households with different gender compositions of children. Housework time was highest in households with

two daughters and lowest in households with two sons, while in households with children of mixed gender, the housework time varied between the two extremes. In households with two daughters, the children’s total time for housework practically exceeded the fathers’ contributions, suggesting that the traditional gender division of housework also applies to the father–daughter dyad.

On the issue of siblings’ allocation of housework time, the second finding of the present study was that the pattern of gender inequality that persisted among adults was duplicated for children: Girls spent more time on housework than boys, which was most evident in households with older girls and younger boys. In households with siblings of the same gender, housework was shared fairly evenly. Although there is no gender criterion in sibling dyads with the same gender that could trigger inequality in housework times, sister–brother dyads seemed to follow exactly the pattern that the children observe in their parents, at least when the sister was the older sibling. With this central finding, this study supports the view of the intergenerational transmission of housework behavior from parents to their children, which has been documented in earlier, and even longitudinal studies (Cordero-Coma & Esping-Andersen, 2018; Dotti Sani, 2016; Schulz, 2020). The findings of the present study support the theoretical perspectives of gendered socialization and family learning in relation to the sphere of housework and claims that today’s families at the beginning of the millennium continue to reproduce traditional patterns of gender inequality that may seem outdated from a modern normative perspective.

Closer examination of children’s housework behavior revealed that older girls spent more time on housework than younger girls, and that younger girls spent even less time on housework if their sibling was a brother. Boys, in contrast, spent more time on housework if they had sisters compared to brothers, regardless if they were the older or the younger sibling. If this finding can be confirmed by other studies in the future, it might indicate a window for social change towards further gender convergence. In such a scenario, sons would draw more learning experiences from their sisters than from their parents, which may result in a stronger participation in housework of boys in childhood, and – if perpetuated – over the life course. It should be

noted that this finding is conditioned on families with two children aged 10–17 years, and that both parental role modeling as well as children's behavior might be different in families with more or less children and children of other ages.

Third, none of the regression models showed a significant correlation between parent's education and children's housework time. Thus, the present study does not support any of the mechanisms that link parental education with children's housework behavior, neither in a positive nor in a negative direction. This was an unexpected finding, given that Germany can still be regarded as a highly stratified society, and that other domains of children's time use, for example educational behavior, were linked to parental education in the past (Heineck & Riphahn, 2009). Nevertheless, this finding could be a product of the educational composition of the small sample, in which confidence intervals are large and respondents with an education below secondary level are strongly underrepresented. The present study was unable to detect differences between households with tertiary and less than tertiary education, but could not account for households with compulsory education only. Future studies will need large-scale data to unravel the different effects of education that are likely to be found between low and medium/high levels of education, rather than between low/medium and high levels of education.

Concerning the limitations of the present study, four questions remain open for discussion and further empirical investigation. First, this study was limited to the German context. Although Germany is an interesting case because of the country's still conservative welfare regime and the associated predominance of traditional gender arrangements, further conclusions on the housework allocation in shared households require time use studies from other countries covering all household members. Yet, the findings for Germany correspond well with the few existing studies on whole-household allocation of housework from Australia and the United States (Craig et al., 2015; Craig & Powell, 2018; Goldscheider & Waite, 1991; Manke et al., 1994). Yet, these earlier studies suffered from samples that were not as suitable as the rigorous four-person-family sample used in this study, for example, because they either combined children's contributions to housework into an

overall measure of all children, or controlled for other children in analytical models. Compared to this situation, the present study benefited from much lower heterogeneity of the households observed.

Second, although the German Time Use Study provided sufficient enough data to investigate the allocation of housework in shared family households, larger samples would have been necessary to spell out the analyses in more detail. This includes, for example, the distinctions between weekdays and weekend days, housework for oneself and for others – as it was done by Craig & Powell, 2018, but was impossible with the available data – as well as more fine-grained life course dependencies of housework behavior. Furthermore, as noted in psychologically inspired studies (McHale et al., 1999), important control variables, such as gender role attitudes, are not included in the German Time Use Study. More knowledge about the mental dispositions of parents and children and the related processes of identity formation would certainly improve our understanding of the interplay of causes and consequences as well as possible selection processes in housework behavior. Furthermore, this study focused on the classical case of the nuclear family. The inclusion of other forms of family life, such as single-parent or patchwork households, would certainly broaden the picture by including arrangements that might be less susceptible to the traditional separate spheres model.

Third, this study did not apply a time-based approach, as the two surveys of the German Time Use Study, which cover a period of 10 years, were used as a pooled sample. To date, there is no longitudinal time diary study that could adequately address the time dependence of the empirical developments and theoretical arguments. Nevertheless, several other studies have documented a gender convergence in time use for housework over the centuries for Germany and other Western societies, both for adults and children (Altintas & Sullivan, 2016; Leopold et al., 2018; Schulz, 2020; Sullivan et al., 2018). According to these studies, gender convergence has been (and obviously continues to be) largely driven by significant reductions in adult women's time budgets for housework. As Germany, like practically every other modern Western society, is in the midst of this slowly proceeding process of change

(Sullivan et al., 2018), one may expect that the time for total housework and the women's share in housework obligations within family households will continue to decrease. Yet, it is theoretically and empirically unclear how long this process will continue, how gender inequality will develop from now on and in the long term, and what role children will play in this setting.

Fourth, children's housework participation needs to be embedded in a more general discussion about changes in children's time use. Studies have shown that children's discretionary time has decreased over the years, especially in favor of educational activities (Hofferth, 2009; Wirth, 2017). Simultaneous decreases in children's housework time, in turn, could well work in the opposite direction, freeing up leisure time for girls and boys. In contrast, housework itself can be a learning activity that strengthens children's sense of responsibility in the family household. In this respect, status differences along the educational level of the parents are likely to contribute to the children's "diverging destinies," depending on the parents' choice of parenting style, "concerted cultivation," or "natural growth" (Lareau, 2011; Lee et al., 2003). The gender dimension attributed to housework could be of particular importance here, as girls and boys may be socialized differently because mothers and daughters may be trading off some housework duties in other ways than mothers and sons, fathers and sons, or fathers and daughters. This gives rise to another issue that needs to be fueled with empirical data in the future, that is the question of shared or solo contexts of children's housework time. The interpretation of daughters' higher time budget for housework would be different if the daughters spent more time on tasks that are done independently, or if they did these tasks together with their parents. Finally, further research should aim to include measures of housework demand in their equations when modeling housework supply, as the difference in demand for housework between daughter-only and son-only families might be an important part of the unobserved heterogeneity of time use for housework.

In conclusion, this study provided a diagnostic analysis at the beginning of the third millennium that serves as a reference point for future research on observed changes or stabilities in unpaid work times in the broader context of gender convergence. In terms of theoretical

reasoning, the study added to the evidence suggesting that children's gender plays a role in their interaction with their parents and that not only gender identity at the individual level, but rather the dyadic gender compositions of families must be considered when explaining the household allocation of housework.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1: Supplementary Information

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