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# Reducing Working Hours as a Means to Foster Low(er)-Carbon Lifestyles? An Exploratory Study on Swiss Employees

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**Abstract:** In the ongoing discussions on the transition to low-carbon systems a reduction of working hours has gained increased interest. A shift to lower incomes coupled with more discretionary time might promote low(er) individual carbon lifestyles without impairing individual well-being. Lower carbon emissions have been linked to shorter working hours on a macroeconomic level and to lower income, and thus less carbon-intensive activities on an individual level. However, little empirical research has been done on the effects of a self-determined reduction of working time on an intra-individual level. The aim of this paper was to explore whether and how a reduction of working hours facilitates low(er)-carbon lifestyles. We do this by means of 17 qualitative guideline interviews with Swiss employees that had recently reduced their working hours. Our results suggest that the underlying motives behind the employees' decisions to reduce their working hours are crucial. A beneficial climate-saving effect arose only for those employees who dedicated their newly gained time to binding activities, that require a certain degree of commitment, such as parenting and further education. In contrast, those who reduced their working hours due to a desire for more recreational time risked increasing the carbon intensity of their lifestyles due to carbon-intensive leisure activities.

**Keywords:** low-carbon lifestyles; working time reduction; part-time work; income; discretionary time

## 1. Introduction

There is a broad consensus that we will encounter huge ecological, as well as societal, adverse consequences, if we fail to dramatically reduce human-made greenhouse gas emissions within the next decade [1]. Particular responsibility lies with the industrialized countries, with their long history of emissions and continually high per-capita emissions on the one hand, and their high level of affluence on the other, which allows them to pioneer new ways of reducing emissions. Although nearly all nations committed to corresponding emission reduction goals in the context of the Paris climate agreement, a turnaround in the emission levels has so far failed to emerge and more ambitious efforts are needed in order to reach a zero-net-emissions goal by 2050 [2]. For example, the per capita carbon footprint of Switzerland, where the present study was conducted, has been stable at a very high level of 14 tCO<sub>2eq</sub>/a over the last 10 years [3]. The consumption of private households is one of the main drivers of greenhouse gas emissions [4], with transportation, housing and food as the dominant emitting domains. For example, a study on Switzerland [5] found that the average per capita carbon footprint is composed of 46% emissions from transportation (33% from private car use and 12% from air travel), 33% from housing, 16% from food, and 5% due to non-durable consumer goods. A closer look at activities that drive emissions up reveals that particularly transportation and housing depend on carbon-intensive recreation and leisure activities [6].

Switzerland, as for most other countries, has so far mainly followed a strategy of energy efficiency based on technological and product innovations, and consistency, i.e., the replacement of fossil fuel energy sources by renewables [7]. This strategy, however, has been criticized as being not ambitious enough and that broader transformations of our consumption and production patterns are necessary. Particularly, gains in energy efficiency are subject to rebound effects and it has been admitted that so far an absolute decoupling of economic growth from natural resource consumption has not manifested itself empirically [8,9]. Such transformations, however, have to be rooted in changes towards low(er)-carbon individual lifestyles. Research on conventional behavior change strategies, such as information and communication campaigns, social marketing or nudging show positive effects, however only to a limited extent [10]. Moreover, it has been found that individual carbon footprint levels, particularly in the domain of housing and transportation, only marginally relate to pro-environmental motivations, whereas individuals' income levels have a much stronger predictive power (e.g., [5,11]). Thus, even highly pro-environmentally motivated individuals emit high levels of greenhouse gases if their income allows them to do so [11], which raises the question of how to encounter this income effect on carbon emissions without impairing the well-being and life satisfaction of people.

The reduction of working hours is increasingly being considered as such an alternative policy that could facilitate a socio-ecological transition to a low-carbon future of the affluent industrialized countries of the Global North [8,9,12]. While the contribution of work time reduction to sustainability also touches upon social, economic and psychological aspects [13], this paper mainly concentrates on its influence on carbon emissions. Several macrolevel studies point towards a positive relationship between the overall or per capita working hours and environmental impact on a national level. For example, Fitzgerald et al. found strong positive relationships between the average working hours and state-level carbon emissions for the US states between 2007 and 2013 [14]. Knight et al. identified positive associations between the average working hours and ecological footprints, carbon footprints as well as carbon dioxide emissions for the 29 high-income OECD countries between 1970 and 2007 [15]. Thus, these two studies confirm the positive relationship between working hours and environmental burden found in earlier research [16,17].

However, how these relationships manifest themselves on an intra-individual level remains unclear up to now. They may be conceptualized in three ways, as illustrated in Figure 1: First, it has been argued, that working less will result in a loss of income, and thus a decrease in high-carbon consumption and activities; referred to as the so-called income effect [18,19]. Previous research has provided well-established evidence that higher incomes go along with higher levels of consumption and thus higher individual carbon footprints [6,11], but very few studies have verified an intra-individual connection between the two, i.e., a nexus between changes in income and changes in consumption as well as carbon footprints that occur within the same respective individual over time.

Second, a reduction of working hours is supposed to result in an increase of the respective person's amount of discretionary time; the so-called time effect. It has been argued that time scarcity prevents increases of consumption from being experienced in a meaningful way and therefore from leading to an increase in life satisfaction [20]. Empirically, it has been shown that spending money on time-saving but energy-intensive services can protect working adults from such adversary effects [21]. Moreover, it has been shown that the experience of time affluence is positively related to subjective well-being, partly because time affluence allows for the better satisfaction of psychological needs, such as autonomy, competence, and relatedness [22]. Furthermore, compensatory consumption can also compensate for unfulfilled psychological needs, with their direct causes being independent of time scarcity [23,24]. Considering that time affluence can have a positive effect on subjective well-being, time affluence may also cancel out this form of compensatory consumption.

It has also been argued, however, that the time effect of a work time reduction may have undesirable consequences in terms of low-carbon lifestyles. This occurs if the newly gained time is spent on activities that are more carbon-intensive than just going to work, simply because one has the

time and, despite experiencing a likely loss of income, the disposable income that allows one to do so. Such effects are referred to as time rebounds [25–27]. In order to evaluate whether a reduction in working time can reliably be described as a strategy that supports the emergence of low(er)-carbon lifestyles, researchers have examined the net burden of energy use and carbon footprints, when subtracting the increase in ecological burden due to the time effect from the increase in ecological benefits due to the income effect. These studies point in the direction of the income effect being stronger than the adverse effects of time affluence [18,19]. However, as mentioned, this empirical evidence is based on inter-individual comparisons and little is known on whether and if so, why individuals relocate time to resource-friendly activities after experiencing more time affluence due to a reduction of working hours.

Third, the ambivalent direction of the time effect has drawn attention to the role of individual value orientation. Generally speaking, more subjective, discretionary time may allow individuals to invest more time in activities that are important to them, i.e., to reduce the gap between their individual values and their actions. Consequently, more time might only manifest itself in more environmentally friendly behavior for individuals for whom the conservation of the environment is of high relevance. Empirical evidence has been found for such a moderating role of pro-environmental value orientation [28], whereas other results [29] do not support the assumption of a moderating effect of pro-environmental values. Other research has shed light on the interrelationship of non-materialistic or intrinsic values, sustainable behavior and subjective well-being, pointing out that individuals with a non-materialistic value orientation show more pro-environmental behavior and are more satisfied with their lives, compared to individuals whose values are highly materialistic (for an overview see [30]). In sum, it remains unclear, however, whether non-materialistic, intrinsic and ecological values may be a prerequisite for the decision to reduce working hours, or play a moderating role in turning newly gained time into a reduction of carbon emissions and whether they are subject to change, i.e., whether an experience of time affluence after the reduction of working time may lead to a shift in values from materialist values to more non-materialist values and hence a reduction of consumption and thus carbon footprints. Moreover, personal values and motives affect the decision to reduce working time [31], but it remains unclear, whether employees' reasons and motives behind their self-determined reduction of working time affect the manifestation of an income and/or time effect.

Taken together, while sizeable amounts of research has been conducted on both the income and time effect and macro-level studies point towards the relation between the reduction of working hours and carbon emissions existing on a national level, the debate on the micro-level, i.e., the individual level, which includes the income and time effects, is more open and incorporates aspects, such as intra-individual connections that have not been researched properly so far.

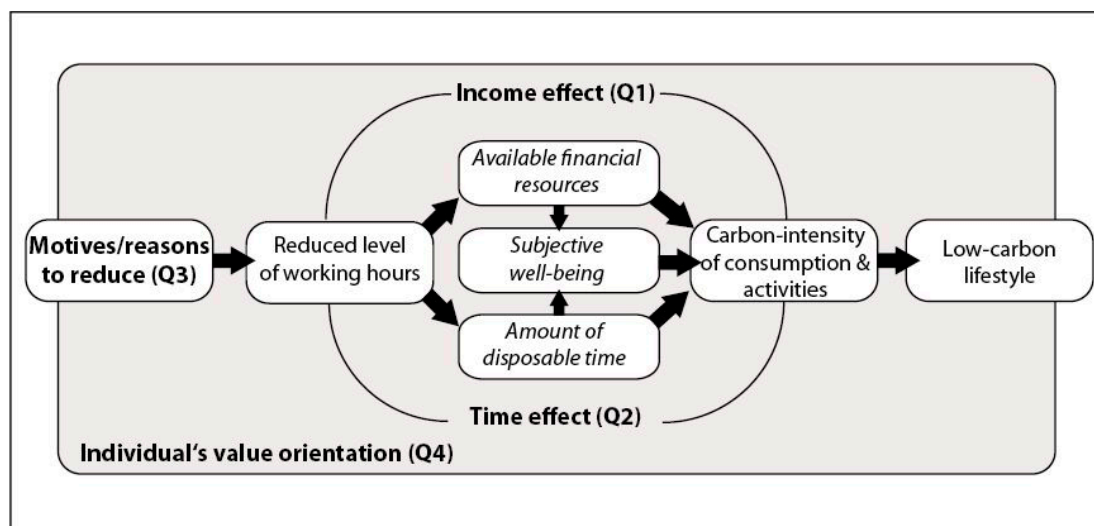
The overall aim of our study presented in this paper was to gain a better understanding of the characteristics and intervening factors and processes of factors and relationships between a self-determined working time reduction and the carbon intensity of lifestyles on an intra-individual level. We were thus interested in learning more about whether and under which conditions a self-determined reduction of working hours leads to a change in carbon-intensive activities on an individual level over time, in order to better understand the relevance of the income and time effects in this process and to explore intervening factors that may influence the manifestation of a potential income or time effect, such as individual value orientation. Our study lays an emphasis on our participants' reductions being self-determined. This is because we assume that in terms of suitable policy measures, in an immediate first step, it is more realistic and pragmatic to implement measures that help individual wishes of working part-time become reality. Contrary to this, legislating legal adaptations of official weekly working hours might result in a bigger impact, its implementation, however, seems to be a much more challenging and long-term process. With 'self-determined' we imply that the reduction in working hours weren't forced upon our study participants due to any decisions made by their employer or a lack of job opportunities. With the aforementioned overall aim in mind, we pursued the following overarching research question: What influence do changes in study

participants' financial resources, discretionary time and value orientations due to a reduction of their working hours, as well as the motives behind their decision to reduce their working hours, have on the carbon intensity of the way they use their time?

In more detail we are interested in the following four research questions:

- Q1: What sort of financial situation(s) do employees who reduce their working time find themselves in, what sort of changes are they subjected to over the course of a work time reduction, and to what sort of further effects do they lead that are carbon-relevant?
- Q2: What sort of changes occur in terms of the study participants' subjective discretionary time due to a reduction of working hours, how is the newly gained time used and, in particular, which changes in time use are carbon-relevant?
- Q3: What are the study participants' motives behind their decisions to reduce their working hours and what role do they play in terms of the carbon intensity of changes in their time use?
- Q4: What effect does a reduction of working hours have on the study participants' values and could any potential changes in values that derive from a reduction of their working hours affect shifts in the carbon intensity of their time use?

Figure 1 sums up the assumed factors and interrelations that are connected with work time reductions and low-carbon lifestyles as described above and locates our research questions within this theoretical structure.



**Figure 1.** Postulated relation between work time reduction and low-carbon lifestyles and associated factors that informed our research questions.

In order to answer research questions 1 and 2 and ultimately examine any potential income and time effects, we aimed to explore whether and how the reduction itself can lead to changes in the employees' available financial resources (Q1) and the amount of discretionary time they perceive to have on their hands (Q2). While the changes in the former case might manifest themselves in a reduction of financial resources (Q1), the changes in the latter case are suggested to result in an increase in employees' subjective discretionary time (Q2). These changes in turn may have a bearing on the employees' subjective well-being, as well as the carbon intensity of their consumption and therefore their contribution to a low-carbon lifestyle. In the context of research question 3, we intend to learn more about what sort of motives and reasons lie behind the decision to reduce one's working hours (Q3). Finally, the role that values might play in the context of work time reductions and low-carbon lifestyles, reflected in research question 4, is presented as an underlying feature in Figure 1, as individual value orientation may influence many parts of the chain of effects illustrated above and the direction(s) of causality may very well go in both directions (Q4).

## 2. Method

The study presented in this paper aims to explore the characteristics and intervening factors and processes of the interrelations between the aforementioned elements (cp. Figure 1). To this aim, an explorative, qualitative methodological approach is most suitable. Only such a qualitative approach allows the identification of different dimensions of relevant elements and processes at this early stage of understanding [32,33]. Semi-structured qualitative interviews were thus held with Swiss employees, who gave a retrospective account of their self-determined reduction of their working hours that they had experienced within the two years before being interviewed. The implications of the research design being explorative, as well as qualitative, are that our findings are not representative, nor can any reliable estimates of the extent of any observed effects be provided, as no such quantification took place. A quantification of the factors and identified effects was beyond the scope of our undertaking. It also means that aspects were analyzed without any prior knowledge of whether they would prove to be relevant for our research aims or not.

### 2.1. Study Site

In Switzerland, which is the geographical context of the present study, part-time work is (with 37.0% of all employees) a fairly frequent phenomenon, with only the Netherlands having a higher percentage of part-time workers in all of Europe [34]. At the same time, it is a rather gender-biased phenomenon, with 57.4% of female employees working part-time, but only 13.9% of men doing so [35]. Regarding the Swiss labor market, it must be noted that a workload of 100% usually corresponds with roughly 42 working hours per week accompanied by five weeks of holidays per year and part-time work is commonly defined as a workload below 90%. What must also be noted in the case of Switzerland, is that with only Norway and Luxembourg demonstrating higher median equivalized total household net income levels (adjusted to purchasing power parity), Switzerland's high wage level means that it is quite likely that it is easier to work part-time in Switzerland than in most other countries and that this may affect any possible income effects [36].

### 2.2. Methodological Procedure

Our research consisted of an explorative qualitative content analysis of semi-structured interviews that focused on reductions of working hours that the interviewees had experienced. Our research design is in a position to identify indications of what type of effects and interrelations between these effects can be found in relation to our research aims, but not to quantify them. In order to recruit participants, the research team collaborated with two big employers (one from the public, the other from the private service sector) in the German-speaking part of Switzerland. One requirement that the participants had to fulfill in order to take part, was that they had to have experienced a self-determined reduction of their workload of ideally at least 20% in the last two years before the interview took place. With one employer the study was announced via Intranet and interviewees proactively contacted the research team, whereas interviewees of the other employer were encouraged to participate by the human resources department. The interview participants were free to choose where their interview would take place. At the beginning of the interview participants were informed about the purpose of the interview, as well as issues of data protection and anonymity. In particular, they were informed that the interviews will only, and this in anonymized form, be used for scientific purposes, and no third party (including their employers) will have access to the raw data. Informed consent for conducting the interviews, using them for scientific purposes, and audiotaping them, was requested from the interviewees. The interviews were conducted in Swiss German, recorded, and their duration was usually around 45 min. Audiotapes of the interviews were subsequently transcribed in anonymized form (in High German) for further analysis.

### 2.3. Sample

Our complete sample was made up of seventeen participants. The sample was selected according to gender, size of the reduction of working time, professional function, age and life situation in a way that ensured that a satisfying diversity of personal characteristics was covered. The aforementioned criteria resulted in the composition of the sample including seven female and ten male participants; two employees estimated to have a management function, five middle-ranking employees and ten without any of the aforementioned attributes; one employee that was near retirement, ten aged roughly between 35 and 55 years and six who were likely to be younger than 35; six at a stage in life, where they don't have any family commitments yet, ten with young children and only one whose children have already left home. In terms of the extent of the study participants' reduction of working hours, eight interviewees reduced their workload by 20–25%, seven by 30% or more and two by only 10%, i.e., less than 20%. The latter two had already experienced another reduction in working time before though, which when added to their more recent reductions surpassed 20%.

### 2.4. Interview Guide

The interviews were conducted with the help of an interview guideline, which included five parts. The first part of the guideline aimed at collecting information on the study participants' reduction of working hours, as well as an array of further information regarding work-related aspects (working conditions, job security and satisfaction etc.) and the support that the study participants received in relation to gainful employment, as well as house- and care work. The second part concentrated on the motives and any doubts that lay behind the study participants' decisions to reduce their working time, while also including some aspects relating to their social situation ((household) income, wealth, etc.) that might contextualize any findings. The third part of the interview guideline intended to gather information on any changes in the study participants' time use and value orientations that occurred after the reduction of their working hours. The fourth part of the interview guideline was set to find out whether there were any obstacles or conducive factors during the study participants' process of reducing their working time. Finally, the fifth and final part of the interview guideline focusses on the study participants' social circle's reaction to the reduction of their working hours and allowed them to make further comments on the interviews themselves, if they wished to do so.

### 2.5. Data Analysis

The data analysis was based on the anonymized written transcripts of the interviews and was done following the structural coding method [37], as it allowed the codification of the data according to given research questions, but still provides a certain degree of inductive, exploratory coding. This enabled the exploration of the previously formulated research questions, but nevertheless guaranteed a certain openness that is required for exploratory research in order to be able to recognize aspects that up to that point hadn't been taken into consideration. In the case of our concrete research questions, this meant that the code families 'Finances', 'Time Use', 'Motives', and 'Values' were established with most of the other codes apart from the inductive codes and ones concerning subjective well-being deriving from them.

Documents (referred to as reports) that were created according to the research questions or rather according to the codes that correspond with the respective research questions were then analyzed. While this predominantly consisted of qualitative interpretations of the coded data, it also included rough quantifications in the form of what Mayring would call 'qualitatively orientated category-directed text analysis' [38]. It must be noted though that due to the non-representative sampling of this research, the authors decided to provide information on different emphases or manifestations of identified factors and processes rather than precise quantifications in the form of numbers. On top of this, a further part of the data analysis consisted of the identification of stereotypes [39].

### 3. Results

In accordance with the first of our four research questions, the following results section highlights some key findings on the financial situations that the study participants find themselves in, the main reported changes in their financial situations due to a reduction of their working hours and whether and how these changes might have an effect that is carbon-relevant. In a second step and reflecting the second research question, insights regarding the changes in their subjective discretionary time and time use due to a reduction of their working hours are provided, as well as an examination of whether these changes have an effect on the carbon intensity of their time use. In regard to the third research question, we then explore what sort of motives and reasons lie behind the study participants' decisions to reduce their working hours and what role they play in terms of the carbon intensity of their time use. Finally, in order to answer our fourth research question we will analyze the study participants' value orientations, whether and if so, how they changed due to a reduction of working hours and whether these changes have an effect on the carbon intensity of their time use.

#### 3.1. Employees' Financial Situations in the Context of Work Time Reduction and Low-Carbon Lifestyles

Based on our first research question, our main interest in this thematic part of the analysis was guided towards potential changes of the participants' income levels. However, further relevant topics emerged from our data, namely the participants' wealth and use of wealth in the context of their reduction of working hours, changes in the amount of money they saved after their reduction in working time, whether other people contribute to the study participants' household income and considerations they made regarding their financial security before their decision to reduce their working hours.

What was most striking, was that a large proportion of the study participants reported a high degree of subjective financial security. Findings that illustrate the study participants' high level of perceived and probably actual financial security are, for example, that most of them rated their job security as high, which means that their income was likely to be reliable, and that considerations regarding their career and income development, as well as their social security and old-age provision rarely played a role in their decision to reduce their working time. Furthermore, all apart from two of the study participants shared a household with someone who also works and therefore contributes to the household's income. Another indicator that demonstrates their perceived financial security is their wealth. Not a single study participant did not have a certain amount of wealth that they could have drawn upon if needed during the reduction of their working hours and only three of them actually had to do so.

As expected, the vast majority of the study participants experienced a loss of income over the course of the reduction of their working hours. In most cases, the study participants' loss of income was proportional to the amount of work time they reduced. In cases that weren't proportional, the share of lost income was bigger than the share of work time that was reduced. Only in cases in which a change of job or a transition from vocational training to regular employment took place was the proportion of lost income smaller than the proportion of working hours that was reduced, or an actual increase in income registered. The study participants' loss of income must be put into perspective though, due to the context of their relatively secure financial situations mentioned above.

It must also be noted though that the study participants frequently stated that they had been saving less money since they reduced their working hours and in many cases they became more aware of their spending, as illustrated by the following statement of an interviewee (all statements are translated from German to English):

*'Financially, one has to consider whether to continue saving money for another month [in order to go travelling], while before one never, or hardly ever had to contemplate whether one can go away or not. Now, with a smaller income, it's more a question of 'can we go [on holiday] this month, or should we wait another month, or should we wait until next year?' (Interviewee No. 8, 00.23.55)*

While quite a few study participants simply stated that there was less or no money left to save at the end of the month, others reported that they still enjoyed expendable forms of consumption (such as, e.g., eating out), but they paid more attention to what they were buying when doing so. Once again, the study participants' relatively secure financial situations played a role insofar that the losses of income had a bearing on the study participants' consumption patterns in only a few cases. In the case of those study participants that actually started to consume less, a decrease in shopping (as in shopping as an end in itself) and travelling was reported, as expressed in statements such as the following ones:

*[When asked whether they went on holiday more or less after their work time reduction]: 'Clearly less in terms of holidays, such as going to Australia or Mauritius and Reunion for five weeks, no, [we can't go] at all anymore.'* (Interviewee Nr. 4, 00.43.15)

*'Well, before I was obviously able to spend my income on nice holidays, I was able to go without something, for example shopping [shopping as in shopping as an end in itself], buying books, or going to the cinema, and in return save some money for longer holidays.'* (Interviewee Nr. 4, 00.44.17)

### 3.2. Employees' Subjective Discretionary Time and Time Use in the Context of Work Time Reduction and Low-Carbon Lifestyles

In the context of our second research question, it is important to focus on not one, but two sorts of changes, namely changes in the study participants' subjective discretionary time, as well as their time use.

In order to find out in which way and to what extent the study participants' time use changed due to the reduction of their working hours, both activities that were reported to have increased and decreased were coded. The two main activities that the newly gained time was spent on were parenting and further education. Beyond this, participants usually invested their time in interpersonal relationships (with regard to both family and friends) and leisure activities, such as sport. There were also two cases in which study participants dedicated their newly gained time towards voluntary work for social and ecological projects.

Most interestingly, our data showed that a voluntary reduction in working time is not necessarily accompanied by an increase in discretionary time, or at least not on a subjective level. More often than not the study participants' subjective discretionary time remained unchanged or even decreased. The newly gained time was quite often immediately filled with activities that the study participants may have freely chosen, but have a binding nature once the decision was made. This applies to the two main shifts in time use mentioned above, namely parenting, as well as further education, and, to a certain extent, taking up voluntary work. Particularly the latter example points to the importance of a differentiation between subjective and objective measures of discretionary, i.e., freely disposable, time (in terms of time left beyond paid work, household work and time for personal needs/care, see for example [40]). The line between subjective discretionary and bound time starts to blur as voluntary work is clearly a free choice on the one hand, but on the other hand study participants that did such work quite often reported that they did not feel that their discretionary time had increased, or even stated that it had decreased. In contrast, the only study participants that experienced some form of gain in subjective discretionary time were those who used their newly gained time for leisure activities.

The ways in which the study participants used their newly gained time exhibited both higher as well as lower degrees of carbon intensity. Cases with lower carbon intensity could be inferred from statements pointing to high-carbon activities being done less (e.g., travelling or shopping (as an end in itself)), as opposed to low-carbon activities being done more (e.g., cycling to work or subscribing to a vegetable basket scheme). The high-carbon activities that declined were mainly travelling, shopping, in the sense of it being an end in itself, as well as carbon-intensive excursions into nature, such as certain cases of hiking. The most interesting aspect of this observation was that this only applied to study participants who experienced a distinct reduction of both their income as well as their



subjective discretionary time, which was the case for some of the study participants who reduced their workload due to parenthood or further education. On the other hand, in some cases an explicit increase in subjective discretionary time went along with more carbon-intensive leisure activities, such as travelling or hiking, as the case of the following interviewee illustrates:

*[When the study participant was asked whether they thought that the reduction of their working hours allows them to go on holiday more often]: ‘That depends on how one defines holidays. In our case, working part-time means that your working days are simply allocated when the annual working schedule is devised and therefore that one has to work a bit more during summer and much less during winter, because there are simply fewer people around then. This means that it may occur that one has five days off in a row after having worked six days in a row due to having a reduced workload. All in all, I’d say yes, it does allow me to do more short trips than if I had to work Monday to Friday.’ (Interviewee No. 5 00.21.18)*

However, if one looks at the most common activities the participants used their newly gained time on beyond the two most frequent activities, parenting and further education—namely interpersonal relationships, certain outdoor activities, social and/or ecological projects and to a lesser extent reading and music, etc.—it must be noted that a high proportion of the activities seemed to exhibit low carbon intensity (when compared to the carbon intensity of different activities as calculated by [25,27]).

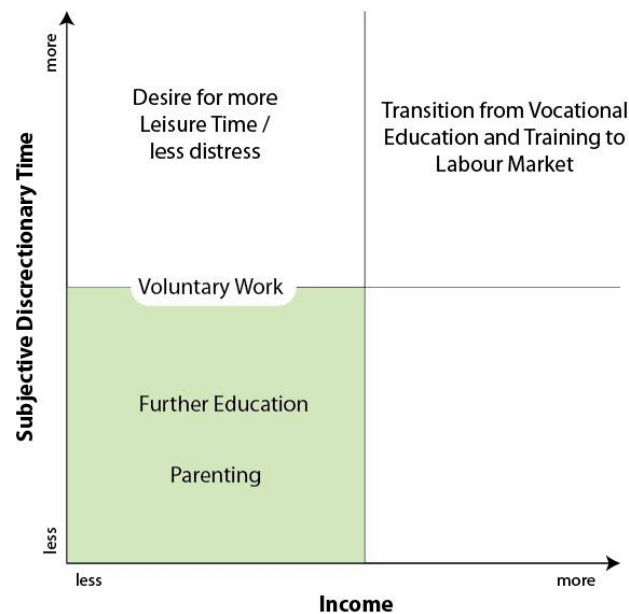
When examining whether the study participants were more likely to attribute the changes in the way they use their time to a change of income or a change of subjective discretionary time, the statements clearly pointed in the direction of the latter being the main driver. This is likely because a lot of the reported activities do not cost a lot of money, but require a certain amount of time (e.g., interpersonal relationships, or certain outdoor activities). When focusing on cases in which carbon-intensive activities decreased though, the changes in income seemed to play a more important role than the changes in subjective discretionary time. As the various combinations of changes in income and subjective discretionary time turned out to show a strong connection with the study participants’ motives to reduce their working hours, the aforementioned relationship is affected by critical life events such as parenthood. One common example that illustrates the aforementioned are parents who weren’t able to afford to go on holiday as much as they used to, both due to financial as well as time-related constraints:

*[When the study participant was asked whether they thought the shifts in their time use and values were due to changes in their financial situation or subjective discretionary time]: ‘As mentioned, both [the changes in income, as well as subjective discretionary time] have an effect in the case of the weekend trips. We want to spend our time with our daughter. If we had more time, we might go on holiday once more, but we don’t have that sort of time and we don’t want to sacrifice that time, because we want to take care of our daughter. Financially, well, I’d say it is different, because if you go away for a weekend with your friends that automatically means paying for food, drink, and accommodation. You can easily end up spending quite a bit of money. That does make itself felt, if one only has 150% income, as opposed to 200%, as we had before. I think one just has to plan differently. If one does treat oneself to something, one indulges oneself, but apart from that the purse strings stay tight.’ (Interviewee No. 3 00.31.26)*

### 3.3. Employees’ Motives behind Their Decision to Reduce Their Working Time in the Context of Work Time Reduction and Low-Carbon Lifestyles

Moving on to our third research question, the most common motives behind the study participants’ decision to reduce their working time can be categorized amongst four main groups, namely parenting, further education, voluntary work and a general desire to have more discretionary time. One important aspect is that the four main categories are sorted in descending order according to the degree of how binding they are. This is important insofar as it influences whether the study participants perceive to have experienced an increase or a decrease of discretionary time after the reduction of their working

hours. At the same time, it became clear that their reasons and motives thus not only determined the extent of the changes in their subjective discretionary time, but also, and just as relevant, the extent of the changes in their income. Moreover, and as briefly touched upon above, the combinations of changes in subjective discretionary time on the one hand and income on the other hand, as well as the extent of these changes, explained the extent of changes in carbon-relevant time use, as can be seen in Figure 2.



**Figure 2.** Motives and reasons fostering voluntary work time reductions according to observed combinations in subsequent changes in subjective discretionary time and income.

Participants who reduced their working hours due to parenting and further education experienced a reduction of both their income as well as their subjective discretionary time, as can be seen in the bottom left quadrant of Figure 2. More importantly, these changes were of a high extent. With regard to such circumstances, it was hardly surprising that they often stated that they did not possess the money and/or time to continue doing certain activities, some of which were carbon-intensive, such as going on certain types of holidays or going on weekend trips, both within Switzerland, as well as abroad (as illustrated in the preceding statement).

The role that the extent of the changes in income and subjective discretionary time plays is also highlighted by the participants who reduced their working time mainly in order to do more voluntary work. The voluntary work to which two study participants dedicated their newly gained time consisted of their participation in social and ecological projects. As from a subjective perspective, they felt that the amount of discretionary time at their disposal had not increased or even decreased, they too experienced a loss of both income and subjective discretionary time, or in the case of the latter at least a stagnation. Hence, their position in Figure 2 is on and around the border between the left-side quadrants.

*'I'd say I'm occupied to the same degree as before, but I think my second role [function within a voluntary project] is also a hobby in a way. I don't have any time pressure, as I do it on a voluntary basis. It's up to me how I organize myself. Sometimes I can decide whether I want to work during a specific week, or not, but I have committed myself to work roughly 20% for the [voluntary project].'*  
(Interviewee No. 1 00.12.26)

The extent of both of these changes, however, wasn't too pronounced, which is probably the reason why they didn't necessarily have to forgo carbon-intensive activities that require a certain amount of money and/or time.

While an obvious explanation for employees reducing their working hours in order to have more discretionary time may be the positive associations they make with the activities that they plan to spend more time on, several of this study's participants were actually driven by an urge to avoid negative situations that they found themselves in, namely the overwhelming feeling of work-related stress. Some of the interviewees expressed the desire for more time affluence, as the following statement demonstrates:

*[When the interviewee who reduced their working hours in order to avoid work-related stress was asked what they wanted to spend their newly gained time on]: 'To live ((laughs)). Just to come home before 22:00 for once, or to not constantly have the impression that I'm always behind schedule or can't get anything done. I wanted more time for my friends [and] parents, but as it was, I always lagged behind.'* (Interviewee No. 13 00.18.22)

Our sample also includes two participants whose income and subjective discretionary time actually increased over the course of their work time reduction. In both cases, this was due to their transition from a form of (further) vocational education to the labor market. Both their motives and the associated changes can be deemed as atypical though, which makes it difficult to make any assertions in regard to their cases.

If we are to take a closer look at the changes in carbon-relevant activities based on the preceding insights, the only combination of changes in income and subjective discretionary time that clearly lead to carbon-intensive forms of time use being done less, was if both the study participants' income and subjective discretionary time were reduced to a significant degree. This relates to the bottom left quadrant of Figure 2 and involves the motives of parenting and further education. While no clear changes in carbon-relevant forms of time use were discernable in the case of those study participants that chose to reduce their working hours in order to dedicate more time towards voluntary work, this didn't apply to those who had reduced their working hours in order to have more leisure time. Amongst them there were study participants that exhibited an increase in carbon-intensive forms of time use, as they had more discretionary time to do so and the reduction of their income didn't affect their disposable income to such an extent that they couldn't afford to do such activities (upper left quadrant of Figure 2).

#### 3.4. Employees' Value Orientations in the Context of Work Time Reduction and Low-Carbon Lifestyles

Last but not least, in regard to our fourth research question, what was conspicuous was that the goals and values the study participants mentioned were predominantly of a non-materialistic nature. Examples of non-materialistic values that were mentioned are mindfulness, gratefulness, honesty, ethical values, deceleration/being able to take one's time, politeness, nature, ecology, respect, caring, justice, health, happiness/joy, being considerate, responsibility, appreciation of life, satisfaction, reliability and interpersonal relationships. While work/productivity at work constitute an exception, discretionary time/self-determination and using time in a meaningful way are somewhere between non-materialistic and materialistic, as they can be individualistic and include examples such as photography, interior design, reading, sport, food and travelling. As can be seen towards the end of this list, values were quite often expressed in the form of activities.

When participants were invited to reflect on whether their values had changed over the course of the reduction of their working time, the most frequent answer was that they had remained the same, as the following interviewee explains:

*'Their [the values'] importance hasn't changed. Quite the opposite, it's rather that they've been given the right frame. I don't know how to put this, but I'm able to do them more justice than before. But their importance has remained the same.'* (Interviewee No. 13 00.37.35)

The preceding assumptions may point to the assumption that non-materialistic values might be a prerequisite for, rather than a consequence of, the decision to reduce working time voluntarily,

driving a desire of having more time to live according to ones values. The (few) participants who stated that their values had changed reported changes in the importance of pre-existing values, rather than that they had adopted new values, or given up old ones. Frequent examples of values that received increased significance were interpersonal relationships and leisure time, while the value of work seemed to be the only value that became less important.

It is also worth pointing out at this point that not a single study participant related the changes in their individual values to a change of income, but always ascribed them to a change in their subjective discretionary time.

Most interestingly, several study participants' statements supported the assumption of a moderating role of subjective discretionary time in the relationship between values and time use (i.e., the value action gap). On the one hand, a lot of study participants claimed they were more capable of living according to their values after reducing their work time when they were directly questioned on this matter and, on the other hand, elsewhere they stated that the reduction of their working hours allowed them to do what they really wanted to do in life, be it spending time with friends and family, or doing voluntary work. Thus, our findings allow the assumption that the study participants' work time reductions helped decrease their value action gaps, particularly in cases in which an increase in subjective discretionary time was recorded. The following quote illustrates the impact that time scarcity had on an interviewee's capacity to live according to their values:

*[When the interviewee was asked whether any of the shifts in their time use and values were due to a change in their subjective discretionary time [the interviewee then referred to the time before their work time reduction, when they had less subjective discretionary time]]: 'As mentioned, my values were influenced insofar as having less time led to stress and being stressed sometimes made it more difficult for me to live according to my principles, because I simply had to focus on coping.' (Interviewee No. 5 00.27.07)*

This is relevant from an ecological point of view, albeit only indirectly, as this suggests that people that possess pro-environmental values before reducing their working time, may be more likely to live according to them after reducing their working time. It must be noted though that our data doesn't include any examples of this nature and that it must be assumed that people who attribute more importance to values other than pro-environmental ones might use their newly gained time in an environmentally unfriendly way.

#### 4. Discussion

The overall aim of our research endeavor was to learn more about the characteristics, dimensions, intervening factors, and processes of the interrelations between a self-determined working time reduction and the carbon intensity of lifestyles on an intra-individual level. We sought, by means of qualitative interviews, to shed more light on what changes might evolve due to a self-determined reduction of employees' working hours in the context of their financial resources, discretionary time, motives and reasons behind their decisions to reduce their working time and individual values and how these potential changes and their interconnections may impact the carbon intensity of the way they use their time.

Starting off with the first research question—the financial changes that occurred in connection with the participants' reduction in working time—it is less the changes of income themselves but more the context in which these changes happened that is informative. Our data shows quite clearly that according to their own statements our study participants found themselves in very secure financial positions when they decided to reduce their working time. This suggests that most participants still possessed a certain amount of disposable income after the reduction of their working hours. While this explains why the reported effects on the study participants' consumption patterns appeared to be small, it did seem to lead to a decrease in the amount study participants save and an increase in awareness of what they spend. Based on our results we must assume that there is no guarantee for an income effect

as described in other studies on consumption decisions [18,19] on an intra-individual level and that the circumstances under which a decision to reduce ones working hours is taken, have to be looked at more closely. On top of this, the high degree of financial security that the study participants enjoyed poses the question of who can actually afford to voluntarily reduce their working time and whether such a degree of (perceived) financial and job security might even be a prerequisite for voluntary reductions of working hours. From this point of view, in a further step, it would be valuable to interview people who would like to reduce their working time, but think that they can't afford to do so.

Moving on to the second research question that relates to the changes in the way the study participants use and perceive their time, our findings on this matter proved to be particularly relevant from a low-carbon perspective. They point to the importance of the degree of how binding the activities are that are pursued with the newly gained time. Examples of binding activities are parenting and further education, but also voluntary work to a certain extent. The first two forms of changes in time use represent very common activities that our participants pursued during their newly gained time. Participants pursuing such binding activities reported unchanging or even lower carbon-intense activities, thus they seem to be resistant to time rebound effects such as those reported in previous research [26]. However, another picture evolved for participants shifting to activities that possess a high degree of flexibility when choosing them. Such activities that were frequently mentioned were spending time with friends and family and doing sport or rather outdoor activities such as cycling or hiking. When taking insights from previous research into consideration [18,25] it becomes clear that in terms of carbon intensity it makes a difference which specific leisure activities are exercised. While spending time with family and friends produces rather low-carbon emissions, sport and outdoor activities lead to a medium environmental burden. The aforementioned sources make no comparison to the carbon intensity of working, but Nässén et al. [41] estimate that these activities constitute a higher burden for the climate than being at work. Even more important, study participants who engage in binding activities do not necessarily experience time affluence in a sense of more perceived discretionary time. Thus, a careful distinction between the feeling of time affluence and the type of activities chosen is needed. Most interestingly, our results suggest that the choice among binding activities or carbon-intensive leisure activities is already laid out in the motives behind the decision to reduce working time.

In regard to the third research question, we were able to observe that the motives and reasons behind the study participants' decisions to reduce their working hours play an important role within the framework of work time reduction and carbon footprints. First off, we were able to identify four main types of motives based on the study participants' wishes to dedicate more time to parenting, enroll for further education, do voluntary work, or simply be able to dispose of their own time more autonomously in the form of leisure time. What became evident and as touched upon above, is that depending on how binding the activities are that these motives imply, they determine the combination of changes in income and subjective discretionary time that the study participants experienced following the reduction of their working hours. These combinations in turn appear to define whether there were any shifts in carbon-relevant time use. To be more precise, highly binding activities lead to sizeable reductions in subjective discretionary time, which, combined with substantial decreases in income, tended to lead to a decline in high-carbon forms of time use due to financial and/or time reasons.

One very important last finding, in regard to our fourth research question, was that in accordance with earlier findings [28] of an inversely correlated connection between subjective discretionary time and individual value action gaps, our data also showed strong indications of an increase in subjective discretionary time leading to a decrease of the study participants' value action gaps, although not necessarily in the context of pro-environmental values.

Returning to our overarching research question—whether work time reductions and related changes have an influence on the carbon intensity of time use—our results point in the direction of a reduction of working hours not necessarily per se, evoking a beneficial effect on individual

carbon footprints. Rather, it seems that this only applies in two specific situations: On the one hand, we observed that the motives behind the study participants' decisions to reduce their working hours, or rather the extent of how binding their content is, shape the subsequent changes and extent of the changes in income and subjective discretionary time, which in combination seemed to determine whether or not any shifts in ecologically relevant time use occurred. For example, when people spent their newly gained, free time on extensive, binding activities, they experienced both a sizeable loss of income and perceived discretionary time, which in turn led to a decrease of some of the carbon-intensive activities that require a certain amount of time and/or money. On the other hand, we found that many study participants felt they were more able to live according to their values after reducing their working hours. The ecological benefits of this effect are, in the case of this study, merely hypothetical though, as there weren't any observations in which this applied to pro-environmental values.

In terms of our study's limitations, it is clear that our study design is suited for providing first exploratory insights at this early stage of research [32], but is not capable of revealing consolidated conclusions and cannot yet be generalized in regard to, e.g., employees' characteristics, working contexts or even national contexts. We are convinced that the potential intervening processes that we were able to identify, i.e., the important role of motives, are worth being further investigated. Following research could go beyond the limitations of this study: First, our study is only based on a small and non-representative sample. Further research should lay an emphasis on testing whether our results also manifest in broader samples and in different structural and geographical contexts. Second, future research should investigate the relative importance of the different processes and intervening factors described in this study by quantifying the strengths of the identified relationships. For this a quantitative, longitudinal research design might be a useful next step. Third, such a quantitative design could also enable the quantification of the carbon intensity of activities, which our study was not capable of, in order to determine whether the effects of various different activities cancel each other out or not. A fourth limitation of our study is that our data is based on the study participants' own retrospective accounts. This means that we can only collect information on phenomena that our study participants were able to reflect upon and deemed as important enough to recount [41]. This retrospective approach might be subject to cognitive biases, and subsequent rationalizing. This could well be particularly relevant in the case of the study participants' values and their potential changes. Touching upon this, further research into how values change over the course of a reduction of working hours would be valuable in terms of observing ongoing processes over time, in order to make sure that any changes in carbon-relevant activities weren't just due to a lack of money or time, but because a person actively cares for the environment. A final limitation is whether the duration between our study participants' interviews and the point in time when they reduced their working hours is long enough for behavioral changes or changes in values to manifest themselves. Future research should be more sensitive to long-term changes.

All in all, the insights from this study point in the direction of the facilitation of part-time work under specific circumstances possibly being a promising, as well as pragmatic, strategy that could contribute to combatting climate change. A self-determined reduction of working time might be particularly beneficial for the climate, if the newly gained discretionary time is dedicated to new binding activities such as parenting, further education or, to a lesser degree, voluntary work rather than to an increase of leisure activities, such as outdoor activities and traveling. The way in which the newly gained discretionary time is invested seems to be predisposed in the motives and reasons that lie behind the individual decision to reduce working time. Further research, however, has to show, whether the effects identified in this study also hold true in larger samples and for other structural or geographical contexts.

If we were to make policy recommendations based on our findings and from a purely ecological perspective, it would make sense to make part-time work easier for employees who wish to dedicate a larger proportion of their time towards parenting, or further education, as a decrease in the carbon

intensity of time use was most probable for such motives. Harnessing the climate-saving benefits of a potential decrease of the value action gaps of employees after they have reduced their working hours seems to be more difficult though. A specific condition under which one may be able to do so, is if one creates offers that allow employees to take unpaid leave with the requirement that they dedicate it towards voluntary, ecological projects. Such measures seem plausible, as comparable initiatives already exist in Switzerland in regard to projects within the fields of youth and sports.

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