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THE INTERNET AND THE GENDER DIVISION OF HOUSEHOLD LABOR

Tim Schwanen^{a,*}

Mei-Po Kwan^b

Fang Ren^c

^a Transport Studies Unit
School of Geography and the Environment
University of Oxford

^b Department of Geography
University of California, Berkeley

^c MS GIS Program
University of Redlands

* Corresponding author
E-mail: tim.schwanen@ouce.ox.ac.uk
Phone: +44 (0)1865 285503
Fax: +44 (0)1865 275885

Final version

The Geographical Journal

October 2012

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Abstract

Geographers and others have long since examined the distribution of paid work, childcare and housework within households and have more recently begun to explore the various effects of Internet use on everyday life and digital inequalities along lines of gender and other social markers. These lines of inquiry have so far remained largely separate and this paper brings them together by analysing the interrelations between Internet and the gender division of household labour. Multi-group structural equation modelling is applied to dedicated survey data collected among heterosexual couples in Columbus (Ohio, USA). The results demonstrate that Internet use is gendered in many ways. Variations in Internet use are explained by a broader range of factors for women than for men, and an unequal division of domestic responsibilities within the household constrains women's Internet use but not men's. Overall, however, the relations between Internet use and the gender division of household labour are modest. The latter is related in different ways for women and men to the residential location, the household situation, the employment situation and gender-specific interactions among paid work, childcare and housework.

Keywords: Internet, gender, activity patterns, structural equation modelling, Columbus (Ohio)

Introduction

This paper seeks to bring two hitherto unconnected strands of geography literature together – the longstanding interest in the gender division of household labour in feminist geography and beyond (Hanson and Hanson 1980; Tivers 1985; Kwan 1999; Schwanen 2007), and the more recent literature on how the Internet mediates everyday life (Kwan 2002; Valentine and Holloway 2002; Madge and O'Connor 2006; Gilbert and Masucci 2011). This focus reflects two observations. One is that in the past the interaction of new technologies and women's daily lives did not necessarily lead to the beneficial changes often touted by the promoters of these technologies. For instance, such domestic technologies as the washing machine, freezer and microwave oven did not reduce the time women spent on housework or significantly change the gender division of labour within the household (Cowan 1983; Kwan 2003; Bittman et al. 2004). This is problematic given the tenacity of inequalities in the gender division of labour and women's more extensive space-time constraints at a time when women are expected to be in paid employment and primary care-givers to children and other dependants (Kwan 1999; McDowell et al. 2005).

Secondly, although it is well recognised that the effects of Internet use on activity participation differ according to gender, race/ethnicity and so forth (Crang et al. 2006; Schwanen and Kwan 2008; Gilbert and Masucci 2011), few studies to date have explicitly and systematically compared different social groups regarding how the Internet mediates everyday life. Studies using qualitative methods frequently focus on a particular (disadvantaged) social group but tend not to contrast the experiences of its members with those of other categories. Authors using quantitative methods often

concentrate on general relationships within a sample of respondents (but see Ren and Kwan 2009a). Like race/ethnicity and class, gender is often taken into consideration but as an exogenous variable; how the relations of such factors as Internet skills, experience and access with everyday activities in the online and offline realms differ by gender (or race/ethnicity and class) is often not considered. As a result, our knowledge of how the Internet mediates everyday activities differently for various social groups is still rather limited. Such knowledge nonetheless has considerable policy relevance and can inform policies to reduce digital divides (Gilbert and Masucci 2011), improve employed adults' work-life balance (Hubers et al. 2011), and reduce carbon emissions from passenger transport (Banister 2011).

This paper asks whether and how the interrelations among internet use, housework, care-giving to children and paid labour differ between male and female partners in couples. Answering this question demands that consideration is given to the nature of domestic labour, each partner's employment situation, the household situation, and characteristics of the household's residential location. We apply multi-group structural equation modelling to data collected among white, middle-class, heterosexual couples in Columbus (Ohio, USA). In this article we use 'domestic responsibilities' and 'domestic work' as catch-all phrases for different forms of housework and care-giving to children, and 'gender division of household labour' as shorthand for the division of housework, childcare and paid labour on the understanding that all are essential to the household's reproduction and wellbeing.

Study background

Gender division of household labour

Across the Western world men's role in domestic labour has increased over time, but women continue to spend more time on domestic and employment responsibilities combined (Fisher et al. 2007) and experience more stringent space-time constraints (Kwan 2000; Schwanen and Kwan 2008). There nonetheless exist notable differences in the gender division of household labour across households at a single point in time. Sociologists, economists and geographers have proposed multiple theoretically informed explanations for those differences, most of which consider the gender division of labour the outcome of a rational choice process (Shelton and John 1996; Bianchi et al. 2000; Kroska 2004; Ettema and Van der Lippe 2009). Suffice it to say that explanations revolve around five key factors. One pertains to men's and women's *employment situation* – their income and type of occupation – and another to the *space-time configuration of paid work* as expressed through weekly employment hours, employment schedule and commute length (South and Spitze 1994; Bianchi et al. 2000; Presser 2003; Schwanen 2007). Following Becker (1965) and new home economics, much literature in economics and sociology assumes that a central mechanism in the production of the gender division of household labour is that the partner with the most economic capital (income and occupational prestige) and/or least time available (longest employment hours or commute time) negotiates his/her way out of domestic responsibilities and especially the more repetitive and unattractive tasks.

A third factor is the *household situation* as reflected in the presence, number and age of children (Bianchi et al. 2000; Presser 2003); it has been suggested that in households with one or more young children the division of domestic labour is particularly unequal (De Meester and Van Ham 2009). Fourthly, differences in the degree to which men and women hold egalitarian *attitudes toward gender roles* have been shown to explain differences in the gender division of domestic responsibilities across households (Huber and Spitze 1983; Ettema and Van der Lippe 2009). Finally, geographers have highlighted the importance of *space*, as the gender division of household labour is more balanced in urban, higher-density locations, at least in North-western Europe (Ettema et al. 2007; De Meester and Van Ham 2009). Whilst this difference may follow from more egalitarian attitudes about gender roles (Karsten 2003), it also reflects variations in accessibility and space-time constraints among urban households (Ettema et al. 2007). In locations offering good accessibility to jobs, childcare providers, shops and other facilities it is easier for women to combine longer employment hours with domestic demands; households elsewhere may cope with poor accessibility through role specialization with one partner – usually the female – conducting more domestic work and the other specializing in paid work.

Whilst useful, the above explanations can be criticized. It is not evident whether attitudes towards gender roles drive or follow from the actual division of household labour, and discrepancies between attitudes and actual practices often exist (Vincent et al. 2004; Schwanen 2007). Additionally, the distribution of domestic responsibilities is sometimes considered to be a function of employment-related factors. It is, however, critical to consider the two-sided nature of employment and domestic relationships. Housework and childcare also impose significant constraints

on individuals' – especially women's – paid work, commuting and activity space (Tivers 1985; Kwan 1999; Schwanen 2007). Moreover, previous research has not always considered differences between domestic responsibilities. This is nonetheless important as different responsibilities vary in the rigidity of space-time constraints they impose (Schwanen et al. 2008) and because men's participation varies considerably between types of housework and childcare (*ibid.*; South and Spitze 1994; Kroska 2004): such activities as repair, gardening and other homework outside the dwelling are often more male-typed or masculine.

Finally, the literature discussed so far tends to sideline the non-rational aspects of the gender division of household labour. For cultural geographers and sociologists housework, childcare and paid labour are not neutral activities but symbolic performances through which 'proper' gender identities are enacted (West and Zimmerman 1987; Valentine 1997; McDowell et al. 2005). Hence, housework and childcare are not necessarily to be allocated or avoided. They can be expressions of love and care, allowing men and women to craft identities that are in keeping with wider societal norms.

The Internet and gender

The studies discussed in the previous subsection disregard the increased importance of the online realm for the gendering of everyday activities. However, a diversified literature about differences in Internet use has come into existence across the social sciences. Much of this work focuses on the gender dimensions of the digital divide – disparities in access to and use of the Internet and related technologies (Hargittai and

Shafer 2006; Helsper 2010; Gilbert and Masucci 2011). Research has indicated that across geographical contexts marked differences between men and women and among the latter exist in technical apparatus (hardware and connection speed), perceived skills and the type of activities undertaken online. With 2004 German data Zillien and Hargittai (2009) showed that women used the Internet more than men for information on travelling and health and for e-mail but less to access economic, political, computer and sports news or information on stock prices and products. Dholakia (2006) reports comparable results for the U.S.A. Using UK data from 2007 Helsper (2010) found that women used the Internet more than men for health information but less for online shopping, finance, social networking, personal networking, personal communication and entertainment and accessing sexual material. These differences depended, however, on employment status, marital status and age. Dholakia (2006) also showed that in the U.S.A. women tend to spend fewer hours online than do men.

A variety of explanations for the above gender disparities have been put forward, including differences in economic capital (monetary resources) and *technological capital* with women having poorer access to fast Internet connections and less online skill and experience (Dholakia 2006; Hargittai and Shafer 2006). Gendered design and the social construction of technologies and online activities have also been identified as relevant (Singh 2001; Dholakia 2006; Kelan 2007): men tend to see the Internet as a tool and women consider it more as a toy, although both sometimes 'do' gender differently and subvert stereotypical gender-technology relations.

Geographers have extended the literature by grounding gendered Internet use explicitly in activity participation in the offline world (Crang et al. 2006; Gilbert and

Masucci 2011; Ren and Kwan 2009a; Ren et al. 2012). Kwan and colleagues have explored how offline maintenance activities (satisfying personal or household needs) and offline leisure activities are related to their online counterparts; people with extensive space-time constraints imposed by housework and childcare – among whom women were clearly overrepresented – tended to conduct fewer online activities, which lasted shorter and were undertaken later during the day (Ren et al. 2012). In addition to these time displacement effects, substitution between time use online and offline occurred, with online maintenance replacing offline maintenance activities for women and online leisure substituting for offline leisure participation among men (Ren and Kwan 2009a). However, more time spent on online maintenance activities also implied longer travel times to access offline maintenance activities for women but not for men. Hence, the overall effect of online maintenance activities on the gender division of household labour was rather small.

Geographers have also highlighted the spatiality of disparities in Internet access and use according to gender and other social markers (Graham 2002; Crang et al. 2006; Gilbert 2010). Gilbert (2010) outlines a multiscalar model of digital inequalities from the international scale to the individual, arguing that the metropolitan and neighbourhood levels are critical to the explanation of inequalities. It is at these levels that processes of the gendering and racialisation of the labour market, residential segregation and the availability of public and non-profit services operate, shaping people's socio-technical resources for and constraints on Internet use in important ways. Additionally, geographers have shown location and accessibility to affect Internet use in the context of domestic labour. Ren and Kwan (2009b) found the adoption of online shopping and frequency of online purchases to be higher in white

neighbourhoods and at locations where accessibility to brick-and-mortar shops is low. Farag et al.'s (2007) findings are more complex: In locations offering good access to physical shops, online searching for product information is less frequent but online purchases are more common. This pattern may reflect that people prefer to experience a product in-store and then buy it online. Thus, online and offline domestic activities may not simply substitute but also complement each other. Feminist geographical research of how mothers use chat rooms and mothering websites point towards a similar conclusion (Madge and O'Connor 2006; Chan 2008): the Internet is not so much used to conduct activities that would otherwise take place in the offline world but rather to relieve concerns regarding parenting and home/work arrangements. It mobilises emotional and informational support allowing mothers to carry on, thereby contributing to the perpetuation of existing inequalities in the gender division of household labour.

Towards the empirical analysis

Based on the above review we suggest that an investigation bringing together the literatures on the gender division of household labour and on gender and other inequalities of Internet use is in order. Such an analysis should focus on the following eight key concepts or variables, measured separately for men and women in (heterosexual) couples: their Internet use, conduct of housework, participation in childcare, engagement in paid work, as well as their technological capital, employment situation, household situation and the character of their residential location. That analysis should meet various requirements.

Caution should be exercised regarding the assumption that the observed relations among housework, childcare and paid labour are the outcome of a rational choice process based on consensual decision-making between the partners and governed by a logic of instrumentality: power relations between partners can be complex, and domestic and employment activities are also sites for identity construction and reconfiguration (Hanson and Pratt 1995; McDowell et al. 2005). That is not to say that there are no trade-offs between partners' activities but rather that these are outcomes of complex negotiations within the household and involve space-time constraints and differential access to resources, such as money, time and skills.

It is also important to not *a priori* assume that a person's paid labour structures his/her domestic activities – especially for women – or that Internet use substitutes for offline employment and domestic responsibilities. Online activities may relate in much more complex ways to offline activities and it is also possible that no interactions exist at all. Additionally, the residential location may be integral to the gender division of household labour: households may select themselves into neighbourhoods that facilitate a particular division or reduce the space-time constraints on (women's) offline activities (Karsten 2003). Finally, it is important to distinguish between domestic responsibilities and to differentiate at the very least, between childcare and housework; the latter might well be differentiated in more feminine and masculine types.

We believe it is important to conduct empirical analyses with a fairly open mind about the nature and direction of the interrelations of Internet use, housework, childcare and paid work. We expect women undertaking more childcare to also engage more in

housework, and this greater domestic responsibility to result in less Internet use and less time spent in paid labour (including commuting to work). But we also want to keep open the possibility that greater Internet use and more paid work reduce women's housework. For men we expect greater trade-offs between paid work and domestic activities, and between childcare and housework. We anticipate that the situation of Internet use displacing time spent on childcare and especially housework is more likely for men than for women. For both genders, however, we expect the interrelations among Internet use, housework, childcare and paid work to be shaped by the household situation, the employment situation, and the character of the residential location. Finally, we anticipate Internet use to be directly dependent on a person's technological capital, which might in turn be affected by the household situation, employment situation and residential location.

Research Design

Study area and data

The study is situated in Columbus (Ohio), a mid-sized metropolitan area with a population of ± 1.62 million in 2000. According to the 2000 U.S. Census, white and African-American groups account for $\pm 95\%$ of the population in the region's most populated county (Franklin County). Columbus is particularly suitable for our study because it has been called the "average city" of the U.S.A. (England 1993). Over half of its population have computers and use the Internet – 57.1% have computers while 52.7% use the Internet in 1999, according to the 2000 U.S. Census. The digital divide

in Ohio parallels national trends: African-Americans, poorer and less educated people use computers and the Internet less.

The dataset used for the current study was collected in 2003-2004 using an activity-Internet diary and a questionnaire about Internet use and household responsibilities. Obviously the age of the data comes with limitations: we cannot explore the recent growth in the use of mobile devices and in social media. The data nonetheless continue to have considerable value. There is no other dataset available with the same level of detail on the gender division of household labour and Internet use; our data provide unique opportunities to address the issues outlined above. Further, Internet use is a fast changing social practice that has been transformed significantly since 2003 but this does not necessarily imply that theoretical notions and results from the pre-social networking and pre-tablet and smart phone era are useless (cf. Hogan and Quan-Haase 2010). It can reasonably be assumed that over time the relations between Internet use and the gender division of labour have both changed and remained stable. We therefore propose to understand our empirical analysis as exploratory and as offering a reference point for the generation of new ideas for future research on people's Internet use and the gender division of household labour.

To recruit respondents we sent screening packages inviting couples with and without child(ren) and single parents with child(ren) to participate in the study to 32,000 randomly selected households living across Franklin County. 875 households agreed and received a survey package with activity-Internet diaries and questionnaires for all adult household members. Complete data from 420 adults in 270 households were obtained. There were 272 women (65%) and 247 individuals with at least one co-

resident child (59%). Most adults were white (93%), highly educated (80% are college or graduate degree holders) and rely on their own automobile (97%). Apart from female, highly educated and white adults, respondents with a high household income were also overrepresented: About 14% had an annual income under US\$40,000 and 42% an annual income over US\$80,000. Clearly, then, the respondents are not representative of the wider population, and we do not intend to generalise the results below to the entire population of the study area. We have excluded single parents from the analysis and utilise data from 405 of the original 420 participants.

Measuring key concepts

For this paper we employ the questionnaire data to measure the eight key concepts of Internet use, housework, childcare, paid labour, technological capital, employment situation, household situation and the residential location. Table 1 lists the variables drawn from the questionnaire to operationalize the key concepts and shows if and how scores on these variables differ between women and men.

<Table 1 here>

Internet use is described through measures of the time spent per week on online activities in general and for shopping and banking/paying bills. The female participants on average used the Internet for some 50 minutes more than did their male counterparts and they participated slightly longer in online shopping and online banking/paying bills. Yet, the difference is only statistically significant (at $p < 0.05$) for

banking/paying bills. Participation in *housework* and *childcare* is operationalised using questions about the share of specific tasks undertaken by participants. Table 1 shows that women's contribution exceeds men's for most tasks, although cleaning outdoors, gardening/yard work and repairs are male-dominated activities. Women's role is much greater than men's for such routine activities as cooking, in-home cleaning and grocery shopping. Overall the observed pattern concurs with previous findings (South and Spitze 1994; Kroska 2004) and underlines the importance of considering different types of housework and childcare. The average shares for men and women do not add up to 100% in Table 1. This reflects that in couples in which both adults participated in the study others (children, cleaners, professional carers, etc.) may perform certain duties and/or partners may have different perceptions of their own role in the household. A second reason is that the analysis includes 60 couples for which we had only data on one adult – typically the female – available. We preferred to include only one person from these households in the analysis over excluding them altogether; the latter would have made it more difficult to reliably estimate the coefficients in the structural equation model described below. The space-time configuration of *paid labour* is described using weekly employment hours and the home-to-work distance. Only the former of these observed variables varies significantly (at $p < 0.05$) between women and men.

Technological capital is operationalised using indicators of experience, skills and the technical apparatus – i.e. the connection speed – for accessing the Internet. In contrast to previous studies (Dholakia 2006; Hargittai and Shafer 2006; Zillien and Hargittai 2009), there are no differences (at $p < 0.05$) between women and men for these indicators. The *employment situation* is described through personal income,

occupation level and the industry of employment. The women in the recruited sample earn significantly (at $p < 0.05$) less than the men, but differences in occupation and industry are very small. Table 1 also lists the variables that describe the participants' *household situation* and *residential location*. We only consider the residential location as this is the place where most housework and childcare and online activities were undertaken.

Method of analysis

We employ structural equation modelling (SEM), which enables us to construct latent variables for Internet use, housework, childcare, paid labour, technological capital, employment situation, household situation and the residential location out of the observed variables listed in Table 1; and to examine how those latent constructs are interrelated. The advantage of SEM is that it allows for more complex interactions between variables than standard regression analysis. Causation cannot be established with cross-sectional data but within a larger set of correlative associations SEM enables comparison of the effect of latent construct A on B with the effect of B on A in terms of model fit. SEM also allows the relations between two latent constructs to be separated into direct and indirect effects. In the former case, A has an effect on B without the involvement of other constructs. With an indirect effect, A affects B via one or more other constructs. The total effect is the sum of the direct and all indirect effects from one construct to another.

In SEM a distinction is made between the measurement model and the structural model. The former describes how the various latent variables are constructed out of

the observed variables, the latter the relations between the latent constructs.

Coefficients are estimated via the covariance method, which can be done in various ways. Since many of our observed variables are ordinal in nature, we estimated polychoric correlations and asymptotic covariance matrices (Jöreskog 2005), and used maximum likelihood (ML) as estimation method. Weighted least squares is often used when many variables are ordinal in nature, but results can be severely biased when the numbers of observations is low (Jöreskog and Sörbom 2001); ML or other estimation methods are then preferred.

As the relations among Internet use, housework, childcare and paid labour may differ between women and men, we have specified a multi-group structural equation model. This means that different measurement and structural models and correlation and covariance matrices are estimated for each gender (Jöreskog 2005). Multi-group models are usually employed to confirm whether the same model structure (the total set of relations among measured and latent variables), coefficients, residuals, and/or the same correlation and asymptotic covariance matrices apply to each group (Bollen 1989). But it was evident that assuming equal matrices, residuals, coefficients and/or model structures would obscure critical gender differences in our data. We therefore developed a three-step modelling approach that is more exploratory and iterative than most multi-group SEM analyses:

- 1) We developed well-fitting model specifications for women and men in completely separate analyses.
- 2) In an iterative process in which the original specifications changed to some extent, we merged the data for women and men and re-estimated the correlation and asymptotic covariance matrices and model specifications.

3) We made the step 2 model, in which all coefficients were allowed to differ between men and women, more parsimonious by constraining coefficients to be equal across genders wherever possible. We started with those coefficients for which the difference in magnitude between women and men was smallest and worked towards those with greater differences in estimated coefficients, using Chi-square tests to avoid that the model as a whole became statistically inferior. Imposing constraints induced further (minor) changes to the model specification but in the end we arrived at a model that is conceptually plausible and maximises the extent of gender difference in a statistically robust manner: constraining any further coefficient to be equal for women and men will produce a model that fits the data significantly ($p < 0.05$) worse than at present.

At the heart of our approach is a reversal of the analytical logic proposed by Bollen (1989) and Jöreskog (2005). Instead of working from similarity across groups towards differentiation, we started from difference and worked towards similarity to reduce the risk of overseeing potentially relevant gender differences. The adopted modelling approach also enabled us to make sure that the final set of coefficient estimates is plausible and robust given the sample size.

During the SEM analysis we have considered the requirements and expectations regarding the interrelations among the latent constructs for Internet use, housework, childcare, paid labour, technological capital, employment situation, household situation and the residential location outlined in 'Towards the empirical analysis'. We also considered direct effects from childcare to housework more plausible than the reverse, because childcare activities impose more stringent space-time constraints and more often act as anchors around which other activities are scheduled (Schwanen,

2007; Schwanen et al. 2008). However, in cases where reverse links proved statistically equivalent or superior, we have correlated the residuals. To keep the model identifiable, we have specified the latent constructs of respondents' employment situation and household situation as exogenous latent variables, meaning they cannot be affected by any of the other latent variables.

Results

The final model fits the data reasonably well. There is no unanimity regarding goodness of fit measures for SEM but the most widely used indicator is the root mean square error of approximation (RMSEA), which is in our case 0.0428 and reliably ($p < 0.01$) below the cut-off criterion for acceptable models of 0.05. The standardized root mean square residual (SRMR) is 0.0843 for women and 0.0847 for men, which is also below the common 0.10 criterion. However, the Satorra-Bentler scaled Chi-square statistic differs clearly from zero ($\chi^2 = 953.8$, $df = 690$) but this is rather common when hundreds of observations are used and not necessarily problematic. While our model does not fully replicate the data, it is adequate and acceptable.

Measurement models

The most important conclusion from the measurement models is that the relations between the observed variables and the latent constructs are both gendered and complex. This is especially true of the latent constructs for housework, childcare, paid labour and respondents' employment situation. Table 2 includes two latent constructs for housework – one called masculine and the other feminine housework. We have specified two constructs because it became clear early on that distinguishing between male-dominated and female-dominated tasks significantly increased the model's fit to the data. Table 2 further includes latent constructs for Internet use, technological capital, household situation and the residential location. We intended to have a single construct for all observed location variables but specifying two partially connected latent constructs provided more plausible results and a statistically superior model.

One construct represents the population composition of the residential neighbourhood and especially its socioeconomic status (because the share of whites has a lower coefficient than the other variables). The other measures land use and accessibility, although the share of higher educated persons in the neighbourhood also loads onto this construct (albeit less strongly than onto the population composition construct). The double loading of the share of higher educated persons reflects the geography of Columbus: highly educated individuals are concentrated not only in middle-class, almost exclusively white neighbourhoods but also in relatively dense and mixed neighbourhoods in the vicinity of the Ohio State University campus and Columbus' CBD.

<Table 2 here>

The latent constructs are gendered because the observed variable loadings for feminine housework, masculine housework, paid labour and employment situation differ significantly (at $p < 0.05$) between women and men (Table 2). Most differences are minor but there are some exceptions. First, working in the government sector loads considerably stronger onto the latent construct for women's employment situation. More than for men being a government employee is associated with high levels of occupational prestige and income for women. Secondly, the slightly smaller coefficient for weekly employment hours for women than – 2.386 versus 2.913 for men – indicates that home-to-work distance and the number of hours worked per week are related slightly stronger for women. Our model thus expresses that the length of women's commute is more strongly dependent than men's on how many hours they work. This may follow from a greater tendency to economise on

commuting relative to the total employment time among the participating women (Schwanen and Dijst 2002), which might reflect more extensive domestic responsibilities and/or lower pay (see, for instance, Hanson and Pratt 1995).

Thirdly, Table 2 also shows that there are no overlaps between the observed variables loading on the latent constructs of feminine and masculine housework for men. These latent constructs are more clearly identifiable among the men than the women, for whom the constructs are partially connected (Strathern 2004) and the shares of in-home cleaning and repairs load on both feminine and masculine housework. The stronger separation of housework into two categories for men may reflect cultural scripts regarding men's and women's role in the household (Vincent et al. 2004; Schwanen 2007): Whereas men's involvement in domestic responsibilities is considered more voluntary and laudatory, women's engagement in the full range of tasks is much more taken for granted in Western culture. Because of such scripts the women in our study may, on average, have experienced less choice in determining which types of housework to undertake.

Partial overlap between latent constructs can also be observed between Internet use and feminine housework; the share of banking/paying bills loads on the construct for Internet use for both genders and duration of online banking also loads on that for feminine housework among women. With the growth of Internet use for banking/paying bills the management of the household's finances has become so digitally mediated that drawing a clear-cut distinction between offline housework and online activity is increasingly difficult, particularly for women. We have therefore defined the latent construct of Internet use for both genders and feminine housework

for women along the lines of Haraway's (1991) cyborg metaphor as online/offline hybrids. These hybrid definitions improved the model fit without clearly affecting the relations among the latent constructs in the structural models.

Structural models

Table 3 summarises the final versions of the structural models for women and men. A comparison shows that the model for women is more complex, with more direct effects included.

<Table 3 here>

Internet use Contrary to expectations, Internet use is related to the gender division of household labour for women but not men. Women undertaking more feminine housework tasks like grocery shopping and cooking spend less time online, which suggests that space-time constraints associated with offline commitments prevent women from using the Internet to a much greater extent than men. We also explored reverse effects from Internet use to housework and childcare but none of these rendered statistically significant effects (at $p < 0.05$). Other latent constructs associated with the gender division of household labour have indirect effects on Internet use because women's feminine housework responsibilities are a function of their childcare responsibilities; the land use and accessibility of their residential location; and their employment situation (Table 3). Perhaps surprisingly, more childcare responsibilities for women marginally increases rather than displaces time online. This positive indirect effect results from the multiplication of the negative direct

effect of feminine housework on Internet use and a second negative direct effect from childcare to feminine housework. The latter suggests that with more childcare responsibilities women (like men) to some extent substitute care-giving for feminine housework (which is reallocated to their partner, to children or to others); this substitution helps to conserve some time for Internet use among the female participants. Supplementary analysis of the activity-Internet diaries indicated that mothers also used the Internet to search for information related to childrearing and their children's development. The indirect effect of land use and accessibility is positive: women living in higher-density locations with better accessibility to stores use the Internet more extensively, because the more equal division of (feminine) housework between partners frees up time for Internet use.

The women's Internet use is affected by both the division of household labour and their employment situation – and by implication their socioeconomic position – but men's use is only related to the latter. The effect of the employment situation is identical for both genders. A higher income and position at the occupational ladder result in more technological capital, which leads to more time online. However, because the effect of technological capital on Internet use is significantly stronger for men than for women, the effects of employment situation on Internet use is slightly larger for the former. Contrary to expectations, technological capital is not affected by men's or women's household situation and residential location.

Overall there are only modest relationships between Internet use and the gender division of household labour: they can only be observed for women and the effects run from offline housework to Internet use rather than the reverse. Internet use did not

appear to have induced a more equitable gender division of labour among middle-class households in Columbus in 2003. Factors beyond Internet use and technological capital were more clearly associated with that division.

Paid labour, childcare and housework The interactions of domestic and employment activities differ by gender and are more complex for women. More childcare responsibilities imply that fathers carry greater responsibility for masculine and especially feminine housework, and that they work and commute longer. The latter effect is may reflect that larger households with young children need more financial resources and a cultural script assigning the provider role more strongly to fathers (Aitken 2000). Relations are different for the recruited women: childcare responsibilities are not associated with weekly employment hours and commute length, but there are trade-offs between paid work and feminine housework. During the modelling it did not become clear whether employment hours and commute distance shaped feminine housework or the reverse; the coefficients associated with each effect were comparable in size. We have therefore not specified direct effects between paid labour and feminine housework but instead correlated the residuals. As mentioned and contradicting expectations, for many of the women more childcare meant less housework. Yet, the positive correlation of the residuals for housework and childcare indicates that this does not hold for all women; there appears to be subset of respondents where all domestic responsibilities are concentrated in the female partner. On balance our analysis offers little support for the expectation of greater trade-offs between paid labour and domestic activities and between childcare and housework among the recruited men.

The model indicates that the household situation, employment location and residential location are all related to the gender division of household labour, and the effects are generally in line with expectations and previous studies. Of particular interest is that the total effects of the household situation on childcare and feminine housework show that, in relative terms, the gender balance in domestic responsibilities is more equal in larger households or when a young child is present. The opposite holds, however, regarding paid labour in those households. The model also indicates that a higher income and better occupational position has stronger effects on women's weekly working hours and commute length than on men's. The effects on childcare responsibilities differ by gender: a higher income and better occupational position increase men's but reduces women's childcare responsibilities.

Further, our analysis confirms that the gender division of household labour is geographically differentiated within Franklin County in Columbus, Ohio. In denser neighbourhoods providing better accessibility to stores and a better educated population the division of housework is more balanced: women undertake less masculine and particularly feminine housework and their partners do more. Men and women also undertake less childcare in those neighbourhoods but this is primarily because households with children are less likely to live there. Because the negative effect on childcare is stronger for men, the division of those responsibilities is less balanced and more disadvantageous to mothers in denser neighbourhoods. Finally, the residential location is indeed integral to the gender division of household labour; the model fit improved significantly once residential location was treated as interwoven and endogenous to the relations between the household and employment situation on the one hand and the gender division of labour on the other. Hence, the model

confirms the idea that having one but preferably two well-paid, high-status jobs enable couples to both live in a socioeconomically good neighbourhood and keep commuting and employment hours within bounds.

Conclusions and discussion

Our analysis contributes to the existing literature in four ways. It demonstrates the importance of considering gender differences in the factors that are associated with Internet use. The time spent on various online activities and Internet use in general was related to technological capital and the employment situation for both the women and the men in our study. In addition, however, Internet use was also constrained by the extent of responsibility for certain types of housework and for childcare and associated to the location of residence for women. There was thus a richer and more varied set of factors shaping women's Internet use.

Secondly, for the households considered the interrelations between the gender division of household labour and Internet use were rather limited. Among women Internet use was shaped by domestic responsibilities, but reverse effects whereby the gender division of household labour is more balanced in households where women spend more time online could not be detected. This may have changed since 2003-2004 when the data for the current study were collected, and further analysis using more recent data is much desired. Nonetheless, all too optimistic narratives about the Internet's potential to reconfigure the gender division of labour should be treated with caution; previous research has suggested that inequalities according to gender and

other social markers can be consolidated and even exacerbated with the growth and development of Internet use (Graham 2002; Schwanen and Kwan 2008). Additionally, much housework and childcare entails physical effort and face-to-face contact, and the effects of Internet use can only be indirect here. It can raise awareness and confidence among women that the time devoted to physical housework and childcare can be renegotiated with their partner, but qualitative research on chat-room use among mothers has not (yet) offered support for such change (Madge and O'Connor 2006; Chan 2008). Finally, additional analysis using the collected activity-Internet data (available from the authors upon request) indicates that the recruited women undertake online activities, such as paying bills, e-commerce, and searching for recipes and health information, more frequently than do men. Only helping children online with homework or games and searching for online information or support regarding parenting were done equally often across both genders. For housework the offline gender relations tended to be replicated online among study participants.

Our analysis also extends the literature about the gender division of household labour more generally by confirming that different mechanisms are implicated in the organisation of housework, childcare and paid labour among women and men. For men a greater contribution to childcare led not only to greater responsibility for housework but also to more time spent on paid labour and commuting; for women there were trade-offs between childcare and housework and between the responsibility for housework and employment hours and commuting distance. Our findings challenge the notion that the partner with the longest employment hours or commute time always negotiates his/her way out of domestic responsibilities. They are more consistent with the notions that power relations between partners are complex; that

domestic and employment activities are also platforms for identification processes; and that cultural scripts matter to how women and men organise the gender division of household labour (Hanson and Pratt 1995; Vincent et al. 2004; McDowell et al. 2005; Schwanen 2007). Nevertheless, respondents' employment situation was of key importance to how paid work, childcare and housework were organised for both genders. From a policy perspective our analysis concurs with the idea that improving women's opportunities to obtain well-paid, high-status jobs is a very effective strategy to increase the gender balance in employment and domestic responsibilities.

Finally, the analysis shows that quantitative methods can make important and unique contributions to critical geography (Kwan and Schwanen 2009). Advanced methods such as SEM can capture many complexities of everyday life and its geographical context; challenge dichotomous, hard-and-fast categories as our measurement models have done; and allow for rigorous comparisons of the experiences of different social groups and so shed new light on the differential mechanisms through which socio-spatial inequalities in everyday life come about.

Acknowledgements

The comments of the editor and anonymous reviewers on an earlier version of the manuscript are gratefully acknowledged. The data used in this paper were collected with a grant from the US National Science Foundation's Information and Technology Research (NSF/ITR) Program (BCS-0112488) to [Second Author].

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Table 1: Observed variables in the analysis

		Women		Men		Total	
		Mean	Share	Mean	Share	Mean	Share
<i>Internet use: hours spent per week on online ...</i>							
Activities in general		10.9		10.1		10.6	
Shopping		0.4		0.3		0.4	
Banking/paying bills		0.5 ^a		0.3		0.4	
<i>Housework: share of ... in household</i>							
Grocery shopping		76.1 ^a		27.0		58.2	
Cooking/baking/preparing meals		74.9 ^a		28.1		57.8	
In-home cleaning		72.1 ^a		28.5		56.2	
Cleaning outdoors		39.1 ^a		63.9		48.2	
Gardening/yard work		36.1 ^a		64.2		46.4	
Repairs		26.0 ^a		78.1		45.0	
Banking/paying bills		64.7 ^a		41.0		56.0	
<i>Childcare: share of ... in household</i>							
Care for older child(ren)		34.3 ^a		16.6		27.8	
Transporting child(ren)		38.9 ^a		16.8		30.8	
Helping child(ren) with homework		33.4 ^a		13.1		26.0	
<i>Paid labour</i>							
Weekly employment hours		29.8 ^a		36.8		32.4	
Home to work distance (miles)		7.1		8.0		7.5	
<i>Technological capital</i>							
Years of internet experience		6.8		7.0		6.9	
Internet ability [1=poor, 5=excellent]		3.8		3.9		3.8	
Internet connection	Slow		45.7		45.3		45.5
	Fast (DSL/Cable)		54.3		54.7		54.5
<i>Residential location</i>							
Number of stores within 5 min from home		133.1		122.3		129.1	
Population density, Census block group area		156.7		153.3		155.5	
Median household income, Census block group area		60.4		61.6		60.9	
Share of higher education persons, Census block group area		48.2		49.1		48.5	
Share of whites, Census block group area		85.5		86.3		85.8	
<i>Employment situation</i>							
Personal income	Less than US\$20,000		31.6 ^a		11.5		24.3
	US\$20,000-39,999		27.3		34.5		30.0
	US\$40,000-59,999		19.5		23.0		20.8
	More than US\$60,000		21.5		31.1		25.0
Occupation level	Managerial/professional		43.6		46.6		44.7
	Other		56.4		53.4		55.3
Sector of the economy	Government						
	Other		14.8		13.5		14.3
<i>Household situation</i>							
Child 0-6 years in household	Yes		26.5		31.8		28.3
	No		73.5		68.2		71.7
Household size [1=1, 5=5 or more]			3.0		3.1		3.0

^a statistically different from the average or distribution for men at $p < 0.05$

Table 2: Measurement models

<i>Latent constructs varying between women and men</i>			
Name	Observed variable	Coef. Women	Coef. Men
<i>Feminine housework</i>	Grocery shopping	1.000	1.000
	Cooking/baking/preparing meals	0.945	0.861
	In-home cleaning	0.790	0.671
	Banking/paying bills	0.654	0.431
	Repairs	0.283	
	Duration of online banking	0.122	
<i>Masculine housework</i>	Gardening/yard work	1.000	1.000
	Cleaning outdoors	1.218	1.250
	Repairs	0.590	0.640
	In-home cleaning	0.218	
<i>Childcare</i>	Transporting children	1.000	1.000
	Care for older children	1.125	1.182
	Helping children with homework	1.051	1.040
<i>Paid labour</i>	Home-to-work distance	1.000	1.000
	Weekly employment hours	2.386	2.913
<i>Employment situation</i>	Personal income	1.000	1.000
	Managerial/ prof. occupation	0.834	0.773
	Employed in government sector	0.924	0.498
<i>Latent constructs that do not vary between women and men</i>			
Name	Observed variable	Coef.	
<i>Internet use</i>	Time spent on online shopping	1.000	
	Time spent on online banking/paying bills	0.928	
	Time spent online	1.472	
	Banking/paying bills	0.368	
<i>Technological capital</i>	Years of Internet experience	1.000	
	Internet ability	1.275	
	Internet connection	0.673	
<i>Residential location, population</i>	Median household income, Census block group area	1.000	
	Share of higher educated, Census block group area	1.059	
	Share of Whites, Census block group area	0.558	
<i>Residential location, land use and accessibility</i>	Population density, Census block group area	1.000	
	Number of stores within 5 minutes from home	0.925	
	Share of higher educated, Census block group area	0.605	
<i>Household situation</i>	Child 0-6 y in household	1.000	
	Household size	5.774	

Table 3: Structural models

Explanatory constructs ↓		Women – Constructs to be explained →								Men – Constructs to be explained →							
		INTUSE	FHW	MHW	CCARE	PL	TCAP	RLPOP	RLLUA	INTUSE	FHW	MHW	CCARE	PL	TCAP	RLPOP	RLLUA
FHW	D	-0.129**		0.339**								0.127*					
	T	-0.129**		0.399**								0.127*					
CCARE	D		-0.138**			0.001					-0.138**			0.057**			
	T	0.018**	-0.138**	-0.055**		0.001					-0.138**	-0.017*		0.057**			
TCAP	D	0.734**								0.935**							
	T	0.734**								0.935**							
RLPOP	D					-0.059**								-0.059**			
	T					-0.059**								-0.059**			
RLLUA	D		-0.183**		-0.179**								-0.383**				
	T	0.021**	-0.158**	-0.063**	-0.179	0.000					0.053**	0.007	-0.383**	-0.022*)			
EMPLOY	D		-0.150**		-0.120**	0.310**	0.202**	0.065	-0.087*		-0.150**			0.185**	0.202**	0.649**	-0.360**
	T	0.164**	-0.119**	-0.048**	-0.104**	0.306**	0.202**	0.065	-0.087*	0.189**	-0.169**	-0.021*	0.138**	0.154**	0.202**	0.649**	-0.360**
HH	D				0.710**			0.239**	-0.311**				0.953**				-0.311**
	T	0.006	-0.049	-0.019	0.766**	-0.013		0.239**	-0.311**		-0.148**	-0.019	1.072**	0.061*			-0.311**
Correlated residuals		FHW & CCARE		0.275**						MHW & CCARE		0.091**					
		MHW & CCARE		0.091**						RLPOP & RLLUA		-0.188**					
		FHW & PL		-0.043*						HH & EMPLOY		0.040**					
		RLPOP & RLLUA		-0.396**													
		HH & EMPLOY		-0.004													

INTUSE = Internet use; FHW = feminine housework; MHW = masculine housework; CCARE = childcare; PL = paid labour; TCAP = technological capital; RLPOP = residential location, population;

RLLUA = residential location, land use and accessibility

D = direct effect; T = total effect

Bold = Direct effect with coefficient differing from other gender at $p < 0.05$; * statistically significant from zero at $p < 0.10$; ** statistically significant from zero at $p < 0.05$