The impact of the time spent and the frequency of giving informal care on concentration at work and the influence of temporal flexibility.

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This thesis has been written as a study assignment under the supervision of an Utrecht University teacher. Ethical permission has been granted for this thesis project by the ethics board of the Faculty of Social and Behavioral Sciences, Utrecht University, and the thesis has been assessed by two university teachers. However, the thesis has not undergone a thorough peer-review process so conclusions and findings should be read as such.

Abstract

Informal caregiving plays a crucial role in the Dutch healthcare system and in today's society. However, the individual's ability to provide informal care is under growing pressure in which their employer can fulfil a crucial role. The impact of the time and frequency of giving informal care on concentration at work, as well as the role of temporal flexibility, remains largely unexplored in existing literature.

This study examined how the time spent and frequency of informal caregiving affect concentration at work, and whether temporal flexibility (the ability to determine the timing of one's tasks) plays a moderating role. Therefore, the following research question was examined: '*To what extent does the time spent and frequency of informal caregiving affect the ability to concentrate at work and does temporal flexibility influence this relationship?'.* A interdisciplinary approach was used with perspectives originating from economics, organizational psychology and resource management. The possibility of a positive impact of temporal flexibility was taken into consideration in the analysis.

The dataset used for this study was the Informal care - IZG 2019 (N=2618). This original study of this dataset provided insights into the number of individuals in the Netherlands involved in informal care.

Based on a binary logistic regression analysis, this study researches that spending more hours on informal caregiving is associated with an increased likelihood of experiencing concentration problems at work. Providing daily informal care increases the odds of reduced concentration at work compared to those who provide care occasionally or not at all. No moderating effect of temporal flexibility was observed, which could mean that temporal flexible work arrangements are not sufficient to mitigate the mental load of caregiving responsibilities

This study recommends an integrated employer approach to reduce mental strain among informal caregivers. Flexibility may help, though it carries risks. Supervisor training, shorter workweeks where feasible, clear communication, and emotional support can all contribute to reducing cognitive burden and supporting caregiving employees.

Introduction

Informal caregiving plays a prominent role in the Dutch healthcare system and impacts many people. Studies have shown that one in three (equals to 5 million) Dutch adults are providing care to a family member, friend, or acquaintance (Verbakel, 2017; De Boer et al., 2017). The number of informal caregivers is expected to grow the coming years (Kromhout, 2020; Ministerie van Volksgezondheid, Welzijn en Sport(VWS), 2023). This growing pressure on informal caregivers is largely driven by demographic and systemic shifts, such as population aging and the decentralization of healthcare services (Kromhout, 2020). Additionally, municipalities are increasingly transferring caregiving responsibilities from professional care to informal care.

While the need for informal caregivers is high, one in ten informal caregivers report feeling severely overburdened and 80% of informal caregivers state that they never feel free from their caregiving responsibilities (De Boer et al., 2020; MantelzorgNL, 2012). Even more worrying is that the number of informal caregivers feeling overburdened is expected to grow the coming years (Mantelzorgelijk, 2025).

A frequently discussed explanation for feeling burdened is the addition of caregiving responsibilities alongside paid employment (VWS, 2023; Heitmueller, 2006). Heitmueller (2006) discussed how the type and frequency of care provided reduces the worked hours of paid employment. Consequently, when essential activities such as sleep and personal well-being are compromised due to caregiving demands, cognitive functioning at work may suffer (Giuntella & Mazzonna, 2019). This reduced focus suggests negative labor market outcomes (Giuntella & Mazzonna, 2019; Gibson & Shrader, 2018). While studies suggest that caregiving may negatively affect concentration at work, this hypothesis is not empirically tested (Vin & Hagen, 2010; Vinarski-Peretz, 2024). Recent research by Urwin et al. (2023) emphasizes the need for a better understanding of how caregivers allocate time and how this affects workplace concentration. Specifically, while job or temporal flexibility (the ability to determine the timing of one's tasks) is often proposed as a mitigating factor, its role in buffering the impact of caregiving demands on concentration at work

remains unclear.

This quantitative study is designed to address this knowledge gap and study the relationship between the time spent and frequency of informal caregiving and concentration at work. The following research question was developed:

To what extent does the time spent and frequency of informal caregiving affect the ability to concentrate at work and does temporal flexibility influence this relationship?

Theoretical framework

This theoretical framework outlines key concepts and relevant literature used to examine the relationship between informal caregiving and concentration at work, focusing on the potentially moderating role of temporal flexibility. This section presents definitions and contextual background for each core concept, discusses relevant theories to clarify these concepts, and concludes with the formulation of four hypotheses.

Informal caregiving

Informal caregiving is defined as help from relatives and non-kin involving assistance with instrumental and personal activities of daily living. It is unpaid and not formally organized, and the care recipient is socially related to the provider of informal care, i.e. a family member, neighbor, or friend (Plaisier et al., 2014).

To contextualize and define informal caregiving, the Informal Care Model (ICM) by Van Groenou & De Boer (2016) is used. The ICM provides a conceptual framework for understanding the dynamics of informal care provision. It explores the factors influencing care needs, the distribution of care within informal networks, and the impact of caregiving on informal carers. By integrating both the supportive and burdensome aspects of informal care, the model offers valuable insights for optimizing care arrangements and informing social and healthcare policy (Klerk et al., 2021; Van Groenou & De Boer, 2016). With the ICM, we can look at to what extent individuals have autonomy in assuming and structuring their caregiving roles.

While some studies combine the time spent and frequency of informal care (Neubauer et al., 2008), this study distinguishes 'time spent' and 'frequency' of informal care. Aligning the ICM (Van Groenou & De Boer, 2016), these concepts reflect different dimensions of caregiving behavior, 'time spent' relates to the caregiver's available resources and ability to provide care and, 'frequency' reflects patterns of engagement that may be shaped by both willingness and contextual constraints. This distinction follows previous literature which emphasized that these two concepts represent different dimensions of caregiving behavior (Aughinbaugh, 2021;Yabroff & Kim, 2009). The concept 'time spent on informal caregiving' is defined as being a person who provides some type of unpaid, ongoing assistance with activities of daily living or instrumental activities of daily living to a person with a chronic illness or disability (Roth et al., 2015). The concept is operationalized by the number of hours of care provided per week (Yabroff & Kim, 2009). The concept 'informal care frequency' is defined as the frequency with which informal care is provided (Yabroff & Kim, 2009).

The ICM acknowledges the existence of time constraints, with paid employment serving as a significant limiting factor (Van Groenou & De Boer, 2016). Research indicates that individuals with long working hours are less likely to take caregiving responsibilities compared to those with shorter working hours (Van Groenou & De Boer, 2016; Josten & De Boer, 2015).

Concentration at work

This study uses the definition by Gardner et al. (1989) to define the concept 'concentration at work'. They used the concept employee focus of attention and define it as an employee's cognitive orientation towards each or multiple targets while he or she is at work; how strongly an employee thinks about various objects/events while physically present at their workplace (Gardner et al., 1989). This definition was applied for this study because it focuses more on the cognitive orientation of employees towards multiple objects or phenomena during work, whereas other definitions are more oriented towards the suppression of distractions (Banbury & Berry, 2004; Seddigh et al., 2014).

Research shows a wide range of negative effects that informal caregiving has on

concentration at work. For example, time constraints interfere with essential activities such as sleep and self-care (Giuntella & Mazzonna, 2019; Gibson & Shrader, 2018). As a result, this may cause mental distraction and has a significant effect on an individual's ability to stay concentrated and perform effectively in their professional role (Gautun & Hagen, 2010; Martsolf et al., 2019; Urwin et al., 2023). Other research showed that employees with caregiving obligations reported a loss of concentration on the job, that they participate less in social events and are not able to accept extra tasks that could promote their careers (Phillips, 1994; Murphy, 2012). Similar conclusions have been drawn by Phillips et al. (2002) and Bolin et al. (2007, stating that due to caregiving responsibilities employees needed to leave work early, stay away from work or are interrupted during their tasks.

In summary, using the ICM and the allocation of time theory as a conceptual lens, the distinction between time spent and frequency of care underscores the complexity of caregiving roles. Importantly, based on the definition by Gardner et al. (1989) and the findings in literature, high levels of stress and distraction caused by informal caregiving might reduce the employee's cognitive presence while being physically at work which may hinder job performance. This resulted in the following hypotheses:

H1: *The more hours individuals spend on informal caregiving, the lower their ability to concentrate at work.*

H2: *Increased frequency of informal caregiving negatively affects concentration at work.*

Temporal flexibility

According to Reilly (1998), flexibility in the workplace means that work can be performed at another moment in time (temporal flexibility), at another place (locational flexibility) or handed over to a colleague (functional job flexibility). This study is focused on temporal flexibility. To explain the influencing role of temporal flexibility in the effect of giving informal care on concentration at work the allocation of time theory by Becker (1965) is used. This theory examines how individuals distribute their time across various domains, including paid employment, caregiving, and leisure. This theory posits that individuals make rational decisions regarding time allocation, optimizing their

schedules within the constraints of available resources and competing demands (Becker, 1965).

Time is identified as a perceived barrier to caregiving (Van Groenou & De Boer, 2016); therefore, it is important to understand how carers use their time to assess the impact of giving informal care (Urwin et al., 2023). The amount of time dedicated to informal care has a significant effect on an individual's ability to stay concentrated and perform effectively in their professional role (Gautun & Hagen, 2010). This aligns with one of the core principles of the Allocation of Time Theory: individuals have a finite amount of time and must make deliberate choices regarding its distribution across various activities, including work, leisure and other commitments (Becker, 1965). When individuals allocate time to a specific activity, including providing informal care, the time available for other pursuits, such as paid employment, diminishes (Becker, 1965). Because of this, flexibility over working hours is the most prominent facilitation that employees emphasize (Philips, 1994).

Additionally, others suggest that flexibility over working hours has a positive impact on balancing work and caregiving responsibilities (John, 2017). John (2017) states that flexible working hours, when strategically implemented and aligned with employees' needs, can contribute to enhanced productivity. To maintain productivity, it is undesirable to have many distractions (Banbury & Berry, 2004). Since productivity is closely linked to concentration, it can be hypothesized that flexible working hours contributes to improved concentration in the workplace(Seddigh et al., 2014). Furthermore, flexible working hours may increase the likelihood that care providers are able to continue working (Pavalko & Henderson, 2006).

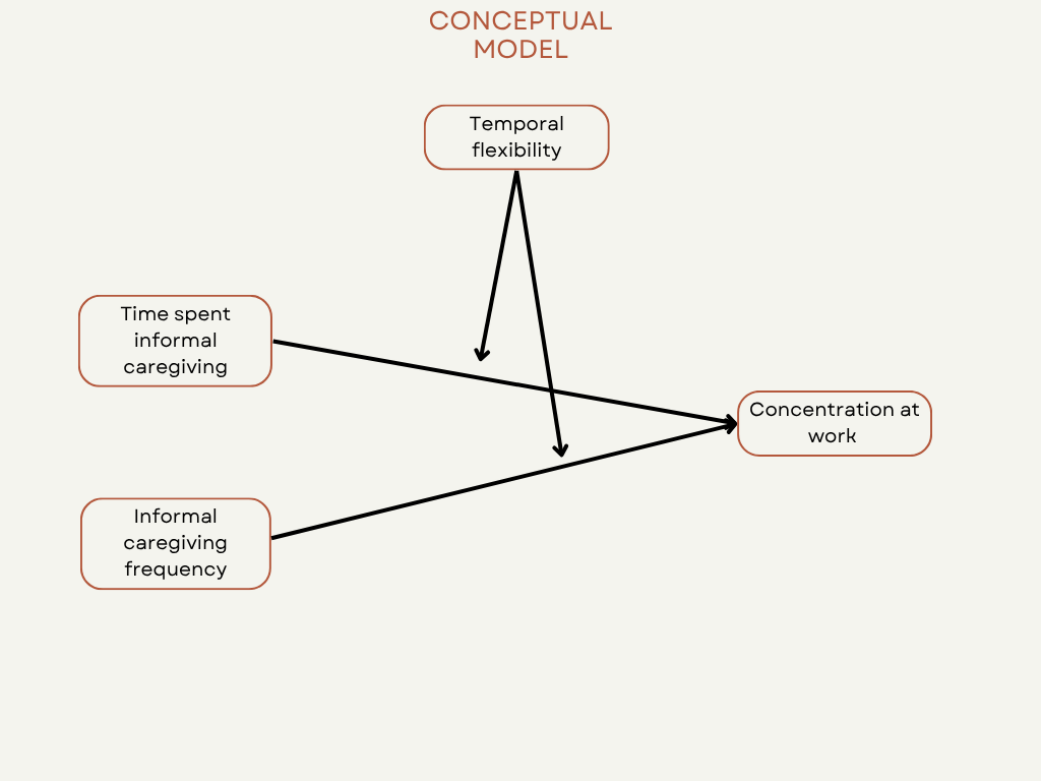
Summarizing, temporal flexibility, appears to play a meaningful role in the relationship between informal caregiving and concentration at work. Using Becker's Allocation of Time Theory, this study highlights how flexibility in work scheduling can help mitigate the negative effects of caregiving responsibilities. By allowing employees to better balance competing demands, flexible working hours not only support continued workforce participation among caregivers but also enhance concentration and productivity at work. Therefore, the following hypotheses state as follows:

H3: *Temporal flexibility buffers (moderates) the positive effect of hours spent on informal caregiving on concentration at work.*

H4: *Temporal flexibility buffers (moderates) the positive effect of informal caregiving frequency on concentration at work.*

This study explores the impact of informal caregiving on employees' concentration at work and the moderating role of temporal flexibility. The growing prevalence of combining work and informal care, serves as the context for this research. This leads to the research question: *To what extent do the time spent giving informal care and the frequency of informal caregiving influence concentration at work and is this relationship moderated by temporal flexibility?*

Figure 1. Conceptual model



Methods

Data collection

This study aims to examine how caregiving time and frequency affect employees' concentration at work, and whether temporal flexibility moderates this relationship.

To test the formulated hypotheses, the quantitative dataset "Informal Care – IZG 2019'' is used (Sociaal Cultureel Planbureau (SCP) & CBS, 2020). The data was collected using quantitative methods, allowing for further quantitative analysis. Because the dataset targeted a broad group of informal caregivers, a quantitative design of this study was particularly suitable for efficiently gathering data from a large and diverse sample. The dataset provides insights into the number of individuals in the Netherlands involved in informal care, either as informal caregivers or as volunteers in the care sector, of which this study only focuses on the primary group of respondents.

The target population of the IZG consists of individuals aged 16 years or older residing in the Netherlands who are part of private households. This is operationalized as all individuals aged 16 years or older who are registered in the Personal Records Database (BRP) and do not belong to the institutionalized population, referring to people living in institutions, such as nursing homes, prisons, or asylum centers.

Both online surveys and telephone interviews were used to collect the data between September 2019 and January 2020. The dataset obtained 12.348 responses, through 8800 online surveys and 3548 trough telephone interviews.

Independent, dependent and moderating variables

This study examines the relationship between informal caregiving and concentration at work, considering time spent on caregiving and caregiving frequency as independent variables. Temporal flexibility is included as a moderating variable, while gender, age and worktime hours are control variables. The following section provides a detailed operationalization of each construct.

Time spent informal caregiving

Time spent is operationalized by measuring the hours per week an individual spent on informal caregiving. The question that was asked was the following: How many hours per week do you help on 65average? If you do not know the exact number, we kindly ask you to make an estimate. Please round up to the nearest whole hour. [0..168] hours per week.

Informal caregiving frequency

The frequency of informal caregiving captures whether informal care was provided on a daily, weekly, monthly, or rare basis. The question asked in the database is the following: How often do you provide care? We refer to all the help you provide to (him /her). 1.Daily 2. Weekly 3. Monthly 4. Since the main focus is on individuals who frequently provide informal care, the following categorization was used for the purpose of this analysis: this variable was recoded into a binary variable: 1 = daily caregiving, and 0 = weekly, monthly, or rarely.

Concentration at work

Concentration at work was assessed as whether caregiving responsibilities negatively affected workplace concentration. Participants indicated whether their ability to focus on work had been impacted. The question asked was: Does providing care affect your concentration at work? 1. No, not at all 2. Yes, a little 3. Yes, very much. For this analysis, the variable was recoded into a binary variable: 1= negative impact, and 0 = no impact.

Temporal flexibility

Temporal flexibility was reported as the extent to which participants could regulate their own work hours. The question in the dataset was: To what extent are you able to determine your own working hours? 1. Almost entirely 2. To some extent 3. Not at all. To test interactions in a logistic regression, categorical variables with only two categories are required. Therefore, this variable was recoded in two binary variables: 1 = almost entirely, and 0 = not at all. 1= to some extent, and 0 = not at all.

Control variables

To account for potential gender-related differences in caregiving behavior and its impact on work concentration, gender was included as a control variable. Respondents specified their gender as either male or female. To examine if weekly working hours are related to the outcomes, this variable was also included in the analysis. Participants were asked: 'How many hours do you work on average per week, excluding overtime and unpaid hours?' Furthermore, to look at age-related differences, age was also included as a control variable. Respondents could choose from six values: 1. 16 to-34 2. 35 -t 44 3. 45 - 54 4. 55 - 64 5. 65 tot 74 6. 75 - .... Due to low respondent numbers in some age categories, the age variable was recoded into three groups: 1 = 16–44, 2 = 45–64, and 3 = 65 and older.

Analysis

To test the hypotheses, a binary logistic regression analysis with moderation was conducted using SPSS. Initially, multiple regression was chosen as the analysis method, as two independent variables were being tested. During the analysis, it became clear that the assumption of normality was not met. This raised doubts about whether the dependent variable could be treated as continuous (See appendix A). The variable turned out to be ordinal and the variable was recoded into a binary variable for analysis. As a result, binary logistic regression was used.

The relationship between the independent variables and the binary dependent variables is analyzed using the logistic function and the estimated b-coefficients. These represent the log-odds of the outcome variable being in one category relative to the other category. Logistic regression requires absence of multicollinearity, a linear relationship with the log-odds, and that outliers are accounted for. There is no multicollinearity because the VIF values are lower than 5 (see Appendix B). The assumption of linearity between the logit and the continuous predictor was tested and was not significant (p=0,807; see Appendix B), suggesting a linear relation. By looking at the standardized and studentized residuals, some observations were bigger dan +3, suggesting possible outliers (see Appendix C). Since the dataset consists of subjective experiences of respondents, these observations

were not excluded. Without objective evidence of measurement or input errors, removing them could lead to the loss of meaningful information. Therefore, the analysis was conducted including all data.

Exploratory analysis

Although time spent and frequency are treated as separate variables because they represent different aspects of caregiving, this study also explores whether they are related to each other. This approach makes it possible to first analyze their individual roles, and then examine whether more frequent caregivers also spend more time doing so.

Data management and ethics

To test the different hypotheses in this study the data analyzing program SPPS (version 30) is used. This study has obtained approval from the Ethics Committee of the Faculty of Social and Behavioral Sciences at Utrecht University. In this study, the quantitative dataset "Informal Care – IZG 2019'' is used (SCP & CBS, 2020). At that time, ethical review was not part of internal quality control of projects. No other ethical reviews were done besides the approval of the Ethics Committee of the Faculty of Social and Behavioral Sciences at Utrecht University.

During this study, the DANS license was complied. The dataset was used responsible in accordance with the Netherlands Code of Conduct for Research Integrity and the General Data Protection Regulation (GPDR). Permission to use the dataset was asked and the dataset is always cited. No personal data was identified and all analyses were conducted respecting the confidentiality of the respondents in the dataset used. The data was stored securely at the Utrecht University and handled with care and responsibility.

Analysis and results

Descriptive statistics

The sample used in this research aligns with the demographic profile of informal caregivers in the Netherlands in comparison with national statistics from CBS (Centraal Bureau voor de Statistiek (CBS), 2023). In the used sample, 55,4% of respondents are women and 44,6% are men. This corresponds with CBS data indicating that women (15,3%) provide informal care more often than men (10,0%). The largest group in the dataset is between 55 and 64 years old, which is consistent with CBS findings that most caregivers are 50 to 59 years old (21,4%) (VZinfo, 2024). The average number of hours of informal caregiving per week in the dataset is 6,28 hours, which is lower than the national average of 9,9 hours in 2019 (CBS, 2023). The higher CBS average can be explained by the stricter inclusion criteria they apply (at least 3 months of care or 8 hours per week) and the larger scale of their study (N = ±365.000) (CBS, 2023). These factors may contribute to a higher reported average in the CBS data compared to this dataset. This suggests that the sample used in this research may be less representative of informal caregivers that spent more hours giving informal care.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Weekly working hours	2895	0	95	29.97	12.774
Time spent informal caregiving	4313	1	168	8.39	18.508
Gender	4313	1	2	1.57	0.496
Age	4313	1	6	3.37	1.568
Temporal flexibility	2940	1	3	2.12	0.720
Informal caregiving frequency	4313	1	4	1.92	0.768
Concentration at work	2659	1	3	1.25	0.483
Valid N (listwise)	2618				

Source: IZG (2019)

The effect of the frequency and the time spent giving informal care on concentration at work

In Tabel 2 Model I, the direct effect of the frequency of giving informal care and the time spent giving informal care is tested on concentration at work. The first hypotheses (H1) of this study expected that the more time individuals spent on informal caregiving, the lower their ability to concentrate at work. A significant effect was observed for this predictor. The odds of experiencing a negative effect on concentration at work is higher when the hours spent giving informal care is higher (B = 0.029, SE = 0.005, $p < .001$, Exp(B) = 1.029, 95% CI [1.018, 1.040]). For every additional hour of informal caregiving, the odds of experiencing a negative effect on concentration at work increase by 2.9%. Therefore, Hypothesis 1 (H1) is supported.

The second hypothesis (H2) expected that a higher frequency of informal caregiving negatively affects concentration at work. A significant effect have been found. Providing daily informal care (compared to none or occasional care) significantly increased the likelihood of a negative impact on concentration at work (B = 0.931, $p < 0.001$, Exp(B) = 2.537). Providing daily informal care increases the odds of experiencing a negative impact on concentration at work by approximately 154% compared to those who provide no or occasional care. This means that the second hypothesis is supported based on the current findings.

The moderating effect of temporal flexibility

The third hypothesis (H3) expected that temporal flexibility moderates the relationship between time spent informal caregiving and concentration at work and the fourth hypothesis (H4) expected that temporal flexibility moderates the relationship between informal caregiving frequency and concentration at work. Table 2 Model II, shows that none of the interaction terms between the time spent informal caregiving and temporal flexibility were significant ($p > 0.05$), indicating that temporal flexibility does not moderate the effect of caregiving on concentration. Therefore, both hypothesis 3 (H3) and hypothesis 4 (H4) are rejected. The direct effect of temporal flexibility on concentration at work was significant (B = 0.332, $p = 0.032$). Temporal flexibility also increased the odds of a negative impact on concentration at work.

Table 2. Binary logistic regression analysis

	Model I			Model II		
	B	**SE**	**Exp(B)**	**B**	**SE**	**Exp(B)**
Intercept	-1.391**	0.190	0.249	-1.436**	0.199	0.238
Time spent informal caregiving	.029**	0.005	1.029	0.024**	0.007	1.025
Informal caregiving frequency	.916**	0.111	2.498	1.026**	0.187	2.791
Temporal flexibility - Full	.032	0.141	1.033	0.076	0.190	1.079
Temporal flexibility - Some	0.181	0.111	1.198	0.274	0.151	1.315
Interaction temporal flexibility – Full x informal caregiving frequency				-0.098	0.318	0.907
Interaction temporal flexibility – Full x time spent giving informal care				0.007	0.014	1.007
Interaction temporal flexibility – Some x Informal caregiving frequency				-0.209	0.248	0.811
Interaction temporal flexibility – Some x time spent giving informal care				0.010	0.012	1.010
Nagelkirke R2	.108			.108		
Hosmer-lemeshow	20.931			16.952		
Chi-Square	193.166**			194.189		

*Notes: *p <0.05 : **p<0.001 Source: IZG (2019), N=2618*

Control variables

Table 4 shows that the number of working hours per week was a small but significant predictor of negative impact on concentration (B = 0.011, p = 0.010), with more hours being associated with an increasing odds on a negative impact on concentration. Gender had no significant effect (p = 0.210), while age was marginally significant (p = 0.062), showing a trend suggesting that older participants were less likely to experience a negative impact on concentration.

Table 3. Binary logistic regression analysis control variables

	B	SE	Exp(B)
Intercept	-1.147	0.160	0.318
Weekly working hours	0.010	0.004	1.010
Gender	0.181	0.103	1.198
Age	-0.102	0.082	0.903

*Notes: *p <0.05 : **p<0.001 Source: IZG (2019), N=2618*

Exploratory analysis

A logistic regression analysis was conducted to examine whether time spent providing informal care and informal caregiving frequency interact with each other and moderate the relationship with concentration at work. This analysis revealed a significant interaction effect (B = -0.124, SE = 0.016, p = 0.001, Exp(B)=0.883).

Table 6: Binary logistic regression analysis – predictors

	B	SE	Exp(B)
Intercept	-0.986	0.091**	0.373
Time spent informal caregiving	0.137	0.016**	1.147
Informal caregiving frequency	0.491	0.122**	1.633
Time spent informal caregiving x Informal caregiving frequency	-0.124	0.016**	0.883

*Notes: *p <0.05 : **p<0.001 Source: IZG (2019), N=2618*

Discussion

This study tested whether there is an impact of the hours spent and the frequency of giving informal caregiving on employees' concentration at work. It also examined the potential moderating role of temporal flexibility in this relationship. Additionally, the association between the time spent on informal caregiving and the frequency of caregiving was tested. The research question was: *To what extent do the time spent giving informal care and the frequency of informal caregiving influence concentration at work and is this relationship moderated by temporal flexibility?*

Key findings

The results confirmed that both longer caregiving hours and daily caregiving are linked to a higher likelihood of concentration difficulties. However, the expected moderating effect of temporal flexibility was not found. While temporal flexibility alone was associated with more concentration issues, it did not buffer the negative impact of caregiving. This suggests that temporal flexible work arrangements are not sufficient to mitigate the mental load of caregiving. Additional findings showed that longer work hours slightly increased concentration problems, age had a marginal protective effect, and gender was not significant. An interaction effect was found between caregiving time and

frequency, indicating that their combined influence intensify concentration issues beyond their individual effects.

Time spent informal caregiving and the frequency of giving informal care

This study found that providing more hours of informal caregiving, on a daily basis, is associated with a higher likelihood of experiencing concentration difficulties. This aligns with findings from previous studies, indicating that informal caregiving negatively affects concentration at work (Giuntella & Mazzonna, 2019; Gibson & Shrader, 2018). In this study, individuals who provide daily informal care are compared to those who provide none or only occasional care. This means that providing informal care on a daily basis, a relatively frequent commitment, has a noticeable negative impact on concentration at work compared to providing care less frequently. These findings highlight that the amount of time devoted to informal caregiving significantly affects an individual's ability to concentrate and perform effectively in their professional role (Gautun & Hagen, 2010; Martsolf et al., 2019; Urwin et al., 2023). Previous studies conceptualize 'time spent' and 'frequency' of informal caregiving as distinct variables, rather than combining them (Aughinbaugh, 2021; Yabroff & Kim, 2009). This analytical separation reflects the notion that caregiving behavior consists of multiple dimensions, each potentially influenced by different factors. Aligning their method, this study examines both separately. However, an exploratory analysis revealed a significant interaction effect between time spent and frequency of caregiving. This suggests that the two dimensions do not function entirely independent, but influence each other's impact on concentration at work. Specifically, the effect of caregiving frequency on concentration at work appears to depend on the number of hours spent providing care. This finding challenges the separation and highlights the value of considering potential interaction effects in caregiving research.

Temporal flexibility

This study found that temporal flexibility does not moderate the relationship between the amount or frequency of informal caregiving and concentration at work. However, it did show a direct negative effect on concentration. These findings contradict earlier studies (Gautun & Hagen, 2010; John, 2017; Philips, 1994), which found that caregiving negatively affects work performance and that flexible hours help employees manage both roles. A possible explanation lies in the measurement of temporal flexibility: this study assessed only whether individuals could manage their own working hours, while flexibility is a broader concept (Reilly, 1998). The direct negative effect is notable and may suggest that flexibility benefits those with high caregiving demands, but may be of limited benefit for those with fewer caregiving responsibilities.

Reilly (1998) highlights that flexibility includes various forms, such as adjusting the timing of tasks or delegating them to others. This study only captured flexibility in scheduling, not in task redistribution or work location. Another explanation may be that flexibility brings its own challenges. According to Hoogenboom et al. (2024), employees with high autonomy over time and location can more easily combine work and caregiving but are more prone to overburdening. Adjusting when or where work is done does not reduce the overall workload, which might explain why flexibility did not have the expected buffering effect.

Influence of weekly working hours

The results show that longer working hours per week, although included as a control variable, are significantly associated with reduced concentration at work. This supports the idea that working time plays a role in cognitive strain. According to Becker's (1965) theory of time allocation, longer workweeks reduce the time available for personal needs, and when combined with caregiving responsibilities, this may lead to mental fatigue and decreased concentration (Giuntella & Mazzonna, 2019; Gibson & Shrader, 2018).

Strengths and limitations

This study has its strengths and limitations. One limitation is that relevant factors regarding this topic are not included in this study, such as the caregiver's home situation and the type of care provided (VWS, 2019). Furthermore, whether informal care is provided in a co-residency context is important, as such arrangements are often inflexible and limit the caregiver's ability to step away from the care environment (Hoogenboom et al. 2024). The caregiving burden can vary depending on these factors, for example, many hours of low-intensity care may have a different impact than fewer hours of high-intensity care. Similarly, frequent small tasks differ in effect from less frequent but more demanding responsibilities (VWS, 2020). Additionally, different types of flexibility should be taken into account to follow previous findings. Future research should therefore account for both the caregiver's context, the nature of the care and different types of flexibility into account.

Regarding methodological strengths and limitations, internal validity is questionable because of social desirability bias. Internal validity indicates how confidently changes in the outcome can be attributed to the independent variable (Kaya, 2015). Social desirability bias may cause caregivers to underreport stress or overstate their work performance (Grimm, 2010). Additionally, the phrasing of questions and the use of binary response options may have encouraged acquiescence bias, reducing reliability (Hinz et al., 2007). For example, concentration is a complex construct that cannot be adequately measured with a simple yes-or-no question. Regarding external validity, the approximate truth or usefulness of an inference, self-selection bias is a concern (Trochim, 2007). The average hours spent on informal care in this dataset are lower than the national average, indicating a less representative sample and limiting generalizability. This may lead to an underestimation of the moderating effect of temporal flexibility, as key segments of the population with higher care hours are likely underrepresented (CBS, 2023; Elston, 2021). Although the study addresses a social relevant issue, its ecological validity (whether or not one can generalize observed behavior to natural behavior in the world) is limited, as surveys may not fully capture the nuanced realities of caregiving and workplace challenges (Schmuckler, 2001).

Despite these limitations, a key strength of this study is its interdisciplinary approach. By using insights of economic theory (e.g.,Becker's (1965) allocation of time theory), management research on workplace flexibility (e.g., John, 2017; Plaisier et al., 2014), and organizational psychology perspectives (e.g., Reilly, 1998), the study captures the multifaceted nature of informal caregiving and its impact on work. This combination of disciplines is essential to understand the complex interaction between caregiving demands, flexibility, and concentration at work.

Implications and recommendations

These findings have important implications for policymakers and employers. When employees experience concentration difficulties and provide informal care, it is crucial to consider the impact of caregiving time and frequency. Organizations and employees should look beyond just temporal flexibility and consider additional measures (Hoogenboom et al. 2024). For example, enabling remote work when possible, offering flexibility in deadlines and task order, and providing psychological support to help manage caregiving-related stress could be beneficial.

Based on this study's findings, an integrated approach from employers is recommended to reduce mental strain among informal caregivers. Various forms of flexibility may be needed (Reilly, 1998), though these can also carry risks (Hoogenboom et al., 2024). To balance support with these risks, supervisor training is key to raising awareness and improving assistance for caregiving employees (Visser-Meily et al., 2004; Handreiking mantelzorg en werk, 2020). Since long working hours has a negative effect concentration, offering shorter workweeks may help reduce cognitive burden (Van Groenou & De Boer, 2016; Josten & De Boer, 2015). Clear communication about available resources, combined with support from supervisors and colleagues and a compassionate workplace culture, helps employees manage caregiving alongside work (Visser-Meily et al., 2004; Handreiking mantelzorg en werk, 2020). Emotional support from employers also plays a role in reducing stress and improving mental well-being (Van Groenou et al., 2015).

This study concludes that both time and frequency of informal caregiving negatively affect employees' concentration at work, independent of each other. Contrary to expectations, temporal flexibility did not buffer this relationship and was itself associated with increased concentration difficulties, suggesting that flexible scheduling alone may not alleviate the mental burden of caregiving. These findings underscore the need for more comprehensive workplace support strategies that stretch beyond temporal flexibility, including adjustments in workload, enhanced supervisor support, and attention to the caregiving context, to effectively support employee well-being and cognitive functioning.

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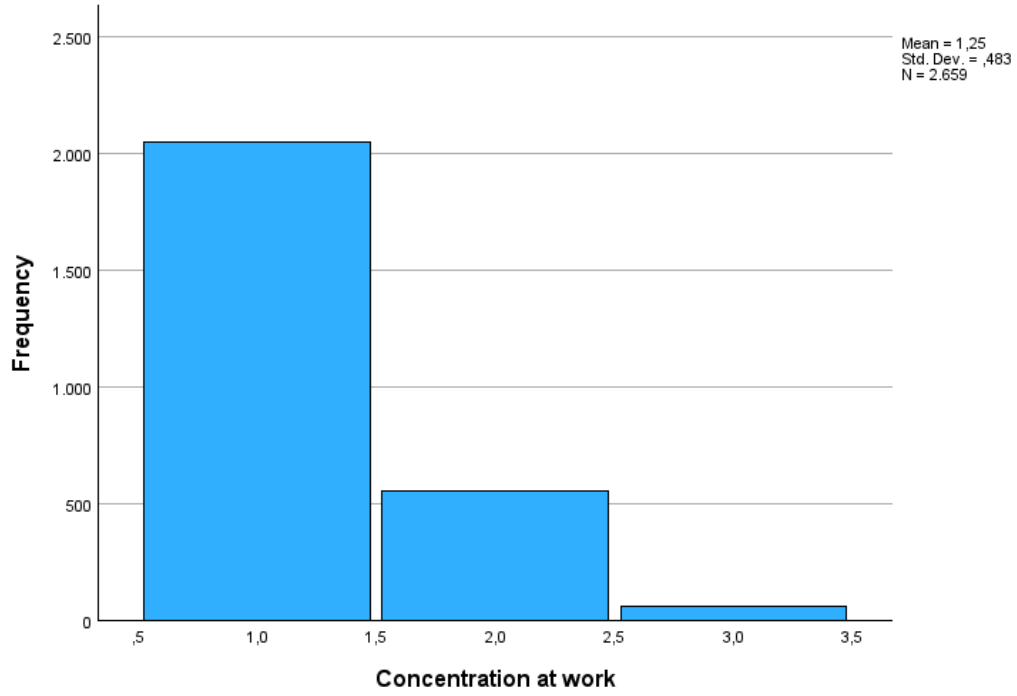
Appendices

Appendix A. Assumption of normality

Histogram 1. shows the distribution of concentration at work



Source: IZG (2019), N=2618

Appendix B. Testing the assumption

Table 1. Assumption of linearity

	B	S.E.	Sig.	Exp(B)
Time spent giving informal care	-0.001	0.056	0.987	0.999
Time spent giving informal careLN	0.888	0.165	<0.001	2.429
Time spent giving informal care LN_interaction	-.003	0.011	0.807	0.997

Source: IZG (2019), N=2618

Table 2. Assumption of collinearity

Model		Collinearity Statistics	
		Tolerance	VIF
	Informal caregiving frequency	0.853	1.173
	Time spent giving informal care	0.853	1.173
	Temporal flexibility	0.999	1.001

Source: IZG (2019), N=2618

Appendix C. Frequencies

Table 1. Temporal flexibility - Some

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0.00	1777	36.1	53.6	53.6
	1.00	1539	31.3	46.4	100.0
	Total	3316	67.4	100.0	
Missing	System	1605	32.6		
Total		4921	100.0		

Source: IZG (2019), N=2618

Table 2. Temporal flexibility - Full

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	2658	54.0	80.2	80.2
	1,00	658	13.4	19.8	100.0
	Total	3316	67.4	100.0	
Missing	System	1605	32.6		
Total		4921	100.0		

Source: IZG (2019), N=2618

Table 3. Concentration at work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0.00	2263	46.0	77.7	77.7
	1.00	651	13.2	22.3	100.0
	Total	2914	59.2	100.0	
Missing	System	2007	40.8		
Total		4921	100.0		

Source: IZG (2019), N=2618

Table 4. caregiving frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0.00	3505	71.2	71.2	71.2
	1.00	1416	28.8	28.8	100.0
	Total	4921	100.0	100.0	

Source: IZG (2019), N=2618

Table 5. Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	1284	29.8	29.8	29.8
	2.00	1908	44.2	44.2	74.0
	3.00	1121	26.0	26.0	100.0
	Total	4313	100.0	100.0	

Source: IZG (2019), N=2618

Appendix D. Binary logistic regression

Table 1. Residuals

Case	Standardized Residual	Normalized Residual
Highest Values		
27	2.219	3.258
51	2.167	3.064
83	2.167	3.062
29	2.161	3.035
305	2.121	—
244	—	2.898
Lowest Values		
1	-2.630	-5.096
2	-2.607	-4.923
4	-2.548	-4.616
3	-2.502	-4.307
5	-2.447	-4.065

Source: IZG (2019), N=2618

Appendix E. Survey questions

Variable	Question	Answer Options
Concentration at work	Has your concentration at work decreased due to the care you (are giving / gave)?	1. No, not at all 2. Yes, a little 3. Yes, very much
Time spent giving informal care	How many hours per week do you (help / helped) on average? *If you don't know the exact number, please estimate and round up to the nearest whole hour.*	[0–168] hours per week
Caregiving frequency	How often do you (give / gave) help? We mean all the help you (give / gave) to (him / her).	1. Daily 2. Weekly 3. Monthly 4. Rarely
Temporal flexibility	To what extent (could / can) you determine your own working hours?	1. Almost completely 2. To some extent 3. Not at all
Weekly working hours	How many hours (did you work / do you work) on average per week, excluding overtime and unpaid hours?	[0–95] hours per week
Gender	What is your gender?	1. Male 2. Female
Age	What is your date of birth? (DD-MM-YYYY)	Open field

Source: IZG (2019), N=2618

Appendix F. Syntax

```
* Filtering invalid or missing values
USE ALL.
COMPUTE filter_$=(WrkTyd <> 8).
VARIABLE LABELS filter_$ 'WrkTyd <> 8 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
_SLINE OFF.

USE ALL.
COMPUTE filter_$=(MantUur <> 998).
VARIABLE LABELS filter_$ 'MantUur <> 998 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
_SLINE OFF.

USE ALL.
COMPUTE filter_$=(MantFreq <> 8).
VARIABLE LABELS filter_$ 'MantFreq <> 8 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
_SLINE OFF.
```

```
* Creating dummy variables and interaction terms
COMPUTE MantFreq_dagelijks=MantFreq  = 1.
EXECUTE.

COMPUTE Concent_dummy=(Concent = 2 OR Concent = 3).
EXECUTE.

FREQUENCIES VARIABLES=Concent_dummy MantFreq_dagelijks WrkTyd
  /ORDER=ANALYSIS.

DESCRIPTIVES VARIABLES=MantUur
  /STATISTICS=MEAN STDDEV MIN MAX.

COMPUTE WrkTyd_Full=WrkTyd = 1.
EXECUTE.

COMPUTE WrkTyd_Some=WrkTyd = 2.
EXECUTE.

FREQUENCIES VARIABLES=WrkTyd_Some WrkTyd_Full
  /ORDER=ANALYSIS.

COMPUTE MantUur_Centered=MantUur - 8.29.
EXECUTE.

COMPUTE WrkTyd_FullXMantUur=WrkTyd_Full * MantUur_Centered.
EXECUTE.

COMPUTE WrkTyd_SomeXMantUur=WrkTyd_Some * MantUur_Centered.
EXECUTE.
```

```
COMPUTE WrkTyd_FullXMantFreq=WrkTyd_Full * MantFreq_dagelijks.
EXECUTE.

COMPUTE WrkTyd_SomeXMantFreq=WrkTyd_Some * MantFreq_dagelijks.
EXECUTE.

COMPUTE UrTot_Centered=UrTot - 30.
EXECUTE.

* Additional filtering for valid values
USE ALL.
COMPUTE filter_$=(MantUur > 0).
VARIABLE LABELS filter_$ 'MantUur > 0 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
_SLINE OFF.

* Log transformation, interaction term and testing on linearity
DATASET ACTIVATE Goede_data_set_26.
COMPUTE MantUurLN=LN(MantUur).
EXECUTE.

COMPUTE MantUurLN_interactie=MantUur * MantUurLN.
EXECUTE.
LOGISTIC REGRESSION VARIABLES Concent_dummy
  /METHOD=ENTER MantUur MantUurLN MantUurLN_interactie
  /SAVE=PRED COOK LEVER SRESID ZRESID
  /CLASSPLOT
  /PRINT=GOODFIT CI(95)
```

```
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* Recoding age into three groups
RECODE Afl_lft_OP6 (1=1) (2=1) (3=2) (4=2) (5=3) (6=3) INTO Leeftijddummy3.
VARIABLE LABELS  Leeftijddummy3 'Leeftijd in 3 groepen'.
EXECUTE.

*Testing on collinearity
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10) TOLERANCE(.0001)
  /NOORIGIN
  /DEPENDENT Concent_dummy
  /METHOD=ENTER MantFreq_dagelijks MantUur WrkTyd.

* Logistic regression with multiple blocks and interactions
LOGISTIC REGRESSION VARIABLES Concent_dummy
  /METHOD=ENTER UrTot_Centered Afl_Geslacht_OP Leeftijddummy3
  /METHOD=ENTER MantUur_Centered MantFreq_dagelijks WrkTyd_Full WrkTyd_Some
  /METHOD=ENTER WrkTyd_FullXMantFreq WrkTyd_SomeXMantFreq WrkTyd_SomeXMantUur
WrkTyd_FullXMantUur
  /CONTRAST (Afl_Geslacht_OP)=Indicator(1)
  /SAVE=PRED COOK LEVER SRESID ZRESID
  /PRINT=GOODFIT CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(100) CUT(0.5).

*  Descriptive statistics and frequencies
DESCRIPTIVES VARIABLES=UrTot MantUur Afl_Geslacht_OP Afl_lft_OP6 WrkTyd MantFreq Concent
  /STATISTICS=MEAN STDDEV MIN MAX.
```

```
FREQUENCIES VARIABLES=Afl_Geslacht_OP
  /ORDER=ANALYSIS.

DATASET ACTIVATE Goede_data_set_26.
FREQUENCIES VARIABLES=Leeftijddummy3
  /ORDER=ANALYSIS.

* Exploratory interaction model
COMPUTE Interactiepredictors2=MantUur_Centered * MantFreq_dagelijks.
EXECUTE.

LOGISTIC REGRESSION VARIABLES Concent_dummy
  /METHOD=ENTER Interactiepredictors2 MantFreq_dagelijks MantUur_Centered
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

*Looking at outliers
EXAMINE VARIABLES=SRE_2 ZRE_2
  /PLOT BOXPLOT STEMLEAF
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES EXTREME
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```