

# Exploring the long-term effects of COVID-19-policies on intra-household care work division

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## 1 Introduction

Due to the COVID-19 pandemic measures to contain the virus have been taken in many countries worldwide. These measures not only affected the spread of the disease, but also drastically altered the everyday life. Time spent at home increased during the lockdown for many, whereas some continued to work their usual hours or more in systemic occupations [2, 4, 7]. Schools and daycare facilities were closed down for several weeks, what lead to an additional burden of care work and educational work for parents [13]. The argument has been brought up before that these unexpected and involuntary changes were strong incentives to adapt the division of care work in the households. Among the first articles about the effect of the COVID-19 pandemic on gender inequality was the paper from Alon et al. [4]. The authors described numerous short-time consequences for women that were mostly negative, but also highlighted the possibility, that the involuntary reversal of time-availability in a small fraction of households may influence the opinion of the surrounding households and lead to a change in the social norm and a more equal division of care work in the long run.

With an agent-based opinion dynamics model we investigate this hypothesis about potential effects of the COVID-19-policies on the intra-household care work division. We seek to answer the question, if a change in the time-availability of the spouses, that lead to a reversion of the traditional gender norm in a small fraction of households, can initiate a larger-scale erosion of the social norm.

## 2 The model

A population is represented in the model by a number of households that consist of a man and a woman. As the research question specifically addresses the gender norm on the division of care work between a man and a woman, we only consider hetero-sexual couple households and leave out homo-sexual couples and single parent households. Households are embedded in a social network. Through the links households interact with each other and social influence acts. The man and the woman in the household divide the care work that needs to be done between them. Each household stores the time the female and the male partner

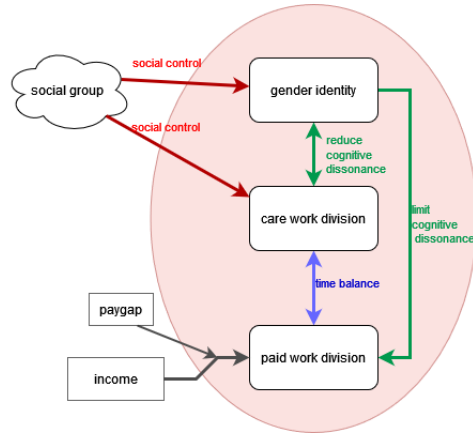
spend on paid work,  $paid_i^f$  and  $paid_i^m$ , respectively, and care work,  $care_i^f$  and  $care_i^m$ , respectively. The variables hold the amount of time spent on the specific action in hours on average per day from 0 to a maximum of  $hours_{max}$  in total per person. Additionally, the gender identity  $id_i$  of the household stores the opinion of the household about how the ideal division of care work should look like. This opinion is one of the foundations for the decision about the care work division and uses a continuous parameter space in the interval  $[0, 1]$ . Where 1 stands for a very traditional gender identity, where the man is a single earner and the woman does all the care work. 0 represents the situation where the woman is the single earner and the man does all of the care work. A gender identity of 0.5 means, that in the opinion of this household, care work and paid work should be divided equally. During initialization the gender identity for every household is drawn from a random distribution with a mean  $id$ . The opinion is gradually adjusted by interacting with others through social influence as it is common in opinion dynamics models [14, 1, 12]. Furthermore, agents try to reduce cognitive dissonance by aligning their beliefs with their actual behavior [3]. Similar forces affect the care work division of the households. Following previous models of intra-household care work division, in our model 3 factors are important for allocation of the spouses' time in care work. On the one hand, households try to adhere to their opinion about the ideal care work division [15], on the other hand, they try to avoid deviation from a perceived social norm [15, 11]. Additionally, the available time of the spouses, i.e. time that is not spent in paid work, is considered when determining the care work division. The importance of time-availability for the intra-household care work division was pointed out by empirical work from [10, 8]. Further, relative resources were stressed as important determinant of care work division and paid work division in previous work [5, 6]. How the household variables in the model interact with each other and the environment is depicted schematically in Figure 1.

## 2.1 Sequence of Events

After initialization of the households and creation of the social network the model runs in 3 phases: i) pre-lockdown ii) during a lockdown and iii) after a lockdown. Agents behavior follows the same rules in the different phases, but exogenous conditions on time in paid work and care work demand change. The following sequence of events is executed in every time step under varying conditions in the 3 phases:

- Agents observe the social norm as the average behavior in their social group in the previous time step and update their gender identity according to the influence of social norm and cognitive dissonance
- Agents update the division of care work under the influence of social norm and cognitive dissonance
- Agents update the division of paid work considering the household income and the influence of cognitive dissonance

In the pre-lockdown phase households adapt their variables under conditions as were found before the COVID-pandemic for a number of time steps sufficient to reach an equilibrium. During the lockdown phase care work demand is increased and the time spent with paid work is forced to a level as was observed during the lockdown. The system reaches an equilibrium state again, that is now different from the state in the pre-lockdown phase. Then, the lockdown ends again and exogenous conditions return to the pre-lockdown level. The simulation runs in the post-lockdown phase sufficiently long to reach an equilibrium state again.



**Fig. 1.** Model variables and their dependencies

Each household stores the gender identity, division of care work and paid work. The gender identity and care work division are subject to social control and influence each other in order to reduce cognitive dissonance. There is a maximum available time for each individual for the sum of paid work and care work. The decision on how much time is spent on paid work is restricted by the urge to achieve enough income.

### 3 Preliminary results

In a first analysis, we were interested in the effect of the size of the fraction of households where the time-availability during the lockdown was reversed on the care work division in the whole population. Figure 2 illustrates how the share of care work done by women changes in the 3 phases (before, during and after a lockdown) for 3 scenarios: in 5%, 10% or 15% of the households is only the man at home for the duration of the lockdown. For 5% and 10% we observed no significant changes in the share of care work done by women before and after the lockdown. Only 15% is a sufficiently high number of households to lead to a small change in the care work share done by women. When the time-availability

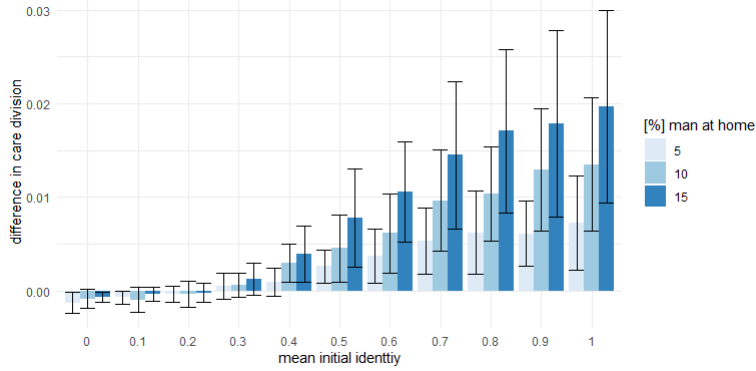
during the lockdown is reversed in 15% of all households, we found a more equal division of care work during the lockdown, but still women were doing a larger part. In the post lockdown phase, the share done by women returns to a slightly higher level, but still is lower than before the lockdown. Meaning that men take over a larger part of care work after the lockdown than before, when in 15% of the households only the man was at home during the lockdown.



**Fig. 2.** Share of care work done by the woman before, during and after a lockdown. On the x-axis are differentiated 3 values of the size of the fraction of households, where only the man is at home during the lockdown. The colors indicate the 3 phases: before a lockdown (pre), during a lockdown (lock) and after a lockdown (post). The initial gender identity of the households was drawn from a normal distribution with mean 0.85. We find that the fraction of households, where the time-availability of the spouses is reversed, is only sufficiently large to initiate a change when it is 15%. For smaller fractions we found no remarkable difference in the care work division before and after the lockdown.

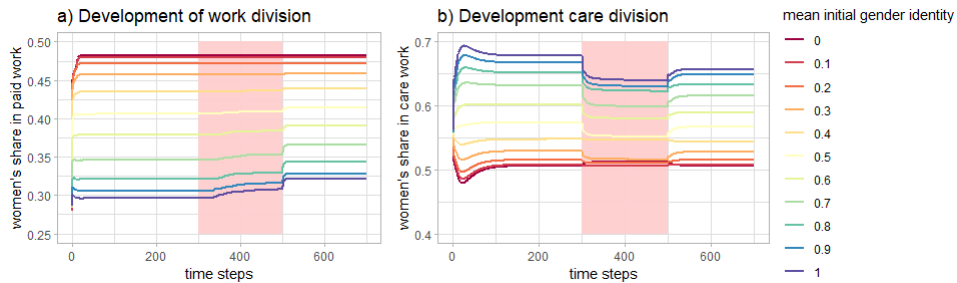
Figure 3 investigates the effect of the mean initial gender identity  $id$  on the difference between the care work division before and after a lockdown. Overall, we found a stronger change towards a more equal division of care work when the mean initial gender identity was more traditional. With very progressive initial gender identities there was a shift towards a traditional care work division, although, this effect was very small. As in Figure 2 the changes were larger, the larger the fraction of households where only the man was at home.

When we look at the dynamics of these changes, as shown in Figure 4, we can see when exactly they take place. Surprisingly, the main change does not happen during the lockdown, but the transitional phase after a lockdown offers the opportunity for an improvement of the situation of women. When the additional care work falls away again and based on the gender identity men show higher willingness to take over care work than before the lockdown, it arises as an opportunity for women to increase their labor participation, which then stabilizes the division of care work at a more equal level. Provided there is the possibility for woman to increase their working hours, i.e. available jobs, flexibility in working hours and suitable childcare.



**Fig. 3.** Mean difference in care division before and after a lockdown for different mean initial gender identity

The x-axis shows the mean initial gender identity. The colors depict the size of the fraction of households where only the man is at home during a lockdown. The height of the bars shows the difference in the care work division before and after a lockdown. Error bars indicate the standard deviation. We observed that the gender identity before the lockdown strongly affects the change in care work division. The more traditional the gender identity before the lockdown, the larger is the change towards a more egalitarian division afterwards.



**Fig. 4.** Dynamics of work division and care division for different mean initial gender identity

Dynamical changes of the division of paid work (a) and care work (b) before, during and after a lockdown. The red area indicates the lockdown phase. The colors of the lines depict the mean initial gender identity. It can be seen from the figures, that the transitional phase after a lockdown plays a crucial role in the development of a more egalitarian division of care work. Whereas parts of the change already take place during the lockdown, a stabilization of the care work division achieved during the lockdown by a more equal division of paid work to large parts happens in the transitional phase after the lockdown ended.

Overall, the effects of a reversed time-availability during a lockdown on the care work division were rather small in various model settings. Important factors are the size of the fraction of households where only the man is at home and the mean initial gender identity. The number of households where the man is the main care provider during the lockdown needs to be sufficiently high, in our model at least 15%, to have an effect on the surrounding households. Additionally, the effect was stronger, the more traditional the gender identity of the households was in the beginning. This reflects findings from Derndorfer et al. [9] who found that in households with a very traditional care work division before the lockdown, men were more likely to take over a larger part of the care work during the lockdown. Whereas, in households where the care work was divided in equal parts already before the lockdown, more often women took over the main part during the lockdown again. From these model results follows, that the lockdown presents a chance for a development towards a more equal division of care work especially for households with a very traditional initial gender identity. Further, the results highlight the importance of the possibility for women to increase working hours after the lockdown to enable a stabilization of the care work division on a more equal level compared to pre-pandemic.

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