Department of Industrial Engineering & Innovation Sciences
Human Performance Management Group

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

MASTER THESIS

A Smarter Academic Year to Reduce Work Stress Among Academic Staff

Analyzing Employee Preferences Through Conjoint Analysis

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Master Thesis Innovation Management

T.C.J. (Tom) Coppelmans

Presented to

Dr. I.C.M. (Inge) van Seggelen - Damen
TU/e Project Leader *A Smarter Academic Year*
i.c.m.v.seggelen.damen@tue.nl

Supervised by

Dr. ir. P.A.M. (Ad) Kleingeld
TU/e Human Performance Management Group
p.a.m.Kleingeld@tue.nl

First assessor:

Dr. ir. P.A.M. (Ad) Kleingeld
TU/e Human Performance Management Group
p.a.m.kleingeld@tue.nl

Second assessor:

Dr. P.F.M. (Philippe) van de Calseyde
TU/e Human Performance Management Group
p.p.f.m.v.d.calseyde@tue.nl

Third assessor:

Dr. Anna-Sophie Ulfert-Blank
TU/e Human Performance Management Group
a.s.ulfert.blank@tue.nl

1. Executive Summary

This master thesis is the outcome of a study for the *A Smarter Academic Year* project at Eindhoven University of Technology (TU/e). The findings about the calendar are relevant for the TU/e Executive Board and departmental boards. The results about work pressure are even suitable for capacity group management and lower-level managers.

1.1. Problem Statement and Research Questions

Academic staff generally perceive high levels of work pressure and stress, also at TU/e. Previous research indicated that universities' long and intense academic calendars could be to blame. This has resulted in a suggestion to change the calendar and, and with that, alleviate the work strain issues. However, it is unclear what causes work stress among academic staff at TU/e. It is also unknown if changing the calendar actually solves the problems of employees. This study helps clarify this with the following research question: **How can TU/e reduce the perceived work pressure of academic staff by redesigning the academic calendar?** To answer this question, the study explores the sub-questions:

- **RQ1.** Where does work pressure among academic TU/e staff come from?
- **RQ2.** How do behaviors such as workaholism and perfectionism affect work pressure for academic TU/e staff?
- **RQ3.** How does the academic calendar impact work pressure for academic TU/e staff?
- **RQ4.** What do academic TU/e staff prefer when designing a new academic calendar?

1.2. Approach of the Study

Two studies were used to answer these research questions (Figure 1). An initial study consisting of interviews was required to design a larger-scale survey, which was the main study. The findings of the survey and the interviews were combined to answer the main research question.

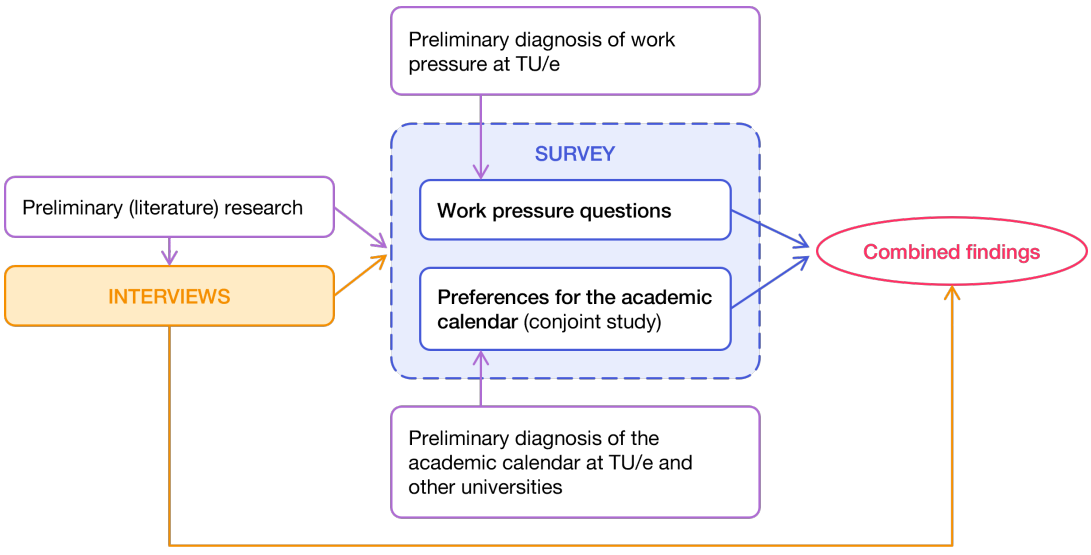


Figure 1
Outline of the Research Process

1.2.1. Interviews

For the initial study, 41 employees of all academic job functions and all departments at TU/e participated in 14 (group) interviews. These interviews were done to:

1. Understand work pressure among academic staff at TU/e in more detail;
2. Understand which aspects of the calendar could actually be changed; and
3. Validate a preliminary design of the survey.

1.2.2. Survey

Besides the interviews, preliminary research and preliminary diagnoses of the issues at hand helped design the survey. For the main study, 291 employees responded to the survey consisting of:

1. Questions about work pressure (mainly to answer RQ1 & RQ2); and
2. Questions about the academic calendar (mainly to answer RQ3 & RQ4).

1.2.3. What is Conjoint Analysis?

The survey questions about the academic calendar provided valuable data about preferences employees had toward the academic calendar. They were analyzed using conjoint analysis—a statistical technique used to uncover preferences.

For this, the calendar was divided into five aspects (A-E in Figure 2), with multiple options for each aspect (1-4 in Figure 2). Different combinations of these options lead to several possible arrangements of the academic calendar. In the survey, employees repeatedly had to select their preferred calendar among two arrangements. In the end, this provided scores for how preferred the 19 options were. These results were used to design calendars that would be more preferred by than the current calendar.

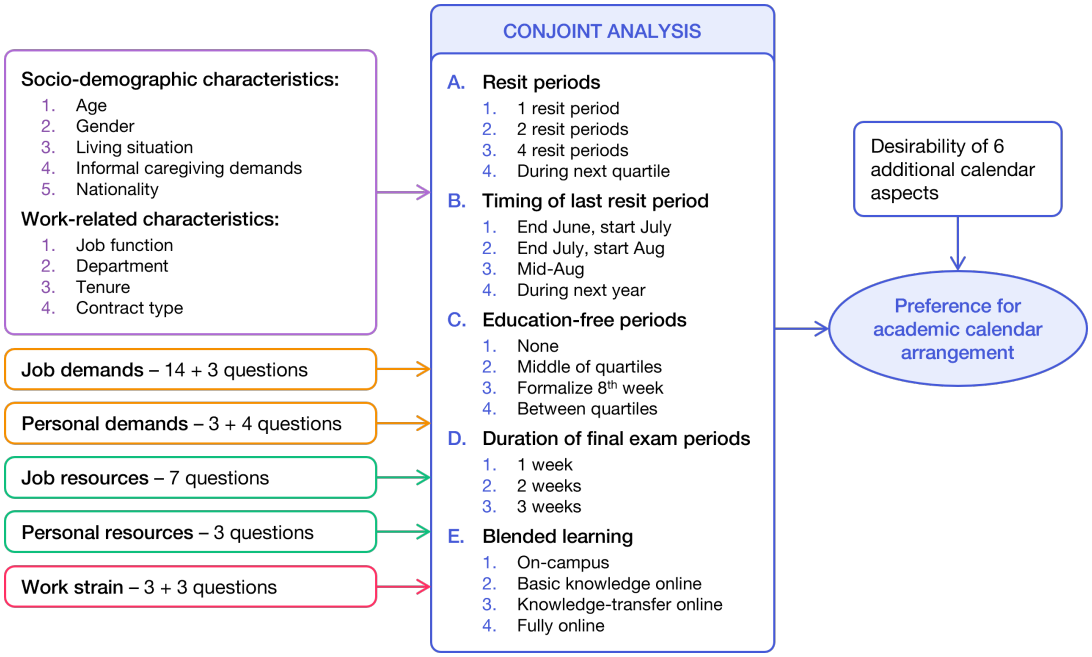


Figure 2

Basic Research Model for the Conjoint Study

1.3. Findings About Work Pressure (RQ1 & RQ2)

The combined results of this study indicate that the most critical stressors for academic staff at TU/e are: general task demands (such as the fragmentation of the job, the pressure to perform to high quality standards, and the number of responsibilities to balance), the pressure to research and publish, and communication activities such as meetings and dealing with emails. Self-imposed demands also affect work stress (which was measured through two concepts: cognitive impairment and exhaustion), particularly perfectionistic work habits and setting high personal goals. They are related to lower cognitive impairment (i.e., work strain related to concentration issues) but have no direct influence on exhaustion.

1.4. Preferences About the Academic Calendar (RQ3 & RQ4)

Figure 3 on the next page visualizes the findings of the conjoint study. It provides scores of how preferred each option is. Higher values indicate a higher preference for an option relative to the other options within the same calendar aspect with lower values. Moreover, the bandwidth of each calendar aspect shows how important it was in employees' preferences.

Considering the current academic calendar, employees find the resits of Q4 exams in mid-August particularly unfavorable. Thinking about the balance between their jobs and private lives, staff prefer the following calendar arrangement (from most to least important):

1. There is a shift from fully on-campus education to a policy where basic and fundamental knowledge is considered online self-study, but regular knowledge transfer activities for more in-depth topics remain on-campus.
2. The last resit period of the year is around the end of June and the beginning of July instead of mid-August.
3. There are two resit periods throughout the year instead of four, although the difference is small.
4. Education-free periods are introduced between each quartile.
5. Final exam periods remain two weeks.

These preferences were used to propose new ways of planning the academic year.

1.5. Designing Alternative Academic Calendars

Figure 4 (p. 7 shows three proposed academic calendars. V0 is the current calendar at TU/e. Redesign V1 focused on removing the interim resit period in mid-August by moving it to the second week of July. Redesign V4 focused on introducing additional education-free periods of 1 week between quartiles after Q1 and after Q3. Redesign V6 incorporated all preferred options by adopting a shorter 7-week quartile or 14-week semester system.

While every successive redesign is preferred over the previous version *and* the current calendar, this might be offset by concessions that had to be made in the design process. For example, the correction period of Q4 final exams is shortened to allow the resits to be scheduled earlier. Moreover, the preferences for a longer Christmas vacation, a shorter summer vacation, or a switch to a 7/14-week system were also difficult to quantify.

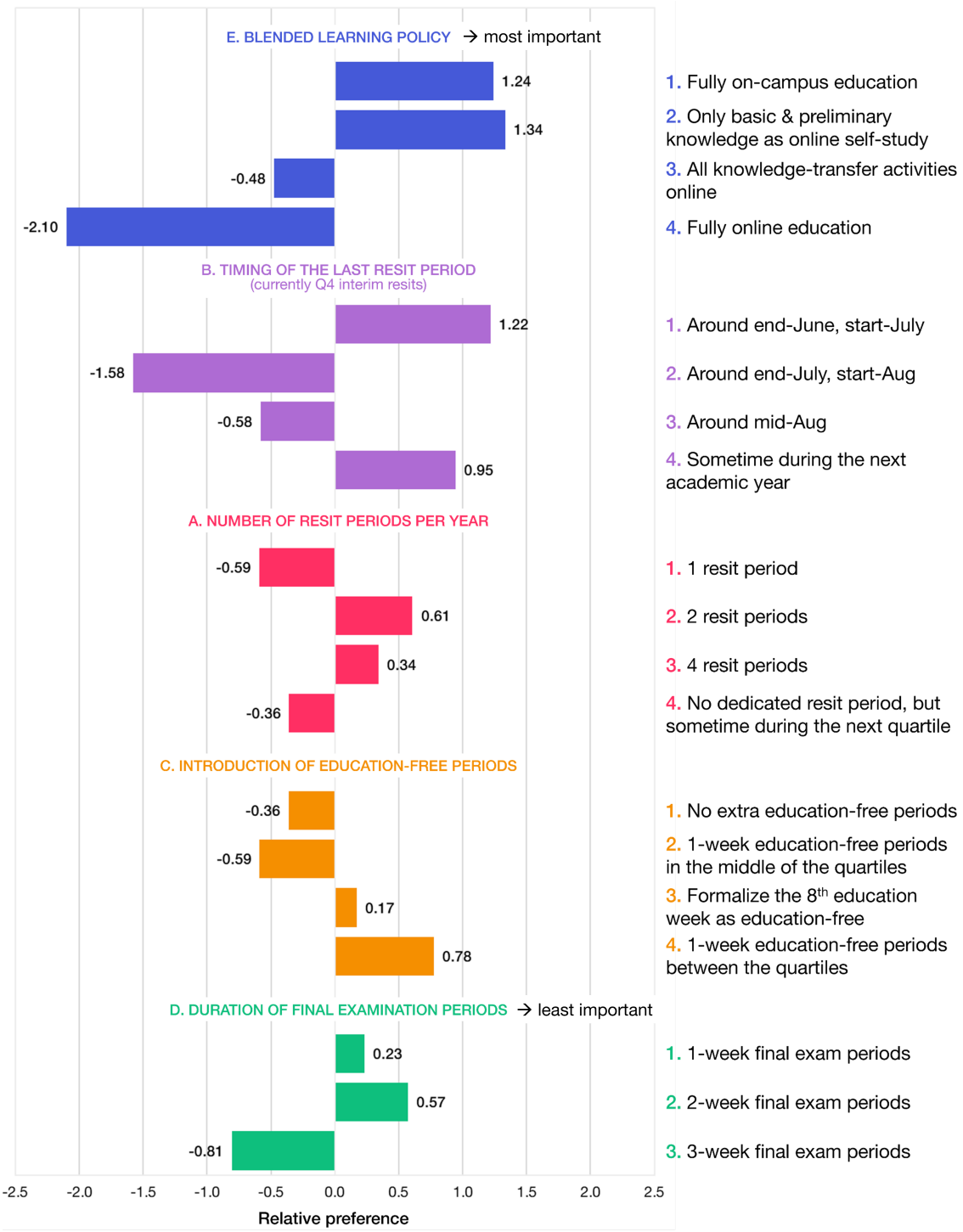


Figure 3

Representation of How Important Each Aspect of the Calendar Was and How Preferred Each Option Was in Employees' Preferences

Interpretation: For example, looking at calendar aspect A: Having four resit periods throughout the year is preferred less than two resit periods. Only one resit period is preferred even less. Still, despite the negative score, it cannot be concluded that employees have an aversion to this option.

Important caveat: Comparing between different aspects is not possible. For example, the preference for four resit periods cannot be compared to the preference for introducing education-free periods between the quartiles.

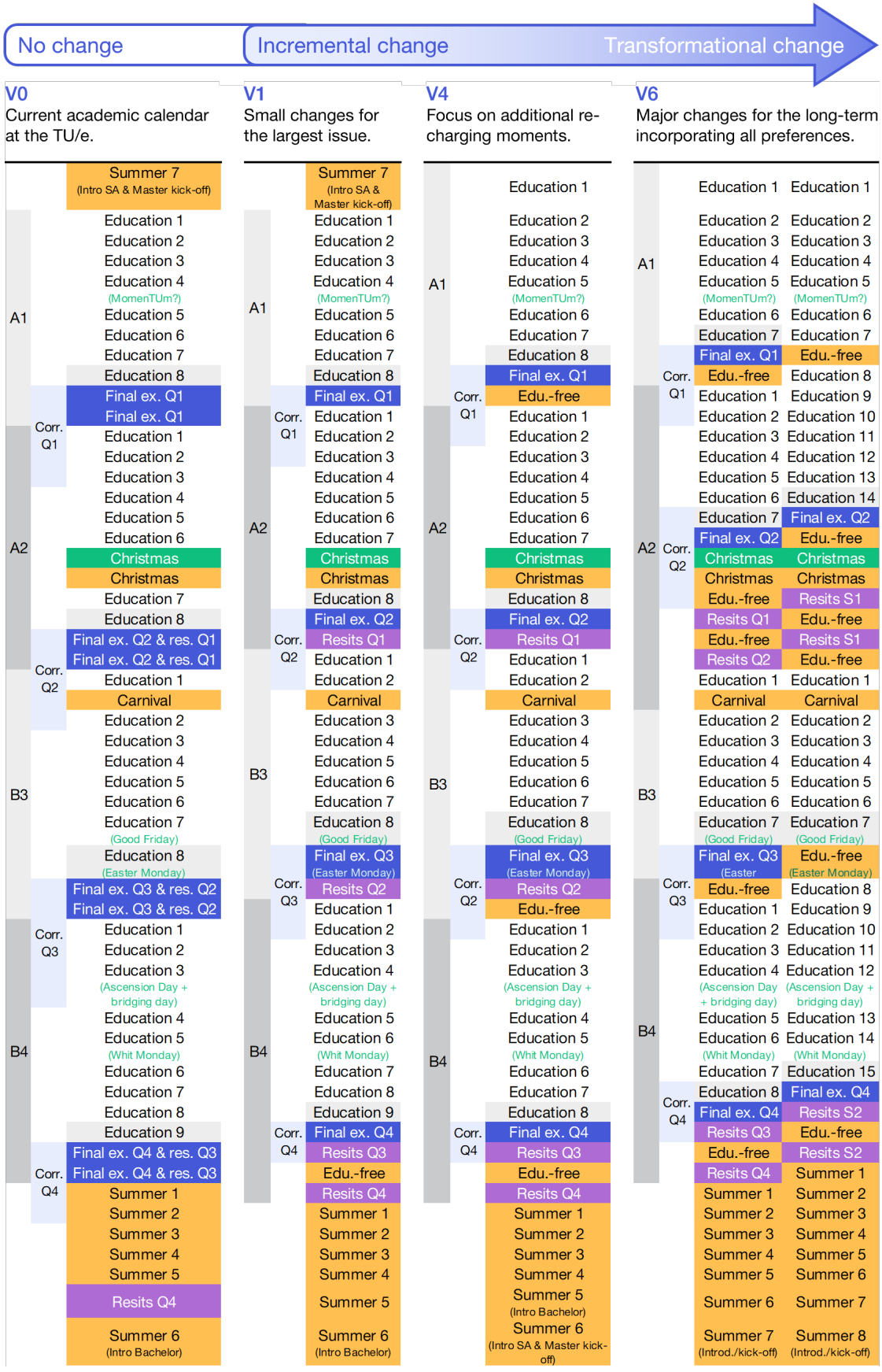


Figure 4

Three Proposed Academic Calendars

1.6. Does the Calendar Actually Impact Work Pressure?

When discussing work pressure during the interviews, the academic calendar was rarely mentioned. When initiating conversations specifically about the calendar, employees mentioned that it is unrelated to work pressure issues and that changing the calendar is unnecessary. Academic staff can be highly flexible in their jobs. They are not dictated by the calendar since it is designed around education, and their jobs are not.

The survey results confirm that differences in the perceptions of work pressure are not related to differences in preferences for the academic calendar. The preferences of employees with high and low work pressure are very similar. Moreover, the three most structural aspects of the calendar (the resit periods, education-free periods, and exam periods) had the least impact on employees' preferences. The blended learning policy—not a direct calendar design aspect—had the highest impact. A nuance in this conclusion is that high-stress employees seem more open to change than those with lower levels of work strain. They preferred more innovative options or were indifferent to changes, while the preferences of low-strain employees were more biased toward the prevailing options.

1.7. Recommendations for TU/e

Redesigning the academic calendar might not necessarily reduce the work pressure. Still, it could reduce frustration and dissatisfaction with the current planning. In this regard, the proposed new calendars would all be an improvement compared to the current planning. In the future, the university should consider the following recommendations:

1. Discuss the results of this study with academic staff (*and* students) to understand why certain calendar options are preferred. Since redesigning the academic calendar might not impact work pressure, what is it good for?
2. Perform pilots with sub-groups of employees (*and* students) for the proposed calendar configurations (Figure 4). Specifically, consider the impact and feasibility of the following changes before a potential university-wide roll-out:
    a. Reducing some examination periods (for example, in Q1) from 2 weeks to 1 week. Shortening the final exams or shifting toward more intermediate feedback moments might be necessary but must be done cautiously.
    b. Splitting examination periods into 1 week for final written exams and 1 week for resits.
    c. Shortening the correction period of the final written exams of Q4.
    d. Shortening the summer vacation from 7 to 6 weeks in favor of additional education-free periods throughout the year or an extended Christmas holiday.
    e. Starting the academic calendar 1 week earlier.
3. Research the possibilities of switching to shorter 7-week quartiles and the introduction of 14-week semester courses or projects in addition to quartile courses. A shift from fully on-campus education to a policy where basic and fundamental knowledge is considered online self-study might be necessary.

CONTENTS

2. Introduction

For over a decade, employees' occupational stress and worry have been increasing globally (Ferry, 2021; Gallup, 2022). High levels of work pressure and reduced workplace well-being have become increasingly prevalent for many. This can lead to short-term stress responses such as headaches but also to long-term health disorders (Sociaal Fonds voor de Kennissector, 2017). The academic teaching profession cannot escape these long-term trends. For example, the digitalization of education, increased student-to-staff ratios, increased responsibility, and increased pressure to publish have contributed to changes in the academic environment (Universities of The Netherlands, n.d.). A report by SoFoKleS (2017) even showed that academic staff—especially those employees with a teaching task besides their primary pursuit of doing research—perceive higher work pressure than workers in most other sectors. They also hint at the importance of non-organizational aspects by highlighting that researchers generally set high standards for themselves, which further adds to their workloads.

2.1. Work Pressure at Eindhoven University of Technology

Eindhoven University of Technology (TU/e) is one of the organizations where these issues are prevalent. The university's Employee Experience Survey (EES) confirmed that the employees' stress generally exceeded their acceptable limits (IVA onderwijs, 2022). Wels-Noordermeer (2018) added that enthusiasm has been low, exhaustion levels high, and the workload has even been increasing considerably. Moreover, academic personnel had significantly higher work stress and experienced significantly more occupational strain than administrative and support staff (IVA onderwijs, 2022; Wels-Noordermeer, 2018). Academic staff showed more negative values for almost all demands and stressors in the EES. For example, academic staff reported that, on average, they worked more hours than formally established in their contracts, worried about work during off-time, and experienced emotional strain.

2.2. A Suggestion by the Young Academy: A Smarter Academic Year

After following the adverse developments in the academic teaching profession, The Young Academy (2021) started researching how to tackle the commonly high work pressure. In a position paper, they suggested that the long and intense academic calendars of universities in The Netherlands potentially could be to blame. This has resulted in the call for a 'smarter academic year.' Examples of how they see this in practice are, among other things, decreasing the number of teaching weeks and diversifying teaching methods.

Based on the paper by The Young Academy (2021), The Dutch Ministry of Education, Culture, and Science initiated the *A Smarter Academic Year* project. They developed 42 pilot projects to reduce the commonly high work pressure of teachers, researchers, and even students at Dutch institutions (Ministerie van Onderwijs, 2023). There are four categories of pilots: (1) curriculum revision, (2) application of blended learning, (3) redesigning final examination and resit periods, and (4) spreading or concentrating education and research tasks (Van Aert, 2023).

2.3. Why Focus on the Academic Calendar?

TU/e is one of the institutions invited to participate in the *A Smarter Academic Year* project. However, although work pressure is a legitimate issue at TU/e, it is unclear which problems the pilot projects are actually solving. The entire initiative was so far only based on an arguable opinion by The Young Academy (2021). The preliminary research described in their position paper was not theoretically nor empirically substantiated extensively. In fact, the literature on the proposed approaches is minimal. Moreover, the report lacks transparency and is not specific enough for TU/e to directly participate in the pilots.

For example, besides assuming that work pressure is an issue, the report does not clarify how The Young Academy interpreted work pressure as such. It is unclear if and how they precisely identified any other potential stressors or specific antecedents of work pressure apart from the academic calendar. The long, intensive academic year arose as a potential problem contributing to the perceived heavy workload only during 'work-pressure lunches' organized at one of the universities. Crucially, further explanation of the analysis is missing. Moreover, the recommendations by The Young Academy (2021) are only based on best practices in the surveyed universities. It is unclear how they define these best practices and why they would be the best targets for stress prevention strategies. Crucially, the report repeatedly focuses on the length of the academic year as the primary issue. However, in a similar position paper on structural changes to tackle work pressure among academics, The Young Academy Leiden (2021) gives eleven recommendations for the short, medium, and long-term. Shortening the year is only one of them; notably, most other suggestions are unrelated to the academic calendar. They consider (1) staff member's autonomy in the organization of teaching; (2) teaching closer to the lecturer's research interests; (3) the role of supervisors in work pressure-related issues such as working overtime, task fragmentation, and fair assessment; (4) less emphasis on the quantity of papers, and more on the quality of contributions in evaluating research excellence; (5) endorsement of a communication charter; (6) diversification in the appreciation of talents and accomplishments; (7) fewer short-term contracts to stimulate professional development; (8) improved hour tabulations including time for hidden but central tasks to researchers; (9) support for relocating staff to The Netherlands; and (10) structural changes to obtaining research funding.

For these reasons, and to determine if the recommendations by The Young Academy (2021) are viable *and* suitable courses of action for reducing work pressure, TU/e needs more evidence. This requires additional research. At TU/e, two studies provide the evidence within the *A Smarter Academic Year* project team. In parallel, one project focuses on students, and one focuses on academic staff (i.e., lecturers). The current study contributes to this second branch of the project.

2.4. Problem Statement and Research Approach

In short, the work pressure experienced by academic staff at TU/e is too high, in absolute terms and relative to other types of employees. From a broader national and European

perspective, The Young Academy (2021) identified similar issues. They concluded that the long and intense academic year could be to blame and that calendar-based interventions should be considered. Because this relationship between the academic calendar and work pressure has not been confirmed yet, the main research question for this study is: **How can TU/e reduce the perceived work pressure of academic staff by redesigning the academic calendar?**

2.4.1. RQ1: Antecedents of Work Stress

To approach the main research question without the assumption that the academic calendar *is* a significant stressor for academic staff, this study starts by examining where work pressure actually comes from. Only a few scholars have examined the antecedents of stress in the occupational group of academic staff (Coppelmans, 2023). Multiple research methods, such as focus groups and questionnaires, have been used, but the results between different studies are often incongruent. A comprehensive overview of all stressors in the academic teaching profession is thus absent. Moreover, the results of the EES—the most specific study available for TU/e staff—are too general as they considered only a few general stressors (IVA onderwijs, 2022). As such, the first sub-question is: **What are the most important antecedents of work stress among TU/e academic staff?** The insights from this sub-question will also help more in-depth analyses of RQ3 and RQ4. That is, it allows linking work strain to information about the academic calendar.

2.4.2. RQ2: The Impact of Personal Demands

In answering the first sub-question, special attention will be paid to the impact of self-imposed demands—self-set requirements for performance and behavior that are associated with physical and psychological costs (Barbier et al., 2013)—on the stress process. Inspired by statements of SoFoKleS (2017), Coppelmans (2023) argued that personal demands could be particularly important for certain types of employees, such as academics. Only little empirical and theoretical research previously considered personal demands in the stress process, and conflicting approaches to conceptualizing the construct exist. As such, the second sub-question is: **Besides regular workload, what is the influence of self-imposed demands in the stress process for TU/e academic staff?**

2.4.3. RQ3: Work Stress and the Academic Calendar

Having taken an unbiased approach to understanding work pressure among academic staff at TU/e, the next step is to zoom in on the academic calendar. Considering the position paper by The Young Academy (2021) which identified the calendar as stressor *and* intervention strategy, this phase of the study is more confirmatory in nature. Structural aspects of the calendar will be explored, and their relation to the previously discovered stressors and the materialization of occupational stress is examined. As such, the third sub-question is: **Which aspects of the university's academic calendar influence (the materialization of) work stress among TU/e academic staff?**

2.4.4. RQ4: Preferences Toward the Academic Calendar

The information of how the academic calendar impacts the stress process is useful for determining more specific calendar-related intervention strategies. Critical in this phase is the involvement and participation of employees (Coppelmans, 2023). Therefore, it will be researched what employees believe is the best way to organize the calendar to reduce or cope with their demands. Specifically, the balance between work tasks and private life is an important aspect. As such, the fourth sub-question is: **Which configuration of the academic calendar is preferred by TU/e academic staff for balancing the demands of their jobs and those from their private lives?**

2.5. Preconditions and Constraints

Subjacent preconditions that the primary education function of the university (i.e., education quality) should not be sacrificed and work pressure for support staff should not increase, are assumed. These will later be tested in feasibility studies and risk assessments by other members of the *A Smarter Academic Year* project team. Another assumption that student study pressure should not increase—or even be reduced as well—will be researched accordingly in the *A Smarter Academic Year* project. However, the findings of the parallel study on students will not be discussed in this report.

Moreover, constraints formulated by the Government of The Netherlands will be considered. For higher education, the only restrictions are that a university bachelor's consists of 3 years and 180 credits and that a master's takes at least 1 year and 60 credits (Ministerie van Algemene Zaken, 2021). Sixty credits should equal 1,680 hours of coursework, meaning that every ECTS equals 28 hours of work for students.

Finally, the TU/e Bachelor College Directive will be used as a guideline (The Executive Board of TU/e, 2022). However, to allow innovation in the academic calendar, exceptions could be made.

2.6. Contributions

This report will contribute to the existing literature in three ways. First, it will introduce empirical results into the highly limited literature on work pressure and stress among academic university employees. Secondly, it adds to the debate about including self-imposed personal demands in the JD-R model by assessing their role in the stress process and exploring if they are crucial in determining outcomes for certain types of employees, in this case, academic staff. Another major contribution is related to stress prevention. Literature on occupational stress mainly concerns the health-impairment process and individual interventions (i.e., secondary and tertiary stress prevention strategies). At the same time, work design literature, which by definition is related to more structural, top-down interventions (i.e., primary stress prevention strategies), is mainly concerned with the motivational process. The current study connects these streams of research by considering how structural changes in the job (i.e., changing the academic calendar) can impact the health impairment process of employees.

Practically, this study identifies structural aspects related to the design of the academic calendar that could improve the balance between private life and the tasks that constitute the workload of academic staff. These aspects are subjected to the preferences of TU/e academic staff concerning possible calendar configurations. Based on these empirical results, this research will propose redesign alternatives of the academic calendar to TU/e.

2.7. Process and Report Outline

Figure 5 visualizes the process for answering the main research question and the four sub-questions. It consists of two interconnected studies. An initial study consisting of exploratory interviews is required to design the main study, which consists of a larger-scale questionnaire. This questionnaire first includes items related to work pressure, primarily for answering RQ1 and RQ2. Secondly, it includes items related to the academic calendar, mainly for answering RQ3 and RQ4. The findings of these two topics will be combined to answer the main question. Besides the interviews, preliminary research and preliminary diagnoses of the issues at hand will guide the development of the questionnaire. Finally, the interviews will also be used as a qualitative validation of the questionnaire results.

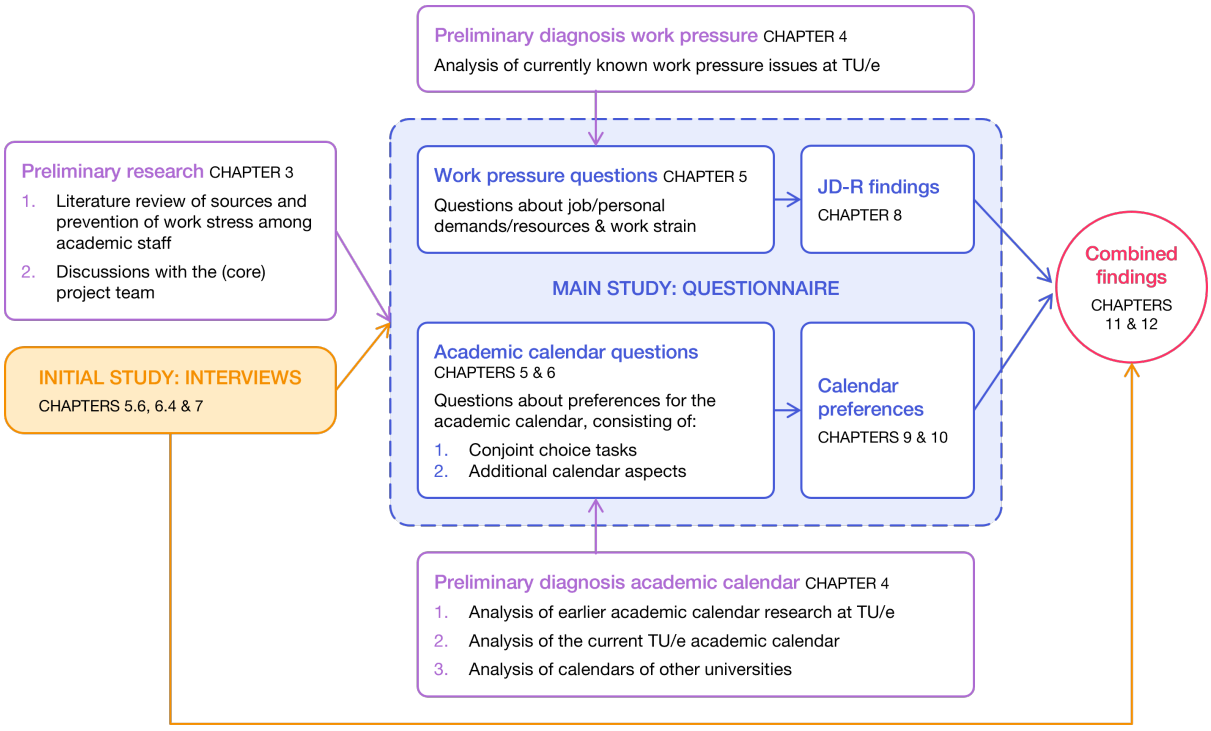


Figure 5
Outline of the Research Process

After summarizing preliminary theoretical research (Chapter 3) and the preliminary diagnoses (Chapter 4), Chapter 5 introduces the methodologies used for the two studies in detail. After that, the design of the conjoint study—a crucial part of the questionnaire—is elaborated (Chapter 6). The results are presented in Chapters 7, 8, 9, and 10. These are then used to design alternative academic calendar configurations (Chapter 11). This report ends with an elaborate discussion (Chapter 12) and conclusions (Chapter 13).

3. Theoretical Background

A literature review of the sources and prevention of work stress among academic staff is crucial for establishing the context of the current research. The findings by Coppelmans (2023) will help conduct the interviews and design the questionnaire. This chapter starts with a high-level overview of relevant concepts from the stress literature and later zooms in on common stressors in academia.

3.1. The Definition of Relevant Concepts

Depending on the source and situational context, the problem described in the introduction of this report can take many forms. For example, TU/e (n.d.-b) and The Young Academy (2021) refer to work pressure as the problem leading to stress or stress-related symptoms. SoFoKleS (2017) adds performance pressure as an antecedent of work stress. Wels-Noordermeer (2018) reviews these concepts and eventually assumes a high workload as the main issue at TU/e. Figure 6 and the following sections distinguish the relevant concepts to clarify the actual work stress problem as discussed by Coppelmans (2023).

In 1936, Hans Selye was the first person to introduce the scientific term stress into the fields of biology and psychology (Selye, 1955). While engineers already used it to refer to loads applied to material objects, Selye used *stress* to mean a ”non-specific response of the body to any demand for change” (Persson & Zakrisson, 2016, p. 149). Quickly, scholars from different disciplines started using the term inconsistently. Even from Selye’s own works, it could eventually be concluded that stress, in addition to being itself, is also the cause and the result of itself. He later proposed the term stressor to define the stimulus that elicits stress and even mentioned that strain would have been a better term to denote the response (Selye, 1955). Almost a century later, the diversity of stress definitions is still high.

3.1.1. From Stressors to Strain

Following Jex et al. (2001), The external factors and conditions of the workplace or the job that can be considered stressful are *workplace stressors* or *job stressors*. While some definitions consider the neutrality of the term, Demerouti et al. (2001, p. 501), among most other occupational stress researchers, refer to stressors as stimuli that have ”the potential to exert a *negative* [emphasis added] influence on most people in most situations” (Jimenez & Dunkl, 2017). According to the ISO 10075 norm, stressors can be assessed objectively, while their more subjective evaluation by employees is labeled *job stress*, *work stress*, or *occupational stress* (Jimenez & Dunkl, 2017). This assessment includes environmental and personal antecedents, intervening processes, indicators of the response, and possible long-term consequences (Lazarus, 1990). These definitions are in accordance with the World Health Organization. They define *stress* as a natural human response that prompts behavioral changes (World Health Organization, 2022), indicating that it is somewhere in between the stimulus and subsequent behavior.

Although the term stress often has negative associations, responses to stress can

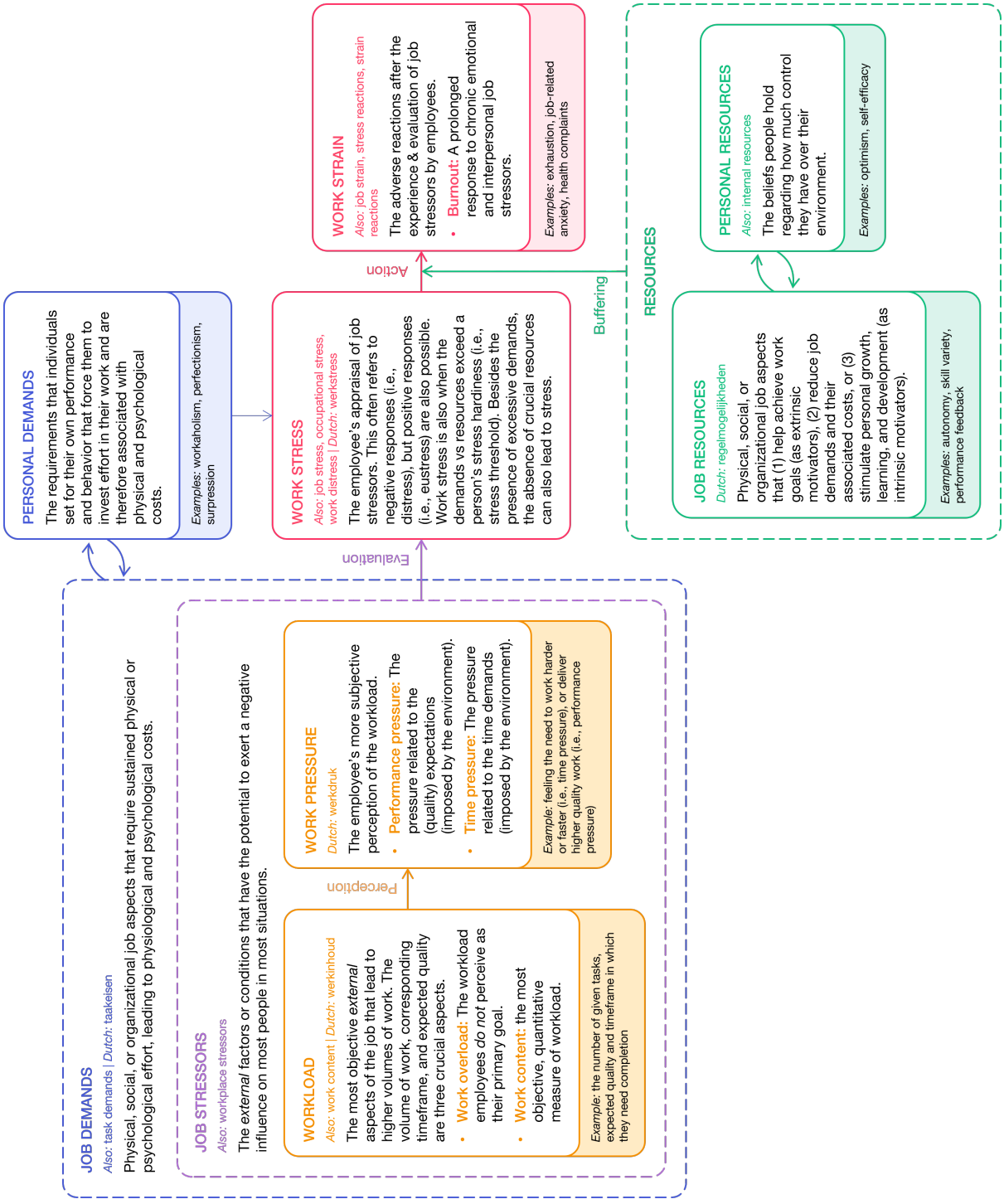


Figure 6

Definitions of Relevant Concepts, Alternative Terms, Examples, and How They Relate

also be positive. Therefore, one can classify stress as a continuum from the stress that triggers positive responses (i.e., *eustress*) to stress that triggers negative responses (i.e., *distress*) (McVicar, 2003). Whereas *work distress* would thus be a more correct term, *work stress* prevails in the literature.

Similar to Hans Selye's works, some research (e.g., TU/e EES by IVA onderwijs, 2022) combines occupational stress and its negative consequences into one concept. However,

most authors encapsulate the adverse reactions expected after the experience and subjective evaluation of job stressors under the term *job strain* (Jex et al., 2001). *Stress reactions* (i.e., reactions to stress) and *strain reactions* (i.e., the reactions classified as strains) refer to the same concept. Examples are exhaustion, anxiety, and other health complaints (Bakker & Demerouti, 2017).

3.1.2. Types of Stressors at Work

Workload. The term *workload* refers to a specific type of stressor; the external characteristics of the job or the situations at work that lead to higher volumes of work (Aronsson et al., 2017). Examples are the number of tasks given, the expected quality of the result, and the corresponding timeframe in which they must be completed. IVA onderwijs (2022) also refers to these three specific components by defining workload as the necessity to properly complete a certain amount of work within a specified period. TNO (n.d.) uses the term *work content* to point to similar phrases usually referring to workloads. Bakker et al. (2003) create the impression that workload is a relatively objective construct by referring to workload as quantitative, demanding aspects of the job (Bakker et al., 2003; Sonnentag & Fritz, 2014). For measuring the construct, however, they use a derivative of the Job Content Questionnaire (JCQ) by Karasek (1985), which includes items related to time pressure and working hard. Arguably, these are only *indirect* measures of the stressors leading to higher volumes of work, and more refer to the individuals' *perceptions* of workloads instead of quantitative elements. For example, time pressure is an evaluation of the amount of time available for a certain amount of work. Therefore, falling back on the original definition by Bakker et al. (2003), the term *workload* should remain prevalent to refer to the most objective external aspects of the job that lead to higher volumes of work. The work volume, corresponding timeframe, and expected quality are three crucial aspects.

Work Pressure. Still, the employees' *perceptions* of workloads remain an essential element. Building on the Transactional Model of Stress and Coping by Lazarus and Folkman (1984)—a widely accepted theory of psychological stress—Dick and Wagner (2001) highlight the importance of perception in the stress process. That is, perception and appraisal mediate between environmental characteristics and stress responses. As multiple notable studies (e.g., Bakker et al., 2004) already do, the items of the JCQ should refer to these perceptions, encapsulated under the term *work pressure*. Feeling the need to work harder after perceiving a particular workload is an example of work pressure.

Performance pressure is a specific type of work pressure related to meeting the expectations set by the environment, such as the employer (Sociaal Fonds voor de Kennissector, 2017). Considering the three critical workload elements, performance pressure most relates to the quality element. Likewise, the term *time pressure* is similar in definition but relates to the timeframe accompanying the task.

Work stress. In yet some other sources, *work pressure* refers to the situation in which a misfit occurs between the job demands (i.e., the work content in a specific work

context) and the resources available to meet these demands (Sociaal Fonds voor de Kennissector, 2017; TNO, n.d.). This imbalance between requirements and employees' possibilities is sometimes also referred to as workload and measured with items such as "I do not have enough time to perform my tasks as well as I would like" (IVA onderwijs, 2022). However, the Transactional Model of Stress and Coping is used to define this phenomenon more appropriately. The model states that stress is "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Lazarus & Folkman, 1984, p. 19). Thus, if there is a mismatch between the perceived demands and the perceived capabilities to meet those demands, an individual's stress threshold (*stress hardiness*) is exceeded, and a stress response (i.e., work strain) is triggered (McVicar, 2003). In other words, work stress is the appraisal of work pressure (i.e., an individual's perception of the workload) relative to the available resources. The presence of excessive demands, the absence of crucial resources, or the combination can lead to stress at work.

Work Overload. Besides workload and work pressure, work overload is the third concept the JCQ has been used to measure (Bakker et al., 2005). TU/e mentions that tasks that are not the primary pursuit of employees lead to excessive work stress (Eindhoven University of Technology, n.d.-b). This statement provides a more straightforward and independent definition of *work overload*, the workload employees do not perceive as their primary goal at work.

3.1.3. Job Demands-Resources (JD-R) Theory

The Job Demands-Control model distinguished between strain and active learning processes (Karasek, 1979); the Effort-Reward Imbalance model demonstrated that stress originates from an imbalance between costs and gains (Siegrist, 1996); and Conservation Of Resources theory emphasized the importance of resources (Hobfoll, 1989; Taris et al., 2001). The Job Demands-Resources model takes these three explanations even further and is currently the most prevalent theory in modern occupational stress research.

JD-R theory proposes that all job characteristics can be classified either as a job demand or as a job resource (proposition 1), and the model uses this distinction to explain different types of worker well-being (Bakker & Demerouti, 2017; Bakker et al., 2010). *Job demands* are physical, social, or organizational job aspects that require sustained physical or psychological effort, leading to physiological and psychological costs (Demerouti et al., 2001). Examples are emotionally demanding client interactions, physical workload, and time pressure (Bakker & Demerouti, 2017; Demerouti et al., 2001). These differ from the definition of job stressors in that demands do not necessarily have a *negative* impact and can also lead to work engagement, for example, (Bakker et al., 2005). While the undesirable constraints posed by *hindrance job demands* prevent achieving valued goals, *challenge job demands* can eventually promote personal growth opportunities (Bakker & Demerouti, 2017).

Job resources are physical, social, or organizational job aspects that can help

achieve work goals and reduce job demands and associated costs (Demerouti et al., 2001). This definition makes them extrinsic motivators. At the same time, job resources can also play an intrinsically motivating role when they stimulate personal growth, learning, and development. In this way, they help fulfill basic human needs as explained by, for example, Self-Determination Theory (Deci & Ryan, 1985) and the Job Characteristics Model (Hackman & Oldham, 1976). Examples of resources are autonomy (intrinsic), skill variety (intrinsic), and performance feedback on the task (extrinsic).

A second contribution of JD-R theory (proposition 2) is that job demands and resources initiate two distinct processes. Namely, job demands are associated with a health-impairment process and a unique predictor of exhaustion (Bakker & Demerouti, 2017; Demerouti et al., 2001). On the other hand, job resources are related to a motivational process and can predict (dis)engagement (Bakker & Demerouti, 2017; Demerouti et al., 2001). By considering these two core dimensions of burnout—exhaustion and disengagement (also referred to as cynicism), JD-R theory can explain burnout through a dual pathway of strain and motivation (Bakker & Demerouti, 2017). High demands with low resources most likely lead to burnout, similar to the strain hypothesis in the JD-C model (Bakker et al., 2010; Karasek, 1979). When both job demands and resources are high, this leads to the highest motivation levels, similar to the active learning hypothesis. Besides burnout, JD-R theory also states job performance as an outcome variable. While motivation positively impacts job performance, strain has a negative impact (proposition 6).

Job resources can also buffer the impact of job demands on the health-impairment process (Bakker & Demerouti, 2017), meaning that the more job resources an employee has access to, the better they can cope with their demands (proposition 3). Considering the motivational process, job resources are particularly influential when job demands are high (proposition 4). Furthermore, *personal resources*—the beliefs people hold regarding how much control they have over their environment—can act similarly to job resources (proposition 5). These are sometimes also referred to as *internal resources*. Typical examples are optimism and self-efficacy, but the literature has only given limited support for this idea (Bakker & Demerouti, 2017).

The final two contributions of the model relate to employee behaviors after experiencing motivation or strain (Bakker & Demerouti, 2017). Firstly, motivated employees are likely to engage in *job crafting*—proactive actions employees can take to change their demands or resources (proposition 7). In turn, these acts of job crafting create 'gain spirals' and enhance motivation even more. Second, strained employees are likely to engage in *self-undermining*—the actions employees take that undermine their performance—increasing their job demands over time (proposition 8). In turn, this creates 'loss spirals' and induces even more strain.

3.2. Common Stressors in Academia

In relation to JD-R theory (Bakker & Demerouti, 2017), some job stressors refer to the presence of demands, while others refer to the absence of resources. The extant literature on the working conditions of academic staff—discussed in-depth by Coppelmans (2023)—provides the first insights into the antecedents of work pressure and stress in academia.

The largest group of stressors consists of job demands: high or unmanageable workloads (Bakker et al., 2005; Gillespie et al., 2001; Kinman & Jones, 2008; Kinman et al., 2006), psychological and emotional demands (Kinman et al., 2006), and a non-ideal work-home balance (Kinman & Jones, 2008; Winefield et al., 2014; Zábrodská et al., 2017). The literature on academic staff mainly presents workload-related stressors. These refer to the high number of working hours (Kinman & Jones, 2008), and the amount and interference of the four tasks academic staff are often involved with; (1) research and publishing, (2) education and teaching, (3) administration, and (4) supervision and management, of which administrative tasks are most disconcerting (Gillespie et al., 2001; Kinman & Jones, 2008; Taris et al., 2001). Research in The Netherlands concludes that the *combination* of research-related tasks and other tasks induces stress, not research itself (Taris et al., 2001).

To a lesser extent, the absence of job resources is also mentioned in extant literature. The lack of appreciation for the profession and management's neglect of employees' needs are two examples (Kinman et al., 2006). A more operational stressor is the lack of time, which has been mentioned in relation to each of the four types of tasks (Kinman & Jones, 2008; Kinman et al., 2006; Winefield et al., 2014). Dutch research confirms that job-related strains mainly originate from the time demands related to the teaching task (Taris et al., 2001).

Furthermore, research on demands academic staff might impose on themselves (i.e., setting high standards) is completely missing. Empirical research on personal demands as an extension of JD-R theory is minimal (Bakker & Demerouti, 2017). Moreover, the initial efforts to incorporate this element in the model are flawed due to the discrepancy between the definition and measurements of the construct. Whereas personal demands refer to self-set requirements for performance and behavior (Barbier et al., 2013), research has conceptualized them through the need for control (Zeijen et al., 2021), intergroup anxiety (Cao & Meng, 2021), caregiving demands, long-term illness (Salmela-Aro & Upadyaya, 2018), and work-life interference (Moloney et al., 2018).

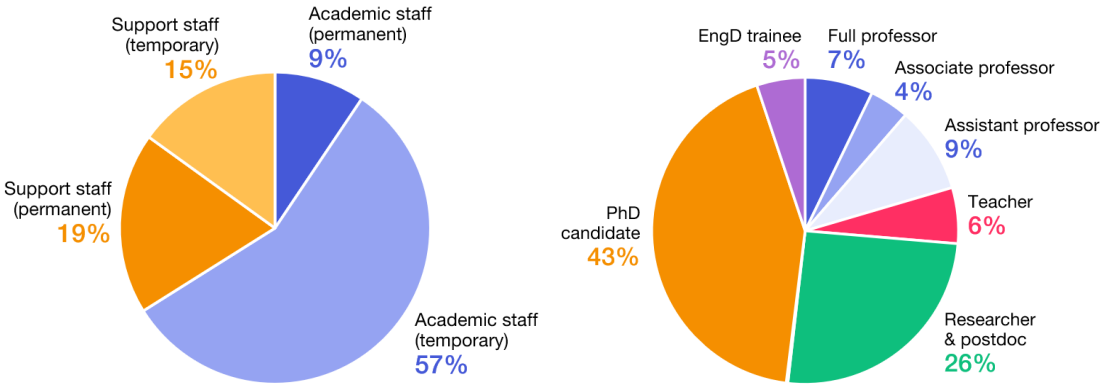
Finally, work stress interventions often focus on individual employees as they are effective and efficient (Giga et al., 2003; Reynolds, 2000). However, for long-term results (i.e., reduced stress and improved employee health), more rigorous interventions on the organizational level are required (Giga et al., 2003; Montano et al., 2014; Semmer, 2006). For example, Kinman and Jones (2008) call for structural changes that organizations can introduce to enhance the work-life balance in academia.

4. Problem Diagnosis

Following the general overview of the work stress literature and common stressors in academia, this chapter provides more specificity. It diagnoses the work pressure issues that are prevalent at TU/e by drawing on the findings of the EES and a preliminary study performed at TU/e with a focus on the academic calendar in relation to work stress.

4.1. Introduction to TU/e

TU/e is a public research university in The Netherlands specializing in engineering science and technology. In total, 12,906 students are enrolled at the university, of which 7,412 (57%) are bachelor students, and 5,494 (43%) are master students (Eindhoven University of Technology, 2022). The organization has 7,081 employees (5,239.2 FTE), of which a majority of 66% is academic staff; 669 of them have a permanent contract (Figure 7a). Among academic staff, 20% is a (full, associate, or assistant) professor, but the majority consists of PhD candidates (Figure 7b). There are nine formal departments at TU/e: Applied Physics and Science Education (APSE), Biomedical Engineering (BmE), Built Environment (BE), Chemical Engineering and Chemistry (CE&C), Electrical Engineering (EE), Industrial Design (ID), Industrial Engineering and Innovation Sciences (IE&IS), Mathematics and Computer Science (M&CS), and Mechanical Engineering (ME).



(a) *Academic Versus Support Staff* **(b)** *Division of Academic Staff*

Figure 7

The Composition of Different Groups of Employees at TU/.

4.2. Work Pressure at TU/e

The results of the EES administered by IVA onderwijs (2022) provided information on work stress and strain among academic staff and administrative and support staff on Likert-scales from 1 (*strongly disagree/never*) to 5 (*totally agree/always*). Compared to support staff, academic staff generally reported more negative values for almost all demands and stressors. They had significantly higher work stress and experienced significantly more strain.

4.2.1. Workload and Stress

Academic TU/e employees reported that, on average, they worked more hours than formally established in their contracts (M = 3.3) and worried about work during off-time (M = 3.0). This

last issue was specific to academic staff, as support staff reported a significantly more positive average (*M* = 2.2). Another significant difference was the lack of time to perform tasks *as well as employees would like to*; this was more a problem for academic (*M* = 2.8) than for support staff (*M* = 2.4). Stress was specifically high among employees in supervisory positions, employees with more contractual work hours (38 hours or more), and employees who had worked at TU/e for three or more years.

Overall, full, associate, and assistant professors experienced the highest workloads and reported that they cannot get all of their work done. They reported especially high numbers of work hours. Moreover, they all reported that they spent less time on research than they were supposed to, and more on education, organizational tasks and meetings, and other tasks.

4.2.2. Stress Acceptance

Both groups experienced stress of about one point (on a 10-point scale) higher than their maximum acceptable stress level. Academic staff accepted stress of 0.6 points higher than support staff. Primarily younger employees (34 years or younger) and those expected to work the most hours according to their contracts (38 hours or more) accepted more stress.

4.2.3. Stressors

For academic staff, especially the demands placed on them (*M* = 2.9) and emotional strain (*M* = 2.8) were important antecedents of stress (Table 1). These were also the two factors where there was a significant difference between academic and support staff; academic staff reported significantly higher values than the comparison group. The EES measured job demands and emotional strain, each with a single composite item. The job demands question referred to the amount of work, the number of responsibilities, the pressure to publish, and the pressure in teaching activities (IVA onderwijs, 2022). The emotional strain question referred to shocking events, the pressure to perform, uncertainty about the future, and the lack of mental support. Apart from these two broad categories of stressors that were included in the research through only two questions, more specific sources of stress at TU/e could not be identified through the EES.

Table 1

A Comparison of Workload Causes Between Academic and Support Staff at TU/e (IVA onderwijs, 2022)

Measure	AS	SS	*Sig.*	Total	*SD*
Demands placed on me	2.9	2.5	Yes	2.8	1.1
Job and organizational factors	2.5	**2.4**		**2.4**	1.1
Degree of individual control	**2.4**	**2.4**		**2.4**	1.1
Lack of downtime	2.6	2.5		2.5	1.2
Emotional strain	2.8	**2.3**	Yes	2.6	1.1

Note. *N* = 2,324.
Values of 2.5 or lower were emphasized in green.

4.3. Work Pressure and the Academic Calendar at TU/e

Additional internal research at TU/e about work stress and the academic calendar by van der Schaft (2022) resulted in suggestions by employees for reducing the workload. These qualitative data were systematically broken down into overarching concepts used to find similarities. These were: earlier start of the year, reduce the number of terms, education-free periods, change examination or resit policy, independent teaching methods, additional (support) staff, flexibility, distribute workload, reduce educational workload, reduce administrative workload. Besides providing more details on job demands and stressors that might lead to work pressure, the findings included seven main suggestions for reducing the workload:

1. **Structural changes** such as starting the year earlier and reducing the number of terms. A semester or trimester structure would result in more parallel courses and a more equal distribution of education-related tasks over the year.
2. **Additional staff.** Although not directly related to the academic calendar, the most frequently mentioned solution was related to hiring additional staff. Many types of staff members were mentioned: teaching staff and teachers, scientific staff and academic personnel, teaching and research assistants, (education) support staff, non-academic personnel, administration staff, project officers, software engineers, and technicians. More specific solutions were involving PhD candidates and postdocs more in education-related tasks (such as supervision) and assigning permanent teaching assistants to faculty members.
3. **Independent teaching methods** in which the focus should be more on self-study (as opposed to guided self-study), less coaching, and less individualized teaching. Challenge-Based Learning (CBL) courses without final examinations and blended learning approaches were mentioned, referring to video-based lectures and on-campus work for practical work and discussion sessions only when necessary.
4. **Assessment, examination, and resit policy.** The focus should be shifted away from final examinations towards midterm examinations and assignments. Examinations should be planned before the holidays, not after, and not during the summer break in August. Exams of larger courses or courses associated with the Binding Study Advice (BSA) should be scheduled as early as possible in the exam period to give assessors more time. Finally, the flexibility of students skipping exams, taking them later, or requesting extra resit possibilities should be limited more.
5. **Education-free or interim periods.** Scientific staff should have at least one to two education-free periods per year without teaching duties. This can also be implemented on a weekly basis by dedicating certain days of the week to research-related tasks, supervision of students, and meetings. Other respondents focus on the longer term by mentioning mandatory sabbaticals every few years.

5. Methodology

Having established the general context of work stress in academia and diagnosed the issues at TU/e, the following chapter details how the current research was performed.

A mixed research design was used for the two studies. The initial study (i.e., interviews) was qualitative in nature, and the main study (i.e., a questionnaire) was quantitative in nature. The initial study was carried out to get acquainted with the work pressure issues and make sure that the main study is tailored toward academic staff at TU/e. That is, the interviews were used as a tool in the process of designing the questionnaire. The focus of the main study is the conjoint analysis. Therefore, this chapter starts with a short introduction to this statistical analysis technique. After that, the complete research methodology is discussed in more detail.

5.1. Introduction to Conjoint Analysis

Conjoint Analysis (CA) is often used in market research to examine how customers value different product features. The product is decomposed into certain attributes that influence the customers' perceived value (i.e., utility) of the full product. Figure 8 (left) provides an example of how a product can be broken down into four attributes (i.e., the brand, model, engine, and price of a car). Each attribute has three different possible values (i.e., levels).

In *Choice-Based Conjoint (CBC)* analysis (or discrete-choice conjoint), the conjoint task is to select a single preferred full product profile from a choice set of realistic concepts. This is the most commonly used form of CA. Figure 8 (right) provides an example of a choice task given to respondents. Many different combinations of levels of each attribute are possible, and respondents choose their preferred combination from multiple series of options (i.e., choice sets). In conjoint studies, the primary question respondents are asked for the conjoint task is similar to: "If you were in the market for your next vehicle and these were the only alternatives, which would you choose?"

Figure 8

An Example of a Conjoint Design (Left) and a Choice Task (Right), Adapted From Sawtooth Software (n.d.-b)

In the current study, the 'product' that was evaluated is the academic calendar. For this, the academic calendar was decomposed into several attributes, with multiple levels for each attribute. Different combinations of these levels lead to different configurations of the academic calendar. For the choice tasks in the questionnaire, the main question was: *If we*

were to redesign the academic calendar to reduce work pressure, and the following were the only possible options, which one would you prefer? Consider your work tasks, private life, and work pressure. Employees repeatedly selected their preferred calendar among two configurations, which provided valuable data about how they value different features of the academic calendar. The attributes and levels for this conjoint study were initially derived from a literature review of work stress in academia by Coppelmans (2023). Chapter 6 goes into more detail on the iterative conjoint design process that followed.

5.2. Research Design and Models

5.2.1. Initial Study: Interviews

While the interviews were instrumental in the design of the questionnaire, their goal was threefold. Firstly, a review of the literature (Coppelmans, 2023) highlighted job stressors specific to academic staff. Internal research (IVA onderwijs, 2022; van der Schaft, 2022) provided sources of stress more specific to TU/e employees. However, these findings were a synthesis of only a limited number of sources that did not necessarily conform with each other or were of substandard quality. Therefore, the first goal of the interviews was to gain a more in-depth understanding of the topic of work stress among academic staff at TU/e. Specifically, the lengthy list of potentially relevant job demands and resources obtained from previous research was first supplemented for a comprehensive overview and then reduced to the most critical factors.

The literature review also resulted in numerous structural aspects of an academic calendar that could be changed for various reasons (Coppelmans, 2023). To make sure all possibilities for change were considered, the second goal of the interviews was to supplement the literature review with potential calendar changes proposed by interviewees.

Earlier activities, such as the literature review and discussions with the project team, resulted in an initial design for the conjoint study. This design consisted of changeable calendar aspects (i.e., the attributes) and different forms that these can take (i.e., the attribute levels). The third goal of the interviews was to validate the set of attributes and levels in terms of clarity and communicability as preparation for the questionnaire.

5.2.2. Main Study: Questionnaire

Although the questionnaire remained open for three weeks, it was considered cross-sectional. It mainly consisted of (1) questions related to the JD-R framework, which was the foundation of the current study, (2) choice tasks imperative for the conjoint study, and (3) other (desirability) questions about calendar aspects that could not be considered in the conjoint tasks. The goal of this main study was twofold.

Firstly, through questions related to job demands, job resources, personal demands, personal resources, and work strain, the work pressure of academic staff at TU/e was assessed in detail. The interviews helped narrow down the scope of this goal and make it particularly relevant for TU/e academic staff. The questionnaire also served as a more detailed sequel to the EES.

Secondly, through the conjoint study, a preferred configuration for a new academic calendar could be analyzed. Preferences were expected to differ between subgroups of different sociodemographic characteristics, job demands, personal demands, job resources, personal resources, and work strain. Therefore, these variables were considered and used for subgroup analysis of the preferences.

5.3. Sampling Procedures

5.3.1. Initial Study: Interviews

Quota sampling was used for recruiting interviewees, where job function was the main criterion for selection. They were self-selected and not compensated for their participation. For each of the nine departments, multiple employees from each mutually exclusive subgroup (full, associate, (standard) assistant, and (tenure/development track) assistant professors, teachers, and paid PhD candidates) were approached.

Between April 24th and May 12th, 2023, contact with the deans of all departments was established through their secretaries and the dean of the Bachelor College. They were asked to propose two potential participants from each of the six job functions for the group interviews. All proposed participants received a message on behalf of Education and Student Affairs (ESA) with more details about the project and a notice that they would soon receive an interview invitation. The Secretariat of General Affairs (GA) scheduled the interviews between May 12th and May 30th. Eventually, 41 employees participated in 14 (group) interviews with 1 to 5 employees per interview. The interviews took 45-60 minutes each. Appendix A provides the interview guidelines.

5.3.2. Main study: Questionnaire

Simple random sampling was used for recruiting participants for the questionnaire. They were self-selected and not compensated for their participation. Similar to the interviews, all 'lecturers' at TU/e were targeted, forming a population of 2,481 employees. All nine departments, and additionally, the Jheronimus Academy of Data Science (JADS)—a collaboration with Tilburg University—were considered.

To avoid the high portion of PhD candidates in this population skewing the results, a maximum of 50 per department was targeted initially (in practice, $N = 396$). These were a simple random sample of all paid PhD candidates within each department. However, due to the low response rate of this group after two weeks ($N = 18$), the remaining PhD candidates were invited later (additional $N = 854$).

Conjoint Study Sample Size. The accuracy of the CA results depends on the number of choice tasks performed by each participant. Therefore, the main consideration in determining the sample size of conjoint studies is the representativeness of the sample of the population of interest. Sample sizes of 200 (per group within the population) have been shown to provide acceptable error margins. However, research with as few as 50 participants can already provide a first impression of the preferences of the population in the

most basic way. For the CA, the minimum required number of respondents was

$$\frac{\text{multiplier} \cdot c}{t \cdot a} = \frac{1000 \cdot 4}{10 \cdot 2} = 200, \tag{1}$$

where a multiplier of 1000 is recommended for smaller projects, c is the largest number of levels across all attributes, t is the maximum preferred number of choice tasks, and a is the number of alternatives per choice task.

Employees of the Communication Expertise Center (CEC) of TU/e drafted a communication plan for raising awareness of the questionnaire. The core message was that TU/e recognized the issue of work stress and wanted to take action but needed employee input to do this properly. With the earlier communication about the group interviews, the deans of all departments were already made aware of the questionnaire that would follow. They were partly responsible for spreading the urgency of participating. An article shared via the website and social media channels of Cursor—the independent news outlet for TU/e—also made potential participants aware that they could soon expect the questionnaire (www.cursor.tue.nl/en/news/2023/april/week-4/what-ideas-does-tu-e-have-for-a-smarter-academic-year). The *Strategy Update* of April 2023—the 6-weekly newsletter on behalf of TU/e Executive Board also included an article on the project. Moreover, an article was published in the Second May Edition of the *People@Work* newsletter—the bi-weekly newsletter for employees with updates from the service departments. Finally, an internal TU/e page was available with more information on the project throughout its duration (www.tuenl.sharepoint.com).

The questionnaire was sent through a no-reply email address of the HR department and remained open for three weeks, from May 30th to June 21st. Two weeks after the first invitation, on June 15th, the invited employees were reminded to complete the questionnaire through a similar email. At this time, the response rate of PhD candidates was low (N = 18), and the first invitation was also sent to 854 PhD candidates who were not considered earlier.

5.4. Participants

With 291 usable responses, the response rate was 12%. In total, 243 participants fully completed the conjoint questions (10% response rate). Table 2 provides an overview of the sample demographics. Under and overrepresented groups were found by comparing the response rate of 10% with the response rate relative to the available characteristics of population sub-groups. The differences were generally acceptable. Employees from outside the EU/EEA region were underrepresented in the sample (only 4% of them). Associate professors (21% of them) and assistant professors (22% of them) were overrepresented, while teachers and PhD candidates were underrepresented (only 6% and 4% of them, respectively). While the IE&IS department was overrepresented (15% of them), BmE, CE&C, and JADS were underrepresented (only 6%, 5%, and 4% of them, respectively). Finally, while employees with a temporary contract were underrepresented (only 5% of them), those with a permanent contract were overrepresented (24% of them).

Table 2

Sample Demographics, With Population Proportions

			Percentage	
Variable	Group	N	Sample	Population
Age		239	82%	
	Under 25 years old	9	4%	
	25-29 years old	43	18%	
	30-34 years old	31	13%	
	35-39 years old	46	19%	
	40-44 years old	30	13%	
	45-49 years old	23	10%	
	50-54 years old	21	9%	
	55-59 years old	11	5%	
	60+ years old	25	11%	
Gender		239	81%	
	Male	148	62%	70%
	Female	77	32%	29%
	Non-binary / third gender	1	0%	0.4%
	Prefer to self-describe	0	0%	
	Prefer not to say	13	5%	
Living situation		238	82%	
	Single, without children	48	20%	
	Single, with older (≥12yr) children	7	3%	
	Single, with younger (≤12yr) children	3	1%	
	In a partnership, without children	78	33%	
	In a partnership, with older (≥12yr) children	41	17%	
	In a partnership, with younger (≤12yr) children	61	26%	
Caregiving demands		238	82%	
	M		1.5	
	SD		0.8	
	Min.		1.0	
	Max.		4.0	
Nationality		239	82%	
	Dutch	146	61%	56%
	Other EU/EEA country, incl. the UK and Switzerland	64	17%	20%
	Other nationality	22	9%	24%
	Prefer not to say	7	3%	
Job function		239	82%	
	Full professor	28	12%	14%
	Associate professor	40	17%	8%
	Assistant professor	68	29%	17%[a]
	Assistant professor (tenure/development track)	25	11%	
	Teacher	16	7%	11%
	PhD candidate (on payroll)	54	23%	50%
	Other	8	3%	
Department		236	81%	
	Applied Physics and Science Education (APSE)	26	11%	10%

Table continues on the next page

Continued

Variable	Group	N	Percentage	
			Sample	Population
	Biomedical Engineering (BmE)	13	6%	9%
	Built Environment (BE)	18	8%	8%
	Chemical Engineering and Chemistry (CE&C)	10	4%	8%
	Electrical Engineering (EE)	34	14%	18%
	Industrial Design (ID)	13	6%	5%
	Industrial Engineering and Innovation Sciences (IE&IS)	43	18%	12%
	Mathematics and Computer Science (M&CS)	50	21%	18%
	Mechanical Engineering (ME)	27	11%	12%
	Jheronimus Academy of Data Science (JADS)	1	0%	1%
	Other	1	0%	
Tenure		238	82%	
	Less than 1 year	13	6%	
	1 to 3 years	47	20%	
	3 to 5 years	51	21%	
	5 to 10 years	38	16%	
	11 to 15 years	27	11%	
	More than 15 years	62	26%	
Employment contract		240	83%	
	Temporary contract	84	35%	74%
	Permanent contract	152	63%	26%
	Other	4	2%	
Total response		291	100%	12%
	Response including conjoint analysis	243	84%	10%
	Partial response	48	16%	2%

[a] 17% of *all* assistant professors.

5.5. Ethical Considerations and Informed Consent

The study complied with The Netherlands Code of Conduct for Research Integrity and the derived TU/e Code of Scientific Conduct. On May 11th, 2023, the central Ethical Review Board (ERB) of TU/e approved this study (reference ERB2023IEIS24). Through an informed consent form and study information sheet (Appendix B), participants were informed about how their data would be processed, their rights to access their data, and their rights to withdraw from the study. Interviewees received the informed consent form and study information sheet before their interviews and provided explicit consent for taking part on paper. Questionnaire participants provided consent by digitally checking the corresponding boxes before starting.

For the initial (qualitative) study, participant anonymity could not be assured due to the nature of the research method. The participant identities were known to the researcher and, therefore, not anonymous. However, participant confidentiality was protected since none of the interview data could be traced back to a specific identity. The transcribed interviews did not contain any information that could be used to identify anyone.

For the main (quantitative) study, participant anonymity and confidentiality were protected. Questions about socio-demographic and work-related characteristics were limited in quantity and scope. Except for the ten choice tasks for the conjoint study, all questions could be skipped. The combination of all data in the questionnaire could not lead to the identification of a specific person. Moreover, the data analysis and corresponding reports never addressed subgroups of less than 10 participants.

The anonymized data was stored on a password-protected and encrypted (through BitLocker) hard drive. After the study, this information will remain in a protected folder on TU/e research drive for 10 years.

5.6. Measurement

The following sections introduce the measurement instruments used in the questionnaire. Appendix C gives the exact items and scales that were used to measure the constructs.

5.6.1. Job Demands

Job Demands (JD) were measured through the question: ”How demanding are the following aspects of your job currently?” with answer options ranging from 1 (*Not at all*) to 5 (*Extremely*). An example item is: ”The pressure to perform to high quality standards.” The 14 JD items were derived from (1) a review of the stress literature discussed in Chapter 3 (Coppelmans, 2023), especially drawing on empirical evidence by Bakker et al. (2005), Kinman and Jones (2008), Kinman et al. (2006), Taris et al. (2001), and Zábrodská et al. (2017); (2) preliminary internal research at TU/e about work stress and the academic calendar by IVA onderwijs (2022) and van der Schaft (2022) and discussed in Chapter 4; (3) discussions with a second researcher focusing on student work stress at TU/e; and (4) suggestions made by TU/e HR staff and during meetings of the *A Smarter Academic Year* project team. Finally, many new job demands were introduced by TU/e academic staff during the interviews in the initial phase of this study. For example:

1. Fragmentation of the job and having to switch between different tasks;
2. Pressure to build a career (separate from the pressure to research and publish);
3. Policy changes and regulations from top management, such as complex and non-transparent procedures for ethical review;
4. Extreme organizational drive for innovation;
5. Emails and unnecessary meetings;
6. Increasing number of students and the irregularity of students in courses;
7. Increasing complaints from students;
8. Inadequate or inefficient arrangement of lecture and meeting rooms;
9. Implicit pressure to invest in online course content;
10. Individual supervision of BSc and MSc students; and
11. Preparing and attending conferences.

These were added to the list of demands before only the 14 most important items were selected for the questionnaire.

Exploratory Factor Analysis. Table 3 provides the Principal Component Analysis (PCA) results for the 14 job demands. These were reduced to three factors: (1) secondary activities (such as administrative and management tasks), (2) general task demands (such as quality standards and the number of work hours), and (3) teaching demands (such as assessments). During the analysis, student motivation/dedication as demand and MSc/BSc thesis supervision demands were removed from the PCA due to low communalities (< 0.40). The pressure to research/publish was removed since it loaded extremely high ($\geq$ 0.85) on one factor and defined a separate construct. However, these removed variables were considered separately as they could still be crucial in the explanation of work stress, even though they did not fit any particular factor. For each of the three identified factors, the mean of the variables within each factor was used for further analysis.

Table 3
PCA Results for 14 JD Items

		Factor loading			
Variable		1	2	3	Communality
Number of responsibilities	JD_1	0.53	**0.60**		0.66
Fragmentation	JD_2	0.47	**0.63**		0.65
Quality standards	JD_3		**0.78**		0.62
Number of students	JD_4			**0.73**	0.61
Student motivation/dedication	JD_5	Removed from PCA, considered separately			
Exam/resit assessment	JD_6			**0.83**	0.76
Assignment/midterm assessment	JD_7			**0.82**	0.72
MSc/BSc thesis supervision	JD_8	Removed from PCA, considered separately			
Pressure to research/publish	JD_9	Removed from PCA, considered separately			
Research funding	JD_10	**0.74**			0.58
Management tasks	JD_11	**0.82**			0.71
Administrative/organizational tasks	JD_12	**0.81**			0.72
Communication activities	JD_13	**0.61**	0.41		0.57
Work hours	JD_14		**0.73**		0.62
Cronbach's alpha		.81	.79	.75	
Proportion of variance explained		26.44	20.28	18.93	

Note. This table presents the results of a Varimax-rotated two-factor solution with Kaiser Normalization.
Factor loadings below 0.30 were omitted.
N = 240.

Work-Home Interference. *Work-Home Interference (WHI)* was measured as a separate demand with three items of the Work Life Conflict subscale from the third version of the Copenhagen Psychosocial Questionnaire (COPSOQ III) by Burr et al. (2019). This scale measures the ways in which work affects private life. The Likert scale ranges from 1 (*To a very small extent*) to 5 (*To a very large extent*). Higher scores thus denote higher interference between work and private life. An example item is: "Do you feel that your work drains so

much of your energy that it has a negative effect on your private life?" In the current study, Cronbach's Alpha of WHI was .90.

5.6.2. Personal Demands

Personal demands were measured through two different concepts; irrational performance demands and personal standards. *Irrational Performance Demands (IPD)* were measured with three items adapted from the IPD subscale from the Work-related Irrational Belief Questionnaire (WIB-Q) by Van Wijhe et al. (2013). This scale refers to the associations between work-related irrational cognitions and workaholism. The frequency scale ranges from 1 (*Completely disagree*) to 5 (*Completely agree*). Higher scores thus denote higher beliefs regarding performance demands. An example item is: "At work, I have to achieve in order to be satisfied with myself." In the current study, Cronbach's Alpha of IPD was .77.

Personal Standards (PS) were measured with four items adapted from the PS subscale from the Frost Multidimensional Perfectionism Scale (FMPS) by Frost et al. (1990). This scale refers to one of five dimensions of perfectionism and is associated with positive achievement striving and work habits. The frequency scale ranges from 1 (*Completely disagree*) to 5 (*Completely agree*). Higher scores thus denote higher personal standards. An example item is: "I set higher goals than most people." In the current study, Cronbach's Alpha of PS was .64, but after removing the item "I am very good at focusing my efforts on attaining a goal," this increased to .74. This item was theoretically different from the other items as it measured behavior toward personal standards, as opposed to the presence of personal standards.

5.6.3. Job Resources

Job Resources (JR) were measured through the question: "How much do you (dis)agree with the following statements?" with answer options ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). An example item is: "I have sufficient autonomy & independence." The seven JR items were derived similarly to the job demands items. Finally, many new job resources were introduced by TU/e academic staff during the interviews or made more specific to TU/e. For example:

1. Digital and online resources such as Canvas, Osiris, Ans, pre-recorded video lectures, Discord, integrated student-follow systems (e.g., Hora Finita for PhD students), and their interconnectedness;
2. Recognition, appreciation, and rewards related to education *quality* (separate from current practices focusing on education *innovation*);
3. Financial resources for education (separate from financial resources for research);
4. Synergism between education and research;
5. Time for reflection and innovation;
6. Assistance for research from the faculty or organization as a whole; and
7. Organizational support for, e.g., planning, scheduling, and implementing blended learning practices.

These were added to the list of resources before only the seven most important items were selected for the questionnaire.

Exploratory Factor Analysis. Table 4 provides the PCA results for the seven job resources. They were reduced to two factors: (1) task & organizational resources (such as organizational support and task clarity), and (2) education time sufficiency (such as the time for preparing courses and helping students). Organizational clarity was removed from the PCA due to a low commonality (< 0.40). However, later it was considered separately. For each of the two identified factors, the mean of the variables within each factor was used for further analysis.

Table 4
PCA Results for 7 JR Items

		Factor loading		
Variable		1	2	Communality
JR_1	Autonomy/independence	**0.70**		0.50
JR_2	Organizational support	**0.79**		0.70
JR_3	Task clarity	**0.77**		0.59
JR_4	Course time		**0.87**	0.77
JR_5	Student time		**0.88**	0.78
JR_6	Organizational clarity	Removed from PCA, considered separately		
JR_7	Valued by organization	**0.75**		0.63
Cronbach's alpha		.77	.74	
Proportion of variance explained		38.37	28.10	

Note. This table presents the results of a Varimax-rotated two-factor solution with Kaiser Normalization.
Factor loadings below 0.30 were omitted.
N = 240.

5.6.4. Personal Resources

Personal resources (PR) were measured through the concept of general self-efficacy. *General Self-Efficacy (GSE)* was measured with three items adapted from the ten-item GSE scale by Schwarzer and Jerusalem (1995). This scale measures the belief that one can perform novel or difficult tasks or cope with adversity. The frequency scale ranges from 1 (*Not at all true*) to 5 (*Exactly true*). Higher scores thus denote higher optimistic self-beliefs. An example item is: "I can solve most problems if I invest the necessary effort." In the current study, Cronbach's Alpha of GSE was .73.

5.6.5. Work Strain

Work strain was measured through two different concepts; exhaustion and cognitive impairment. Both concepts were adapted from the general version of the Burnout Assessment Tool (BAT-12) by Schaufeli et al. (2020a). This scale measures burnout, which is a conceptualization of the "inability and the unwillingness to no longer spend the necessary

effort at work for proper task completion" (Schaufeli et al., 2020b, p. 3). The tool consists of four core symptoms: exhaustion, mental distance, cognitive impairment, and emotional impairment. The scale ranges from 1 (*Never*) to 5 (*Always*). Higher scores thus denote more severe burnout symptoms.

Exhaustion (EXH) was measured with three items of the exhaustion subscale from the BAT-12. An example item is: "At work, I feel mentally exhausted." In the current study, Cronbach's Alpha of EXH was .84. *Cognitive impairment (COG)* was measured with three items of the cognitive impairment subscale from the BAT-12. An example item is: "At work, I have trouble staying focused." In the current study, Cronbach's Alpha of COG was .85.

5.7. Procedures

5.7.1. Data Collection

With the interviewee's consent, the interviews were recorded using a mobile device (audio only) or via Microsoft Teams (including video). The audio was transcribed or summarized soon after the interview, and the audio file was deleted within 2 weeks. The questionnaire was created and administered using the Qualtrics Conjoint Analysis Software Tool (Qualtrics, 2021).

5.7.2. Data Analysis

For data preparation, Microsoft Excel 2023 Version 2208 for Windows and IBM SPSS Statistics 28 for Windows were used (IBM Corp, 2020). The CSV files exported from Qualtrics were merged based on a response identifier, and unnecessary columns were removed. The entries of respondents who did not at least complete 17 questions for introducing the conjoint analysis were removed. The data of one respondent who mentioned in one of the open questions to ignore their answers were removed as well. The independent and dependent variables were created by calculating the means of the respective scale items. For the remaining analysis steps, either SPSS or RStudio version 2023.06.0 Build 421 for Windows was used (RStudio Team, 2022).

In SPSS, the data were tested on the underlying assumptions of the chosen method. First, partial regression plots were considered for checking linearity; no clear non-linear trends were observed. Second, boxplots on which outliers (identified through Tukey's method) are visualized were used for outlier detection. Twelve outliers were detected, but none were deleted after a closer content-wise inspection of the data. Third, the data were tested for normality by inspecting skewness ($-2.0 < S < 2.0$) and kurtosis ($-7.0 < k < 7.0$) levels, histograms, and normal Q-Q plots; the normality assumption was satisfied (Field, 2009; Kim, 2013). Finally, the correlation matrices ($r \geq 0.8$) and VIF scores ($r \geq 5.0$) were checked for multicollinearity, which was not observed (Field, 2009). Cronbach's Alpha was calculated for all measurement scales to check for sufficient internal consistency ($\alpha \geq .70$), which was satisfactory (Field, 2009).

5.7.3. Conjoint Analysis

For the preference data, four typical types of analysis for conjoint studies were performed.

Counting Analysis. A counting analysis in SPSS provided an efficient calculation of the main effects for the choice-based conjoint (CBC) data (Lemmens, 2019; Sawtooth Software, n.d.-a). For each level, it was determined how often it was part of the preference profile relative to how often it appeared in the choice task. A benefit of this type of analysis is that the results (i.e., the percentages) are easy to interpret. However, since some combinations of levels were prohibited in the questionnaire, the given proportions were biased and not totally reliable. In this study, the counting analysis' main goal was to determine if the attributes contributed significantly to respondents' choices. This conclusion could be drawn for a particular attribute if all its levels differed significantly in their frequency of choice, which was tested with a Chi-square test.

Logistic Regression Analysis. Secondly, an analysis based on logistic regression in SPSS provided the part-worths of all attribute levels, which are estimates of the overall preference (i.e., utility) for the specific level (Lemmens, 2019; Sawtooth Software, n.d.-a). The utility of level j of attribute i, relative to the other levels of attribute i, is

$$\alpha_{ij} = B_{ij} - \frac{1}{n_i}\sum_{j=1}^{n_i} B_{ij}, \tag{2}$$

where n_i is the number of levels of attribute j and B refers to the MNL parameter estimates (Conjointly, 2012). With this, the importance of each attribute in respondents' choices could also be calculated. The importance of attribute i

$$W_i = \frac{I_i}{\sum_{i=1}^{m} I_i}, \tag{3}$$

where m is the total number of attributes. The range of relative utilities for attribute i

$$I_i = max_j(\alpha_{ij}) - min_j(\alpha_{ij}). \tag{4}$$

The results of the logistic regression analysis provided the first indication of how important each academic calendar aspect was in differentiating between a preferred and non-preferred calendar configuration (Lemmens, 2019; Sawtooth Software, n.d.-a). It also showed which options for these aspects were preferred relative to the other options. This study assumed a main effects conjoint model (i.e., additive model), where the sum of the relative utilities of all levels in a configuration reflects the total utility score of that configuration.

Hierarchical Bayesian Analysis. Other results were obtained from Hierarchical Bayesian (HB) analysis in Qualtrics and used to study the differences between individuals further. HB estimation is an iterative technique consisting of two models that converge into one solution to output utilities of all levels for each individual respondent (Qualtrics, n.d.; Sawtooth Software, n.d.-a). A higher-level logistic regression model predicts full sample

preferences. A lower-level model gauges the differences between the distribution of the MNL model and the predicted relative utilities of individual respondents. Specifically, the Markov Chain Monte Carlo Hierarchical Bayes (MCMC HB) estimation method runs 1000 iterations per Markov Chain and runs 4 chains (Qualtrics, n.d.).

HB analysis is a relatively complex method and provided more reliable results, while their interpretation is equal to the interpretation of the logistic regression analysis results. Still, the outcomes of this analysis were primarily useful for subsequent subgroup analyses.

Conjoint Subgroup Analysis. Finally, results were obtained from Latent Class Analysis (LCA) and k-means clustering (Lemmens, 2019). These methods classified individual respondents into subgroups with similar preferences or perceptions of work strain.

LCA can be used to identify clusters of similar observations from multivariate categorical data by calculating the probabilities of each observation belonging to each cluster. The `poLCA` R package for LCA of polytomous variables was used (Linzer & Lewis, 2011, 2013). It employs Expectation-Maximization (EM) and Newton-Raphson algorithms to find maximum likelihood estimates of the latent class parameters.

Secondly, the unsupervised machine learning method k-means clustering classifies observations into a pre-determined number of clusters such that the total within-cluster variation is minimized. For this, the `kmeans()` function of the `stats` R package was used (RDocumentation, n.d.). This function uses the Hartigan-Wong algorithm which defines the total within-cluster variation as the sum of squared Euclidean distances between the observations and the corresponding cluster centroid. In the interpretation of the results of this analysis, the *compactness* of the solution indicates the similarity of observations within the solution's clusters and, thus, how well the data was grouped (University of Cincinnati, n.d.). It was the main criterion for selecting the highest potential solution and was calculated by dividing the between-cluster sum of squared distances by the total sum of squared distances. The chosen solutions were validated through their average *silhouette coefficient*, which is a measure of how similar an observation is to its own cluster compared to the other clusters (University of Cincinnati, n.d.). It ranges from -1 to +1, where high values indicate that the observation matches well with its own cluster but poorly with the other clusters. Negative values indicate that the observation was placed in the wrong cluster.

6. Designing the Conjoint Study

Figure 9 presents the research model for the conjoint study. Most importantly, it shows that the academic calendar was decomposed into five attributes, totaling 19 levels. Kløjgaard et al. (2012) emphasize the importance of testing, optimizing, and reporting the design of CBC designs. So, the remainder of this chapter details how this conjoint design came to be. Specifically, four design iterations are highlighted. Appendix D gives the exact designs.

The model also includes sociodemographic characteristics, work-related characteristics, job demands, personal demands, job resources, personal resources, and work strain. These variables were used for further analysis since calendar preferences were expected to differ between subgroups.

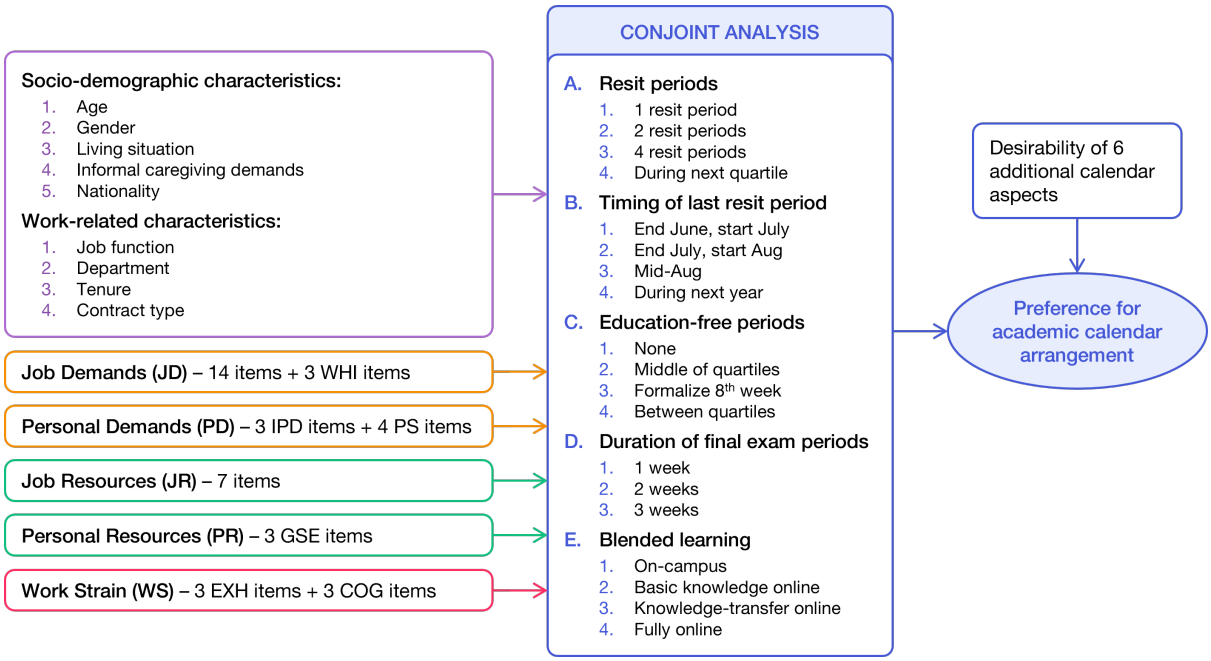


Figure 9
Full Research Model for the Conjoint Study

6.1. Design Iteration 1: Preliminary Version

The first version of the design for the conjoint study was primarily derived from a literature review of work stress in academia (Coppelmans, 2023). Especially school calendar design literature, the information available on structural stress prevention strategies, and the position paper by The Young Academy Leiden (2021) were helpful for this preliminary conjoint design. For example, the attribute 'A. Number of terms' was a derivative of the school calendar design literature, which focuses on various term systems.

Moreover, attention was paid to the findings of the problem diagnoses discussed in Chapter 4. This included preliminary internal research at TU/e about work stress and the academic calendar by IVA onderwijs (2022) and van der Schaft (2022).

This first version also considered experience with the academic calendar at TU/e and suggestions made during meetings of the core *A Smarter Academic Year* project team.

6.2. Design Iteration 2: Substantiated Version

The revision of the preliminary design iteration was guided by

1. The revised directive of the Bachelor College for 2023;
2. Recommendations by a working group focused on assessment in the context of revising the Bachelor College program; and
3. Ongoing discussions with the core project team, an expert in IO psychology (at the same time project supervisor), a second researcher focusing on student work stress at TU/e, and TU/e HR staff.

For example, attributes 'D. Final exams' and 'E. Blended learning policy' are a result of feedback from the assessment working group and consequent discussions of the core project team.

6.2.1. Design Considerations

Besides these changes that were naturally incorporated into the design process, the primary goal for the second design iteration was to design an objectively better conjoint study (Hair et al., 2013, Chapter 8 Conjoint Analysis). The following sections introduce the CA design principles considered from here on.

Firstly, the conjoint study should include all attributes that create (positive attributes) or detract (negative attributes) from the overall utility of a configuration. However, they should be able to differentiate sufficiently between different configurations. Moreover, combining the attributes and levels should always result in a representative concept that could be implemented in practice. They should thus be specifiable and quantifiable.

Considerations Regarding Attributes. The number of attributes is another concern. Adding attributes to the study increases the number of profiles respondents have to judge. Also, the more complex the relationship (e.g., in the case of interaction terms), the more profiles are needed. The absolute minimum number of profiles shown to participants can be calculated according to

$$\text{Minimum no. of profiles} = \text{Total no. of levels across all attributes} - \text{No. of attributes} + 1. \quad (5)$$

For example, this conjoint study with five attributes with three or four levels each (19 levels) needs 4 x 4 x 4 x 3 x 4 = 768 profiles. The minimum number of profiles shown per participant is 19 - 5 + 1 = 15 profiles. However, a multiple of two to three is suggested for deriving reliable part-worth estimations. This example could lead to 30 to 45 choice tasks in which the participants choose between two profiles (i.e., pairwise comparison). Moreover, when attributes are correlated, the parameter estimates are affected, and reliable estimates cannot be obtained due to the lack of uniqueness of each level. When attributes are correlated, this can lead to unrealistic combinations.

Considerations Regarding Levels. Furthermore, the number of levels should be equalized as much as possible across all attributes to avoid a bias regarding relative

importances. Moreover, the range of the levels should be set outside existing values, although not at an unbelievable level, since results should never be extrapolated beyond the defined minimum and maximum levels.

6.2.2. Learning From Other Universities

The design process toward the second iteration also included analyzing and comparing existing academic calendars. The current academic calendar at TU/e consists of three periods: education weeks, combined final examination and resit weeks, and education-free weeks (i.e., the Christmas recess, Carnival holiday, and summer break). Different arrangements of these periods are a possibility for restructuring the academic schedule.

However, the calendars of other universities can provide inspiration and creativity for more possibilities. In total, 18 different academic calendars of 15 international universities were compared to the schedule at TU/e. The Netherlands counts four universities of technology and one with multiple relevant technical studies; these five institutions are assumed to be similar to TU/e (4TU.Federation, n.d.). Regular collaboration with Tilburg University (TiU) also makes this institution relevant to include in the comparison. Appendix E provides the full analysis and comparisons of all academic calendars. In short, TU/e could learn from the other Dutch universities that there are:

1. Possibilities for self-study weeks before examination periods and education-free weeks after examination periods;
2. Possibilities for longer or shorter examination periods; and
3. Different arrangements of examination periods (e.g., split final examinations and resit exams).

Moreover, TU/e students can take study components at other (inter)national universities. Here, the EWUU (EWUU Alliance, n.d.), EuroTeq, and EuroTech (EuroTech Universities Alliance, 2022) alliances play important roles. Additional European universities similar to TU/e (i.e., they offer bachelor programs *and* master programs in similar disciplines, are medium-sized, publicly funded, demonstrate high research contributions, and score similarly in the QS World University Ranking) are also considered (“University Search,” n.d.). From the international universities, TU/e could discover that there are:

1. Possibilities for different term systems (e.g., semesters and trimesters instead of quartiles);
2. Possibilities for introducing education-free and self-study weeks throughout and between educational periods; and
3. Different arrangements of examination periods (e.g., split final examinations and resit exams).

6.3. Design Iteration 3: Interview Version

The second iteration of the design for the conjoint study was subjected to feedback from:

1. The extended *A Smarter Academic Year* project team, including a representative of

TU/e Young Academy of Engineering and a representative of a working group, focused on assessment in the context of revising the Bachelor College program;
2. An expert in education sciences and development; and
3. Ongoing discussions with the core project team, an expert in IO psychology, the second researcher, and TU/e HR staff.

This resulted in a third iteration of the conjoint design, which was used for feedback from academic staff during the interviews (i.e., the third goal of the initial interview study).

6.4. Design Iteration 4: Final Version

The third design iteration was improved by drawing on feedback from academic TU/e staff during (group) interviews and the Dean of TU/e Bachelor College. This resulted in a final version of the design for the conjoint study (Table 5). The combinations of level C4 about introducing education-free periods between the quartiles with levels D2 or D3 were excluded from the conjoint study. These 'prohibited pairs' would otherwise present unrealistic configurations to respondents, as they consisted of calendar with too many weeks.

6.4.1. Validation of the Conjoint Design During Interviews

The attribute 'C. Planning of breaks' confused many interviewees as the definition of a break in this context was unclear. Breaks, vacations, and education-free periods are inherently different, especially from the perspective of academic staff. It emerged that if staff were confronted with extra breaks, they would use these to catch up on overdue work (e.g., assessing final exams) or do more research. Especially in the context of high work pressure, these breaks would not be considered vacations or free days. Therefore, the attribute was reformulated as 'planning of education-free periods.'

The attribute 'E. Blended learning' was also confusing for some interviewees, as the definition of online education was unclear. Various forms of blended learning, hybrid learning, front-led teaching, and online tools such as email, Canvas, and video lecture platform were mentioned as different types of online education. This attribute was thus reformulated with a focus on the role of the teacher and 'the way course activities are delivered.' It was based on a scale ranging from brick-and-mortar to online learning, inspired by Clayton Christensen Institute (2021).

Others believed blended learning should not be considered in a study about the academic year. Indeed, this is not a structural element of the calendar and will not be used as a 'building block' in the redesign process. However, from discussions with the project team, it emerged as a critical peripheral issue, especially during the aftermath of the COVID-19 pandemic. Moreover, the application of blended learning is one of the four categories of pilots proposed by Van Aert (2023) and, therefore, crucial to consider.

Level 'B4. During the following academic year' left some interviewees wondering when exactly during the following academic year resits would be scheduled. Possible options mentioned were (1) before the start of the academic year, (2) during Q1, and (3)

during the Q1 final exam period. Depending on these details, interviewees had different preferences relative to the other levels of this attribute. These remarks led to adding an extra desirability question to the questionnaire.

An additional question about the alignment of vacations and education-free periods at TU/e with the fixed school holidays of primary and secondary education in the south of The Netherlands was removed after the interviews. All interviewees agreed that an overlap would be beneficial, especially for those with children. However, most already accepted that this alignment is not always possible. Similarly, a question about preferences for splitting or combining final exams and resits in one examination period was disregarded. For almost all respondents, this decision did not matter.

Table 5

Design Iteration 4 (Final Version) Of the Conjoint Study With Five Attributes and 19 Possible Levels

Attribute	Levels
A. Resit periods	**1.** 1 resit period: after Q4.
	2. 2 resit periods: halfway through the year and after Q4.
	3. 4 resit periods: in Q2, in Q3, in Q4, and after Q4.
	4. No dedicated resit periods: resits are during the education period of the following quartile, possibly in the evening.
B. Timing of last resit period	**1.** Around the end of June and the beginning of July.
	2. Around the end of July and the beginning of August.
	3. Around mid-August.
	4. During the following academic year.
C. Planning of education-free periods	**1.** Introduce no extra education-free periods.
	2. Introduce education-free periods of 1 week in the middle of each quartile.
	3. Formalize education-free periods of 1 week before each final exam/assessment period.
	4. Introduce education-free periods of 1 week between the quartiles (after each final exam/assessment period).
D. Duration of final exam periods	**1.** Students' coursework of 1 quartile is assessed during 1 week of exams (total of 4 final exam weeks per year).
	2. Students' coursework of 1 quartile is assessed during 2 weeks of exams (total of 8 final exam weeks per year).
	3. Students' coursework of 1 quartile is assessed during 3 weeks of exams (total of 12 final exam weeks per year).
E. Blended learning	**1.** All course activities are on campus. Digital resources (such as Canvas) may be used to enhance learning.
	2. Only basic & fundamental knowledge is online self-study. Knowledge transfer activities (such as lectures) for more in-depth topics are on campus.
	3. Knowledge transfer activities (such as lectures) are online self-study. Teacher-guided practice and projects are on campus.
	4. The majority of course activities is online self-study. Some complementary sessions with a teacher (such as Q&As) are on campus.

7. Findings of the Interviews

The goal of the interviews was threefold. Chapter 6.4.1 already discussed interviewees' feedback on the design of the conjoint study. Chapters 5.6.1 and 5.6.3 already detailed the interview results regarding specific job demands and resources. Based on the assumptions of JD-R theory, Figure 10 presents the demands and resources that were eventually included in the questionnaire after the interviewees' feedback. This chapter gives the remaining

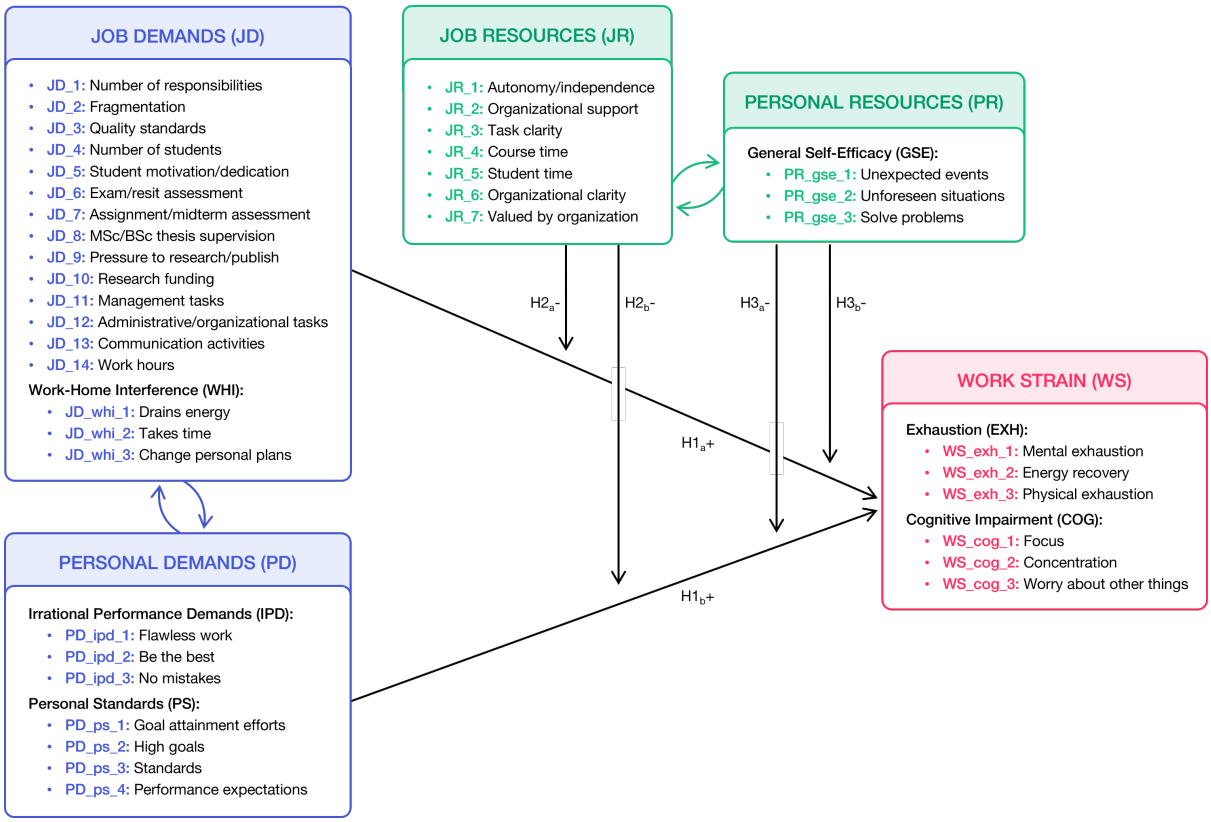


Figure 10

Assumptions of the Research Design Based on JD-R Theory

interview findings related to general work pressure and opinions about the academic calendar. The possibilities for change were assessed through these opinions, serving the remaining goal of the interviews.

7.1. Work Pressure Among Academic TU/e Staff

The academic staff mentioned that they experience work pressure to some degree, but not necessarily as negative. The workload is high, but most have accepted this already as inherent to their jobs. For many, teaching might feel like wasted time as it causes the most amount of work and takes time away from research. Employees mentioned "how tasks are progressing," "how you feel," and "internal performance pressure" (mainly related to research) as other aspects potentially more crucial for the experience of work pressure.

Because of the high workload, employees often do not have the time to take time off. They sometimes work during weekends or on holidays, which is a choice and not associated

with negative consequences per se. They often spend this time on enjoyable activities or simple administrative tasks. Nonetheless, work is almost always mentally present.

7.2. Opinions on the Academic Calendar

7.2.1. Structure and Flexibility

Lecturers appreciate the structure of the current 10-week (or 7+1+2-week) quartile system. This leads to clarity, certainty, and predictability. While flexibility on a daily basis is high, flexibility in yearly and course planning is lacking, especially in the Bachelor College. It currently is not flexible enough to account for the needs of different courses and departments. For example, opinions on the necessity of the 'no new material'-arrangement in the eighth education week are diverse.

Course Length. Also, 1-week modules would be appropriate for some courses. For others, time on task is critical, and eight education weeks is already insufficient. Regarding courses that span longer periods, lecturers mentioned they may need to provide students with more guidance to keep them on track. Furthermore, more intermediate and formative assessments might be preferred or required instead of a focus on final exams and summative assessments. As a benefit, this may reduce the peak work pressure during the examination periods. In any case, courses must remain 5 ECTS.

Weekly Timeslots. Moreover, staff mentioned their dissatisfaction with the current 4-hour timeslot system. While these blocks are too short for some project work (leading to losing momentum), they are too long for lectures (leading to exhaustion). The whole 4 hours are often not used, leading to fragmented daily planning. Moreover, the timeslots contain evening hours, while they are rarely used. This is confusing and implies that evening work is expected. Incidental evening work (e.g., resit exams) was generally accepted, but structural evening work (e.g., evening lectures) was not.

7.2.2. Fragmentation of the Second Semester

The second semester is fragmented due to the national holidays and bridging days. Even though Q4 is extended by one week, the regular work must be finished in fewer working days, resulting in higher time pressure compared to the rest of the year. Rescheduling courses costs a lot of time, mainly because the holidays differ yearly. Moreover, lectures and meetings were sometimes moved to evening hours to compensate.

Carnival Holiday. The Carnival holiday is a quiet week since most students are not on campus. Lecturers can focus on overdue work, research tasks, and assessment of Q2. Only some regard it as a crucial holiday. However, the break causes a loss of momentum during Q3, increasing lecturers' workloads to help students back on track and reducing the possible amount of course content. Overlapping the Carnival break with national holidays or bridging days in the second semester could be a solution.

7.2.3. Christmas Holiday

The schedule around the Christmas period is suboptimal. As the first week is not seen as a break due to the holidays, it does not allow for rest much. Moreover, because the Q1 exam period is so soon after the Christmas break, lecturers often have to grade assignments last minute or provide feedback. Finally, the break causes a loss of momentum during Q2.

7.2.4. Summer Holiday

The workload during the summer period has increased in the past years, and it has become challenging to schedule vacations. Lecturers are expected to supervise students working on their thesis projects during the summer, leading to high workloads toward the new academic year. Prohibiting graduations around the summer period or dictating thesis project start times (as at the Department of ID) could be a solution. Including these often lower-priority tasks considered as constant pressure, such as thesis supervision and conferences, in the academic calendar is crucial but probably impossible.

7.2.5. International Alignment

Staff also mentioned that the academic calendar should be more aligned with other European universities. Not only regarding education (primarily examination periods) but also research.

7.3. Changing the Academic Calendar

Opinions about the current academic calendar ranged from neutral to ”terrible.” While there was no genuine appreciation, staff were generally indifferent to changing the calendar. Employees expressed frustrations and dissatisfaction with the current calendar, that not lead to work pressure per se. Academic staff generally believed that work pressure issues were unrelated to the yearly planning. Their jobs are highly flexible and not dictated by the calendar. Lecturers were primarily concerned about how calendar changes would impact students. If a redesign could help students and not result in higher demands for staff, it would be accepted.

Since different tasks have different time horizons, scheduling can be improved on multiple other levels. For example, reserving days, weeks, months, or quartiles to focus on particular tasks, such as researching and redeveloping courses, can be beneficial.

8. Preliminary Findings on Work Strain

8.1. Descriptive Statistics

Table 6 provides descriptive statistics of all 11 scales, three separate job demands, and one separate job resource. Appendix F provides additional descriptive statistics on an item level.

Table 6

Descriptive Statistics

Construct	Scale/item	*n*	*M*	*SD*
Job demands	Work-home interference	3	3.1	1.1
	Secondary activities	4	3.1	1.0
	General task demands	4	**3.5**	0.8
	Teaching demands	3	3.1	0.9
	Student motivation/dedication	1	2.8	1.2
	BSc/MSc thesis supervision	1	3.2	1.1
	Pressure to research/publish	1	**3.6**	1.1
Personal demands	Irrational performance demands	3	2.9	0.9
	Personal standards	4	**3.3**	0.8
Job resources	Task & organizational resources	4	**3.6**	0.9
	Education time sufficiency	2	**2.6**	1.0
	Organizational clarity	1	2.7	1.1
Personal resources	General self-efficacy	3	**3.9**	**0.6**
Work strain	Exhaustion	3	**2.9**	0.9
	Cognitive impairment	3	2.7	0.8

Note. N $\geq$ 237, -0.79 < *S* < 0.38, and -0.90 < *k* < 0.33.

Noteworthy positive values were emphasized in green and negative values in red. Noteworthy standard deviations were emphasized in orange.

Among all job demands, especially general task demands (*M* = 3.5) and the pressure to research/publish (*M* = 3.6) were high, on average. The number of responsibilities (*M* = 3.6), the fragmentation of the job (*M* = 3.7), and the high quality standards (*M* = 3.6) contributed to the high general task demands. The number of work hours (*M* = 3.2) was the least demanding within this scale. Communication activities were also relatively demanding (*M* = 3.6), with the highest mean of all secondary activities. Conversely, the demands of management tasks were not extreme (*M* = 2.7). However, not all employees have management duties, so this could point to potential sub-group differences (based on job function). The standard deviation of being involved with acquiring research funding was generally high (*M* = 3.2, *SD* = 1.5), which can also be explained through differences in job function. Considering personal demands, personal standards (*M* = 3.3) were generally more demanding than irrational performance demands (*M* = 2.9).

Compared to the other variables, the standard deviation of GSE was relatively low,

while its mean was high (M = 3.9, SD = 0.6). Among the job resources, especially task and organizational resources (M = 3.6), were high, on average. Specifically, autonomy and independence (M = 4.2) and task clarity (M = 3.8) contributed to this. Education time sufficiency (M = 2.6), primarily related to preparing, revising, and further developing courses (M = 2.3), was low, on average.

Regarding work strain, exhaustion was generally higher (M = 2.9) than cognitive impairment values (M = 2.7), which was specifically related to the difficulty of energy recovery after a workday (M = 3.1). The cognitive impairment item related to making mistakes at work because employees have their minds on other things was relatively low (M = 2.4).

8.2. Correlation Analyses

Table 7 provides Pearson's correlations of essential sociodemographic and work-related variables, all 11 scales, three job demands, and one job resource.

Most of the sociodemographic variables significantly correlated with age. Notably, age, job function, tenure, and type of employment contract were all strongly ($|r| > .50$) and significantly correlated. It was assumed that job function could best differentiate between demands, resources, and work strain. For example, it significantly correlated strongly with demands of secondary activities (r = -.56, $p < .01$). Thus, these demands increase with a higher job function (reverse-coded). As side effects of a higher job function, age and tenure would be higher, and employment contracts would more likely be permanent. Further analyses sometimes disregarded these side effects by only including job function.

The two outcome variables—exhaustion and cognitive impairment—were positively correlated (r = .57, $p < .001$), indicating that they measured a similar construct—work strain. Exhaustion also positively correlated with WHI (r = .69, $p < .001$), showing the importance of WHI in the stress process while potentially distinguishing between the more physical and cognitive components. General task demands positively correlated with WHI (r = .62, $p < .001$) and demands of secondary activities (r = .63, $p < .001$). However, they negatively correlated with education time sufficiency (r = -.52, $p < .001$). That is, general task demands such as high-quality expectations might primarily take time away from preparing, revising, and further developing courses. Finally, task & organizational resources negatively correlated with exhaustion (r = -.52, $p < .001$) and WHI (r = -.52, $p < .001$). This indicates that these types of resources could be beneficial in the stress process but not necessarily for its cognitive component.

8.3. Linear Regression Analyses

Multiple linear regression analyses were performed to gain a basic understanding of the relationships between the work strain variables and the measured demands. These were based on the hypotheses of JD-R theory, shown in Figure 10 (p. 45) in Chapter 7. Moderation analyses of resources on these relationships and mediation analyses were not performed due to time constraints and other priorities in the findings of this study.

Table 7

Pearson's Correlations With Cronbach's Alpha on the Diagonal

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Age	-																							
2	Gender		-																						
3	Living situation	.25**		-																					
4	Caregiving demands	.18**			-																				
5	Nationality	-.16*	.43**			-																			
6	Job function (R)	**-.69****		-.39**			-																		
7	Department							-																	
8	Tenure	**.79****		.31**		-.20**	**-.64****		-																
9	Employment contract	**.57****		.25**			**-.60****		**.59****	-															
10	Work-home interference			.16*		.14*	-.16*				**(.90)**														
11	Secondary activities	.36**		.32**			**-.56****		.34**	.30**	.43**	**(.81)**													
12	General task demands	.14*		.23**		.14*	-.27**		.14*	.14*	**.62****	**.63****	**(.79)**												
13	Teaching demands	.15*		.21**			-.14*				.29**	.39**	.37**	**(.75)**											
14	Student motivation				-.13*							.21**	.17**	.36**	-										
15	Thesis supervision	.21**		.26**			-.23**		.19**		.30**	.41**	.39**	.37**	.15*	-									
16	Pressure to research/publ.	-.24**						-.20**	-.15*	-.18**	.26**	.21**	.40**		.15*	.32**	-								
17	Irrational perf. demands										.14*		.21**				.20**	**(.77)**							
18	Personal standards			-.15*		.24**			-.15*		.18**		.21**					.49**	**(.74)**						
19	Task & org. resources		-.19**			-.18**					**-.52****	-.29**	-.39**	-.15*	-.19**	-.14*	-.19**			**(.77)**					
20	Education time sufficiency			-.20**			.21**		-.14*	-.16*	-.44**	-.43**	**-.52****	-.24**	-.16*	-.27**	-.20**		-.16*	.33**	**(.74)**				
21	Organizational clarity	.15*			.15*				.13*		-.17**		-.18**							.38**	.23**	-			
22	General self-efficacy			.19**											-.13*					.17**			**(.73)**		
23	Exhaustion	-.16*				.15*	.13*		-.15*	-.13*	**.69****	.24**	.44**	.17**			.34**	.15*	.15*	**-.52****	-.33**	-.21**	-.20**	**(.84)**	
24	Cognitive impairment						.15*		-.15*		.38**	.14*	.23**	.13*		.17**	.24**			-.37**	-.25**		-.17**	**.57****	**(.85)**

Note. Insignificant correlations were removed, and noteworthy correlations (|*r*| > .50) were emphasized.

* $p < .05$, ** $p < .01$, *** $p < .001$

Firstly, the analyses were performed with exhaustion as the dependent variable (Table 8). In the insignificant control model (model 1.1, R^2 = .044, *F*(6, 222) = 1.72, *p* = .118), nationality (β = 0.15, *p* = .042) and job function (β = 0.16, *p* = .031) were statistically significant. This result indicated differences between some sociodemographic groups in explaining exhaustion levels. However, it prevented uncovering which demands had significant effects on exhaustion. A similar analysis without controlling for these sociodemographic effects (model 2, R^2 = .524, *F*(9, 225) = 27.5, *p* < .001) showed significant effects of WHI (β = 0.69, *p* < .001), thesis supervision demands (β = -0.13, *p* = .021), and the pressure to research/publish (β = 0.21, *p* < .001). The effects of WHI were relatively high in models 1.2, and 2. To uncover other relevant predictors, it was removed from the remaining analyses. For example, model 3 (R^2 = .239, *F*(8, 226) = 8.87, *p* < .001) showed that besides the pressure to research/publish (β = 0.22, *p* = .001), general task demands (β = 0.37, *p* < .001) could be an important predictor of exhaustion as well.

Table 8

Linear Regression Results With Exhaustion as Dependent Variable and Sociodemographic Variables and Demands As Independent Variables

DV = exhaustion	Model 1.1			Model 1.2			Model 2			Model 3		
	β	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*
Intercept		0.32	**<.001**		0.34	**.018**		0.25	**<.001**		0.32	**.007**
Gender	-0.07	0.07	.337	0.00	0.05	.999						
Living situation	0.08	0.03	.278	-0.03	0.03	.539						
Caregiving demands	-0.02	0.08	.724	-0.07	0.05	.151						
Nationality	0.15	0.08	**.042**	0.02	0.06	.719						
Job function	0.16	0.03	**.031**	0.25	0.03	**<.001**						
Department	-0.08	0.02	.251	-0.07	0.02	.126						
Work-home interference				0.68	0.04	**<.001**	0.69	0.04	**<.001**			
Secondary activities				0.11	0.06	.118	-0.06	0.05	.317	-0.02	0.07	.799
General task demands				0.00	0.08	.998	0.01	0.08	.902	0.37	0.09	**<.001**
Teaching demands				0.00	0.05	.967	0.02	0.05	.783	0.05	0.06	.437
Student motivation/dedication				0.00	0.04	.955	0.02	0.04	.638	0.02	0.04	.792
MSc/BSc thesis supervision				-0.10	0.04	.077	-0.13	0.04	**.021**	-0.09	0.05	.182
Pressure to research/publish				0.15	0.04	**.005**	0.21	0.04	**<.001**	0.22	0.05	**.001**
Irrational performance demands				-0.01	0.05	.812	-0.01	0.05	.856	-0.02	0.07	.823
Personal standards				-0.01	0.06	.838	0.02	0.06	.780	0.06	0.07	.404
Cognitive impairment												
R Square		.044			.566			.524			.239	
Adjusted R Square		.019			.535			.504			.212	

Secondly, the analyses were performed with cognitive impairment as the explanatory variable (Table 9). In the insignificant control model (model 1.1, R^2 = .052, *F*(6, 222) = 2.01, *p* = .065), job function (β = 0.18, *p* = .014) was statistically significant. In the model that additionally included all job and personal demands (model 1.2, R^2 = .247, *F*(15, 213) = 4.66, *p* < .001), nationality (β = -0.18, *p* = .010), WHI (β = 0.34, *p* < .001), and irrational performance demands (β = -0.15, *p* = .035) became significant. Analysis without controlling

for sociodemographic effects (model 2, R^2 = .180, $F(9, 225) = 5.48$, $p < .001$) also showed significant effects of the pressure to research/publish ($\beta = 0.19$, $p = .007$), besides WHI ($\beta = 0.35$, $p < .001$). The effects of WHI were again relatively high in models 1.2 and 2. However, the regression analyses without this predictor (model 3) provided similar results.

Table 9

Linear Regression Results With Cognitive Impairment as Dependent Variable and Sociodemographic Variables and Demands As Independent Variables

DV = cognitive impairment	Model 1.1			Model 1.2			Model 2			Model 3		
	β	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*
Intercept		0.28	**<.001**		0.39	**<.001**		0.29	**<.001**		0.30	**<.001**
Gender	-0.01	0.06	.928	0.01	0.06	.878						
Living situation	0.07	0.03	.301	-0.02	0.03	.753						
Caregiving demands	0.05	0.07	.468	0.01	0.06	.842						
Nationality	-0.12	0.07	.104	-0.18	0.07	**.010**						
Job function	0.18	0.03	**.014**	0.27	0.03	**<.001**						
Department	-0.08	0.02	.208	-0.08	0.02	.199						
Work-home interference				0.34	0.05	**<.001**	0.35	0.05	**<.001**			
Secondary activities				0.12	0.07	.205	-0.04	0.06	.672	-0.01	0.06	.880
General task demands				0.01	0.09	.948	-0.02	0.09	.851	0.17	0.08	.062
Teaching demands				0.04	0.06	.579	0.04	0.06	.584	0.06	0.06	.429
Student motivation/dedication				-0.05	0.04	.444	0.00	0.04	.956	-0.01	0.04	.917
MSc/BSc thesis supervision				0.03	0.05	.731	0.01	0.05	.921	0.03	0.05	.739
Pressure to research/publish				0.11	0.05	.140	0.19	0.05	**.007**	0.19	0.05	**.009**
Irrational performance demands				-0.15	0.06	**.035**	-0.14	0.06	.055	-0.14	0.06	.060
Personal standards				0.03	0.07	.686	0.00	0.07	.957	0.02	0.07	.812
Exhaustion												
R Square		.052			.247			.180			.105	
Adjusted R Square		.026			.194			.147			.073	

8.3.1. *Conclusions of the Regression Analyses*

These analyses show that WHI and the pressure to research/publish could be positively related to both work strain outcomes; the higher these demands, the higher the work strain. However, thesis supervision demands were negatively related to exhaustion but not cognitive impairment; supervising theses is associated with lower exhaustion while not affecting the cognitive strain dimension. General task demands were positively related to exhaustion but not cognitive impairment. Irrational performance demands were negatively related to cognitive impairment only; workaholism-like behaviors were associated with fewer cognitive issues but did not affect exhaustion. Finally, exhaustion and cognitive impairment were related to each other as they represented different facets of work strain.

8.4. Differences Between Sociodemographic Groups

The linear regression analyses indicated that job function and nationality could be differentiators in the discussed work strain relationships. Differences between sociodemographic groups were uncovered through one-way analyses of variance (ANOVA)

for each of the 11 scales, three job demands, and one job resource. The following sections describe the most relevant results of consequent post hoc Tukey tests. Due to their intercorrelations, the differences between age, tenure, and type of employment contract groups are only reported when job function was not a significant differentiator.

8.4.1. Work Strain

Exhaustion. Compared to full (M = 2.5, p = .024) and associate professors (M = 2.6, p = .032), exhaustion was significantly higher for assistant professors in a tenure track (M = 3.3). Other assistant professors (M = 3.0) also had relatively high levels of exhaustion. However, this mean was not significantly different from other groups. Moreover, compared to Dutch employees (M = 2.8), exhaustion was significantly higher for employees from other EU/EEA countries (M = 3.1, p = .044). Non-EU employees also had relatively high levels of exhaustion (M = 3.2). However, this mean was not significantly different from other groups.

Cognitive Impairment. Compared to full professors (M = 2.3), cognitive impairment was significantly higher for assistant professors (M = 2.9, p = .012). Teachers (M = 2.9) also had relatively high levels, but associate professors (M = 2.5) had relatively low levels of cognitive impairment. These means were not significantly different from other groups.

8.4.2. Demands

Work-Home Interference. Compared to PhD candidates (M = 2.6), work-home interference was significantly higher for assistant professors (M = 3.4, p = .004) and assistant professors in a tenure track (M = 3.4, p = .049). Teachers also had relatively low work-home interference (M = 2.9), although this mean was not significantly different from other groups.

Compared to Dutch employees (M = 2.9), work-home interference was significantly higher for other EU/EEA employees (M = 3.4, p = .01). Non-EU employees also had relatively high work-home interference (M = 3.3). However, this mean was not significantly different from other groups.

General Task Demands. Compared to PhD candidates (M = 3.1), general task demands were significantly higher for assistant professors in a tenure track (M = 3.9, p = .002), associate professors (M = 3.8, p < .001), and assistant professors (M = 3.7, p = .003). Teachers also had relatively low general task demands (M = 3.2), although this mean was not significantly different from other groups.

Compared to Dutch employees (M = 3.4), general task demands were significantly higher for other EU/EEA employees (M = 3.8, p = .031). Non-EU employees also had relatively high general task demands (M = 3.9). However, this mean was not significantly different from other groups.

Compared to employees in a partnership with younger ($\leq$12yr) children (M = 3.9), general task demands were significantly lower for single employees without children (M = 3.3, p = .003) and employees in a partnership without children (M = 3.4, p = .01).

Thesis Supervision Demands. Compared to PhD candidates (M = 2.8), thesis supervision demands were significantly higher for associate (M = 3.6, p = .002) and assistant professors (M = 3.4, p = .029). Assistant professors in a tenure track also had relatively high thesis supervision demands (M = 3.4), and teachers had rather low thesis supervision demands (M = 2.8). These means were not significantly different from other groups.

Pressure to Research and Publish. The pressure to publish was highest at CE&C (M = 4.3) and lowest at M&CS (M = 3.3), but this difference was not significant according to the Tukey test. Compared to male employees, female employees reported significantly higher scores for the pressure to publish (M_f = 3.8, M_m = 3.5).

All groups showed a significantly higher pressure to publish than teachers (M = 1.9). The pressure to publish for PhD candidates (M = 4.0) was also significantly higher compared to full professors (M = 3.2, p = .024). Assistant professors (M = 3.8) and assistant professors in a tenure track (M = 3.8) also had a relatively high pressure to publish. These means were not significantly different from other groups.

Irrational Performance Demands. Compared to male employees, female employees reported significantly higher scores for irrational performance demands (M_f = 3.1,M_m = 2.8).

8.4.3. Resources

Task and Organizational Resources. Compared to assistant professors in a tenure track (M = 3.3), task & organizational resources were significantly higher for full professors (M = 4.0, p = .047). Assistant professors (M = 3.4) and teachers (M = 3.4) also had relatively low task & organizational resources, although these means were not significantly different from other groups.

Education Time Sufficiency. Compared to PhD candidates (M = 3.0), the time available for education was significantly less sufficient for associate professors (M = 2.4, p = .049) and assistant professors (M = 2.3, p = .001). Assistant professors in a tenure track also had relatively little time available for education (M = 2.4), although this mean was not significantly different from other groups.

Compared to employees in a partnership with younger children (M = 2.3), education time sufficiency was significantly higher for singles without children (M = 2.8, p = .041).

Organizational Clarity. Compared to Dutch employees (M = 2.8), organizational clarity was significantly lower for other EU/EEA employees (M = 2.4, p = .045). However, non-EU employees had relatively high organizational clarity (M = 2.8), but this mean was not significantly different from other groups.

Compared to employees with a tenure of 11-15 years (M = 3.3), organizational clarity was significantly lower for employees with a tenure of 1-3 years (M = 2.5, p = .03) and employees with a tenure of 3-5 years (M = 2.4, p = .005).

9. Main Findings of the Conjoint Study

The main results of the conjoint analysis are divided into three sections, discussing (1) the counting analysis, (2) the logistic regression analysis, and (3) the Hierarchical Bayesian analysis. Respectively, these highlight the impact of attributes on preferences, a first indication of sample preferences, and individual-level preferences. After that, the desirability of the additional calendar aspects is discussed.

9.1. Counting Analysis: The Impact of Attributes on Preferences

The results of the conjoint counting analysis show the impact the attributes had on respondents' choices. Tables 10 until 14 provide choice distributions for all levels within the five attributes. These show which options were chosen most and least often, relative to how many times they occurred in the choice tasks. The Chi-square tests of all attributes were highly significant ($p < .001$), meaning that the levels of all attributes differed significantly in their frequency of choice. In other words, all attributes had an impact on respondents' choices in the choice tasks.

However, the variation in the proportions of the options was small, which could indicate that the attributes were relatively unimportant in respondents' choices. The attribute 'blended learning' shows the largest difference between the most (57%) and least (37%) selected levels, so it may be the most crucial in respondents' decision-making. Since some combinations of levels were prohibited in the questionnaire—related to the attributes 'education-free periods' and 'duration of final exam periods'—the given proportions were biased. This may also explain the low discrepancy between their levels' proportions.

Table 10

Counting Analysis Results for the attribute 'Number of Resit Periods'

Level	Proportion
2 resit periods: halfway through the year and after Q4.	54%
4 resit periods: in Q2, in Q3, in Q4, and after Q4.	53%
No dedicated resit periods: resits are during the education period of the following quartile, possibly in the evening.	47%
1 resit period: after Q4.	46%

Note. Chi-square test for the main effect of the counting analysis, $\chi^2 = 25.86, df = 3, p < 0.001$.

Table 11

Counting Analysis Results for the attribute 'Timing of Last Resit Period'

Level	Proportion
Around the end of June and the beginning of July.	58%
During the following academic year.	55%
Around mid-August.	46%
Around the end of July and the beginning of August.	41%

Note. Chi-square test for the main effect of the counting analysis, $\chi^2 = 97.64, df = 3, p < .001$.

Table 12

Counting Analysis Results for the attribute 'Education-Free Periods'

Level	Proportion
Introduce education-free periods of 1 week between the quartiles (after each final exam/assessment period).	56%
Formalize education-free periods of 1 week before each final exam/assessment period.	51%
Introduce education-free periods of 1 week in the middle of each quartile.	48%
Introduce no extra education-free periods.	47%

Note. Chi-square test for the main effect of the counting analysis, $\chi^2 = 25.26, df = 3, p < .001$.

Table 13

Counting Analysis Results for the attribute 'Duration of Final Exam Periods'

Level	Proportion
Students' coursework of 1 quartile is assessed during 2 weeks of exams (total of 8 final exam weeks per year).	53%
Students' coursework of 1 quartile is assessed during 1 week of exams (total of 4 final exam weeks per year).	50%
Students' coursework of 1 quartile is assessed during 3 weeks of exams (total of 12 final exam weeks per year).	44%

Note. Chi-square test for the main effect of the counting analysis, $\chi^2 = 24.36, df = 2, p < .001$.

Table 14

Counting Analysis Results for the attribute 'Blended Learning'

Level	Proportion
Only basic & fundamental knowledge is online self-study. Knowledge transfer activities (such as lectures) for more in-depth topics are on campus.	59%
All course activities are on campus. Digital resources (such as Canvas) may be used to enhance learning.	57%
Knowledge transfer activities (such as lectures) are online self-study. Teacher-guided practice and projects are on campus.	47%
The majority of course activities is online self-study. Some complementary sessions with a teacher (such as Q&As) are on campus.	37%

Note. Chi-square test for the main effect of the counting analysis, $\chi^2 = 161.76, df = 3, p < .001$.

9.2. Logistic Regression Analysis: Initial Indication of Preferences

The logistic regression analysis results (Table 15) provided the first indication of the full sample preferences of TU/e employees. The main output consisted of parameter estimates used to calculate each level's relative utility values (α_{ij}). Consequently, these were used to calculate the importance of each attribute in respondents' choices (W_i). Table 15 also presents how the zero-centered MNL parameter estimates were used to calculate these two elements. The utility values of each level present a preference relative to the other levels within the same attribute. A negative relative utility does not necessarily indicate an aversion toward a certain level but only a lower preference relative to higher values.

From Table 15, it follows that attribute 'E. blended learning' was most important in respondents' choice-making ($W_E = 0.34$), with the lowest preference for fully online education ($\alpha_{E4} = -0.56$). Employees had the highest preference for a situation where only basic and fundamental knowledge is online self-study, while knowledge transfer activities (such as lectures) for more in-depth topics are on-campus ($\alpha_{E3} = 0.38$). The second most important was attribute 'B. timing of last resit period' ($W_B = 0.26$), with the lowest preference for resits around the end of July and the start of August ($\alpha_{B2} = -0.38$) and the highest preference for the earliest dates ($\alpha_{B1} = 0.34$). With 13%, 13%, and 14%, the other attributes were substantially less important in employees' preferences for the configurations.

Table 15

Parameter Estimates of the MNL Model, Including Attribute Importances

DV = Calendar configuration choice (yes/no)										
Attribute i	Level j	*B*	*SE*	*df*	*p*	Exp(*B*)	95% CI Exp(*B*)	Rel. utility α_{ij}	Range I_i	Attr. imp. W_i
	Intercept	-0.82	0.11	1	<.001					
A. Resit periods	1. 1 resit period	-0.07	0.08	1	.403	0.94	[0.80, 1.10]	-0.18	0.36	13%
	2. 2 resit periods	0.29	0.08	1	<.001	1.34	[1.14, 1.57]	0.18		
	3. 4 resit periods	0.22	0.08	1	.006	1.25	[1.07, 1.47]	0.11		
	4. During next quartile	0.00		0				-0.11		
B. Timing of last resit period	1. End June, start July	0.15	0.08	1	.062	1.16	[0.99, 1.36]	0.34	0.73	26%
	2. End July, start Aug	-0.57	0.08	1	<.001	0.56	[0.48, 0.66]	-0.38		
	3. Mid-Aug	-0.35	0.08	1	<.001	0.71	[0.60, 0.83]	-0.16		
	4. During next year	0.00		0				0.19		
C. Education-free periods	1. None	0.00		0				-0.08	0.35	13%
	2. Middle of quartiles	-0.08	0.09	1	.342	0.92	[0.78, 1.09]	-0.17		
	3. Formalize 8th week	0.15	0.07	1	.05	1.16	[1.00, 1.34]	0.06		
	4. Between quartiles	0.27	0.09	1	.002	1.31	[1.10, 1.55]	0.18		
D. Dur. of final exam periods	1. 1 week	0.29	0.08	1	<.001	1.33	[1.13, 1.57]	0.06	0.38	14%
	2. 2 weeks	0.38	0.08	1	<.001	1.47	[1.25, 1.73]	0.16		
	3. 3 weeks	0.00		0				-0.22		
E. Blended learning	1. On-campus	0.85	0.08	1	<.001	2.33	[1.99, 2.73]	0.29	0.93	34%
	2. Basic know. online	0.93	0.08	1	<.001	2.55	[2.17, 2.99]	0.38		
	3. Know.-transfer onl.	0.44	0.08	1	<.001	1.56	[1.33, 1.83]	-0.11		
	4. Fully online	0.00		0				-0.56		
Total									2.75	100%

Note. Chi-square test, $\chi^2 = 336.67, df = 14, p < .001, AIC = 2270.61, BIC = 2369.00$.

9.3. Hierarchical Bayesian Analysis: Individual-Level Preferences

The Hierarchical Bayesian (HB) analysis results provided the most detailed look into the preferences of *individual* TU/e employees. Instead of calculating utilities and importances for the full sample as in the MNL model, HB analysis outputted utilities of all levels for each individual respondent. This provided more reliable results necessary for subsequent subgroup analyses (Chapter 10). Figure 11 presents the average attribute importances and Figure 12 the average relative utilities of the sample according to the results of the HB model created by Qualtrics. The interpretation of these results is identical to the MNL results, and the outcomes were similar.

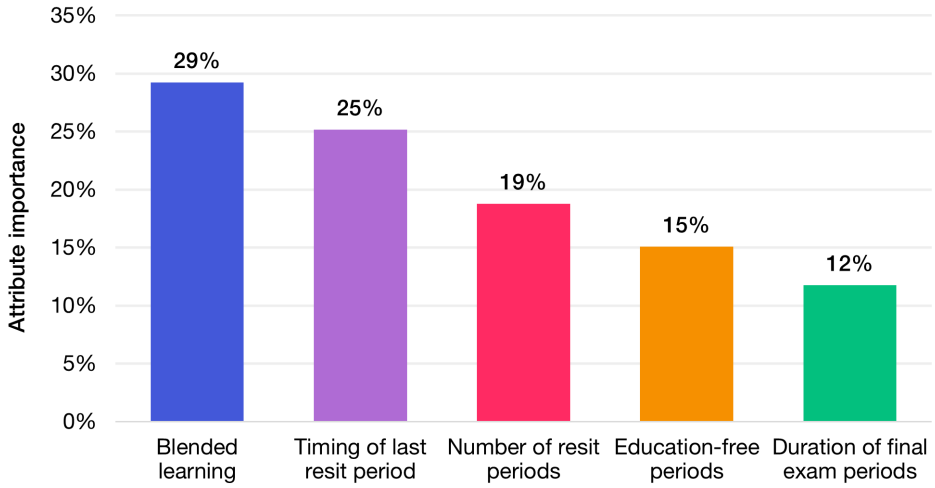


Figure 11

Average Attribute Importances According to HB Analysis, Sorted From Most to Least Important

The increased specificity of the HB analysis uncovered that the importances of the three least essential attributes were less similar to each other than initially expected based on the MNL model. The analysis clarified that attribute 'A. number of resit periods' is the third most important (19%), 'C. education-free periods' is the fourth most important (15%), and 'D. duration of final exam periods' is the least important (12%).

Assuming an additive model, the most preferred calendar would be one where:

- The last resit period of the year is around the end of June and the beginning of July;
- There are two resit periods throughout the year;
- Education-free periods are introduced between each quartile;
- Final exam periods are two weeks; and
- Only basic and fundamental knowledge would be online self-study, while knowledge transfer activities (such as lectures) for more in-depth topics would be on-campus.

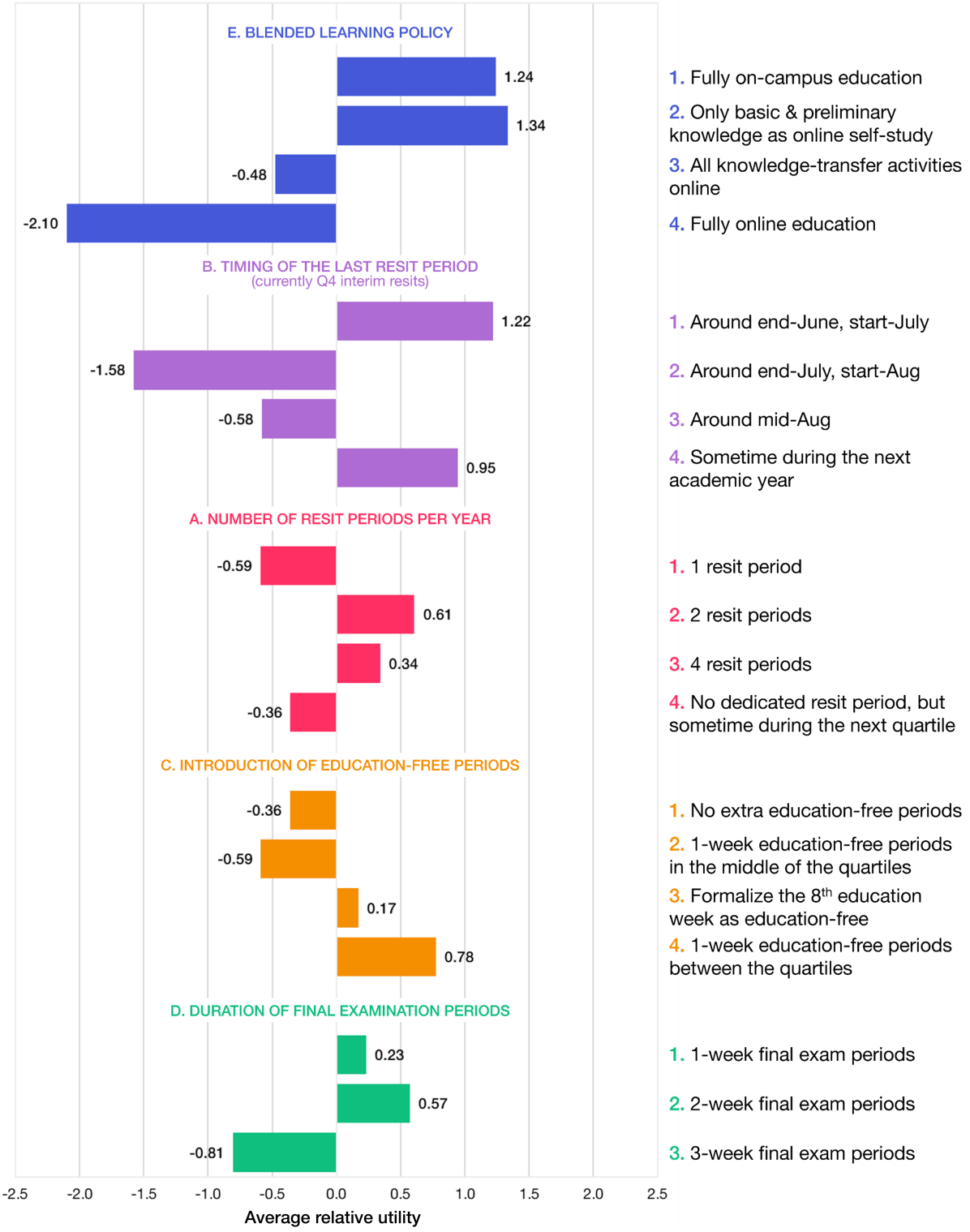


Figure 12

Average Utility Values According to HB Analysis, Sorted From Most to Least Important Attribute

9.4. Desirability of Other Calendar Aspects

Besides the calendar aspects considered as attributes in the conjoint study, the desirability of six other aspects was measured. With a mean of 3.0 on a scale from 1 (*very undesirable*) to 5 (*very desirable*), extending the Christmas holiday (instead of introducing education-free periods throughout the year) was (very) undesirable according to 36%, and (very) desirable to 36%. The no new material'-arrangement of the eighth education week (M = 3.4) was (very) undesirable according to only 20%, and (very) desirable to 53%. Decreasing the importance of written final exams in favor of several intermediate course assignments and feedback moments (M = 2.7) was (very) undesirable according to 48%, and (very) desirable to only 31%. Restricting the duration of final exams to 2 hours (M = 2.9) was (very) undesirable according to 38%, and (very) desirable to 34%.

If resits during the summer interim period were abandoned and scheduled during the following academic year instead, most respondents (49%) preferred them to be scheduled at the beginning of September, before Q1 commences. Thirty percent preferred them to be scheduled during the Q1 final exam period, only 19% at other moments during Q1, and 2.0% preferred other undisclosed options.

Term Systems. Although the differences are small, the longer term systems of 8/16 weeks (M = 3.0) were generally preferred over shorter systems of 7/14 weeks (M = 2.9). Quartile systems (M = 3.1) were preferred over semester (M = 2.9) and flexible systems (M = 2.9). According to paired samples t-tests, the desirability of the current quartile system was significantly higher compared to all other proposed systems ($t(241) \geq 2.64$, $p \leq .009$). The desirability of a long semester system was lowest and also significantly lower compared to the long flexible ($t(243) = -2.03$, $p = 0.043$) and short semester ($t(243) = -3.68$, $p < .001$) systems. Comparing the two flexible systems, the short flexible system was rated significantly less desirable than the long flexible system; $t(241) = 2.42$, $p = 0.016$.

9.5. Conclusions on the Main Conjoint Analysis Results

This chapter first provided information on which attributes impacted employees' decision-making and, thus, preferences (Chapter 9.1). Then, it discussed more details of these preferences on a sample level and quantified the importance of each attribute (Chapter 9.2). As the last conjoint finding, this chapter introduced more specificity by discussing individual-level preferences, especially providing better insights on the attribute importances (Chapter 9.3). Finally, the desirability of other calendar aspects was discussed (Chapter 9.4).

To make a connection with work stress and uncover hypothesized sub-group differences, further analysis is required. By relying on the individual-level HB results described in this chapter, the following chapter goes in-depth on this procedure.

10. Conjoint Subgroup Analysis

This chapter presents the efforts of creating subgroups within the results introduced earlier. This was achieved through Latent Class Analysis (LCA) and k-means clustering.

10.1. Latent Class Analysis (LCA)

Through LCA, class probabilities were assigned to all preferred calendar configurations of all respondents. These probabilities were based on which levels were included in these preferred calendars. To obtain class probabilities for each respondent, the probabilities of their ten selected configurations were averaged.

The analyses were performed with multiple values for the number of predefined classes. The absolute model fit improved the most between 1-class (χ^2 = 1,002.68) and 2-class (χ^2 = 491.65) solutions. Moreover, both comparative fit indices (AIC = 31,426.09, BIC = 31,594.29) were the lowest for the 2-class solution. These results indicate that the 2-class solution leads to the best subgroups. This resulted in class population shares of 80% and 20%. However, when averaging the class probabilities of the calendar configurations across respondents' 10 preferred calendars, 96% of the respondents were classified into the same subgroup. Up to 5-class solutions were tested, but appropriate subgroups could not be identified. Table 27 in Appendix G provides more details of these other solutions.

10.2. K-Means Clustering on Preferences

K-means clustering was the second method to uncover preference-based subgroups in the sample. Instead of the characteristics of the most preferred calendar configurations (as in LCA), the individual relative utility scores from the HB analysis were the input to this analysis.

The compactness scores were low for 2, 3, 4, and 5-cluster solutions ($\leq$ 41.90%). The average silhouette coefficients were larger than zero (Si > 0) and thus well-clustered. However, none of the silhouette coefficients exceeded 0.50, meaning that some observations could still be classified *between* clusters. Chapter G.2 provides more details on the solutions. Ultimately, the study sample could not be clustered based on individuals' preferences for the configuration of the academic calendar, neither through LCA nor k-means clustering.

10.3. K-Means Clustering on Work Strain

For the second k-means clustering approach, the study sample was clustered based on work strain (i.e., exhaustion and cognitive impairment) variables instead of indicators related to respondents' preferences. The compactness scores were higher than the previous analyses (49.40%-82.10%), meaning the data was more appropriately grouped. However, solutions with 3, 4, and 5 clusters contained observations with negative silhouette coefficients, indicating that observations were placed in the wrong cluster. The 6-cluster solution included relatively small groups (ranging from n = 23 to n = 54), which made interpretation complicated. Therefore, the 2-cluster solution with a compactness score of 49.40% and an average silhouette coefficient of 0.41 was considered the best solution. These clusters were used for further analysis. Chapter G.3 provides more details on the other solutions.

10.3.1. Differences in Descriptive Statistics: Naming the Clusters

Table 16 provides the differences in descriptives between the two clusters. For group 1, all job demands and work strain variables were significantly higher ($p \leq .013$), and all personal and job resources (except for organizational clarity) were significantly lower compared to group 2. The differences in personal demands were non-significant. Exhaustion ($F(1, 238) = 306.07$, $p < .001$) and cognitive impairment ($F(1, 238) = 163.52$, $p < .001$) showed the most variation between the clusters (relative to the within-cluster variation). Variation in WHI ($F(1, 238) = 82.99$,$p < .001$) was also relatively high. *Based on these differences, group 1 was considered the high-strain cluster, and group 2 was the lower-strain cluster.*

Table 16

Differences Between the Two Strain Clusters and Independent Samples T-Test Results

	Group	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Work-home interference	1[a]	3.7	0.9	9.11	238	**<.001**	0.99
	2[b]	2.6	1.0				
Secondary activities	1	3.4	1.0	3.27	238	**.001**	0.99
	2	2.9	1.0				
General task demands	1	3.8	0.7	4.56	238	**<.001**	0.78
	2	3.3	0.8				
Teaching demands	1	3.2	1.0	2.61	237	**.010**	0.91
	2	2.9	0.9				
Student motivation/dedication	1	3.0	1.2	2.50	237	**.013**	1.20
	2	2.6	1.2				
MSc/BSc thesis supervision	1	3.4	1.1	3.21	234	**.002**	1.08
	2	3.0	1.1				
Pressure to research/publish	1	3.9	1.0	4.68	236	**<.001**	1.09
	2	3.3	1.1				
Irrational perf. demands	1	3.0	0.9	1.36	237	.180	0.88
	2	2.8	0.9				
Personal standards	1	3.4	0.7	0.92	237	.360	0.78
	2	3.3	0.8				
General self-efficacy	1	3.8	0.6	2.51	237	**.013**	0.59
	2	4.0	0.5				
Task & org. resources	1	3.2	0.9	6.79	238	**<.001**	0.79
	2	3.9	0.7				
Education time sufficiency	1	2.3	0.9	3.84	237	**<.001**	0.98
	2	2.8	1.0				
Organizational clarity	1	2.5	1.2	1.92	238	.060	1.11
	2	2.8	1.1				
Exhaustion	1	3.6	0.6	17.49	238	**<.001**	0.57
	2	2.3	0.5				
Cognitive impairment	1	3.2	0.6	12.79	238	**<.001**	0.58
	2	2.2	0.5				

[a] Group 1 = high-strain cluster, $N \geq 110$.

[b] Group 2 = lower-strain cluster, $N \geq 128$.

10.3.2. Differences in Sociodemographics

Table 17 on the next page shows the sociodemographics of the two strain clusters. Some subgroups were combined to perform Chi-square tests with a sufficient number of observations per subgroup.

Chi-square tests showed that only for job function, there was a significant association with the two clusters ($\chi^2(5) = 14.01$, $p = .016$). The proportions of full and associate professors were higher in the lower-strain cluster, while the proportion of assistant professors was higher in the high-strain cluster. Moreover, a Mann-Whitney test showed that tenure was significantly higher among employees in the lower-strain cluster ($U = 5954.0$, $p = .038$). However, this could point toward the same effect as that of job function since these variables were correlated (Chapter 8.2). For the only continuous variable, an independent-sample t-test indicated that employees from the high-strain and lower-strain clusters did not have different caregiving demands ($t(236) = 0.26$, $p = .799$).

Other differences between the clusters, although not significant, could be observed as well. However, all these differences could be related to the effect of job function. The proportion of employees of 50 years or older is relatively high in the lower-strain cluster, while the proportion of employees between 30-39 years old is high in the high-strain cluster. A formal Mann-Whitney test on all nine age categories showed that age was not significantly higher among employees in one of the clusters ($U = 6425.5$, $p = .211$). The proportion of employees with a temporary contract is relatively high in the high-strain cluster. In contrast, the proportion of employees with a permanent contract is high in the lower-strain cluster.

10.3.3. Differences in Conjoint Preferences

The results of the HB analysis (i.e., the individual relative utilities for all levels) allowed a comparison of the mean utilities and importances between the two strain clusters. Figure 13 (p. 65) shows the differences in attribute importance. Compared to the lower-strain cluster, the high-strain cluster emphasized the timing of the last resit period more and blended learning less in their decision-making. However, t-tests on the individual utility ranges and attribute importances did not show any *significant* differences between the groups. Different from the HB analysis results but similar to the results of the MNL model, attributes D, C, and A had relatively low importance scores.

Figure 14 (p. 66) compares the preferences for each level within each attribute for the two clusters. To visually compare the preferences between the two groups, they were standardized relative to the other levels within the same attribute. This removed the effect of attribute importance. Multiple t-tests on the individual utility scores for each conjoint level did not show any significant differences in level preferences between the two clusters.

Table 17

Demographics of the Two Strain Clusters and Chi-Square Test Results

		N		Percentage		Chi-square test		
Variable	Subgroup	1[a]	2[b]	1	2	χ^2	*df*	*p*
Age		109	130			7.00	3	.072
	Under 29 years old	22	30	20.2%	23.1%			
	30-39 years old	**43**	**34**	**39.4%**	**26.2%**			
	40-49 years old	25	28	22.9%	21.5%			
	50+ years old	**19**	**38**	**17.4%**	**29.2%**			
Gender		103	123			1.44	2	.486
	Male	65	83	63.1%	67.5%			
	Female	38	39	36.9%	31.7%			
	Non-binary / third gender	0	1	0.0%	0.8%			
Living situation		109	129			2.61	2	.271
	Without children	61	65	56.0%	50.4%			
	With older (≥12yr) children	17	31	15.6%	24.0%			
	With younger (≤12yr) children	31	33	28.4%	25.6%			
Caregiving demands		108	130					
	M	M_1 = 1.47, M_2 = 1.45						
	SD	SD_1 = 0.78, SD_2 = 0.81						
Nationality		107	125			0.54	2	.763
	Dutch	65	81	60.7%	64.8%			
	Other EU/EEA country, incl. the UK and Switzerland	32	32	29.9%	25.6%			
	Other nationality	10	12	9.3%	9.6%			
Job function		107	124			14.01	5	**.016**
	Full professor	**6**	**22**	**5.6%**	**17.7%**			
	Associate professor	**15**	**25**	**14.0%**	**20.2%**			
	Assistant professor	**39**	**29**	**36.4%**	**23.4%**			
	Assistant professor (tenure/development track)	**15**	**10**	**14.0%**	**8.1%**			
	Teacher	6	10	5.6%	8.1%			
	PhD candidate (on payroll)	26	28	24.3%	22.6%			
Department		107	128			4.74	9	.856
	Applied Physics and Science Education (APSE)	13	13	12.1%	10.2%			
	Biomedical Engineering (BmE)	6	7	5.6%	5.5%			
	Built Environment (BE)	9	9	8.4%	7.0%			
	Chemical Engineering and Chemistry (CE&C)	6	4	5.6%	3.1%			
	Electrical Engineering (EE)	17	17	15.9%	13.3%			
	Industrial Design (ID)	6	7	5.6%	5.5%			
	Industrial Engineering and Innovation Sciences (IE&IS)	21	22	19.6%	17.2%			
	Mathematics and Computer Science (M&CS)	20	30	18.7%	23.4%			
	Mechanical Engineering (ME)	9	18	8.4%	14.1%			
	Jheronimus Academy of Data Science (JADS)	0	1	0.0%	0.8%			
Tenure		109	129			5.55	2	.062
	Up to 3 years	**31**	**29**	**28.4%**	**22.5%**			
	3 to 10 years	**46**	**43**	**42.2%**	**33.3%**			
	11 years or more	**32**	**57**	**29.4%**	**44.2%**			
Employment contract		108	128			1.55	1	.213
	Temporary contract	**43**	**41**	**39.8%**	**32.0%**			
	Permanent contract	**65**	**87**	**60.2%**	**68.0%**			

[a] Group 1 = high-strain cluster.
[b] Group 2 = lower-strain cluster.

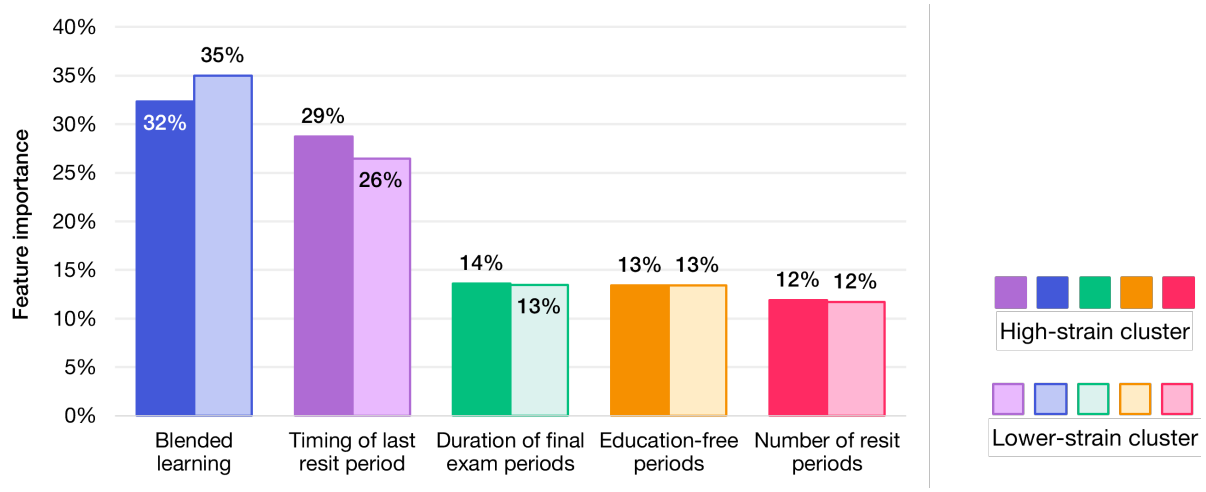


Figure 13

Attribute Importances According to HB Analysis for Two Strain Clusters, Sorted From Most to Least Important

10.3.4. Differences in Preferences for Other Calendar Aspects

T-tests and a Chi-square test were performed on the additional desirability questions to uncover more differences between the strain clusters. Tables 18 and 19 (p. 67) show these results.

A t-test ($t(237) = 2.65$, $p = .009$) showed that the high-strain cluster reported significantly higher desirability for extending the Christmas holiday ($M = 3.2$, $SD = 1.2$) compared to the lower-strain cluster ($M = 2.8$, $SD = 1.1$). In this group, 45.0% found this option (very) desirable, while in the lower-strain cluster, only 26.2% found this option (very) desirable. Moreover, a larger portion was undecided (33.8%) in the lower-strain cluster compared to the high-strain cluster (22.0%).

Other differences between the clusters, although not significant according to the t-tests or Chi-square test, could be observed as well. Notably, more employees in the lower-strain cluster found the 'no new material'-arrangement (very) desirable (57.7%), compared to 49.1%. A larger portion of the high-strain cluster was undecided as well (27.3% vs. 19.2%). Moreover, restricting the duration of all final exams to 2 hours was considered very undesirable by a larger portion of the lower-strain cluster (16.2% vs. 10.9%).

Furthermore, shorter systems were generally more desirable to those in the high-strain cluster than those in the lower-strain cluster. On average, the high-strain cluster did not report major preference differences between quartile, semester, and flexible systems. However, the lower-strain cluster generally preferred quartile systems over semester and flexible systems.

Finally, in case the interim resit period of Q4 exams is abandoned, and these exams are scheduled during the following academic year, the order of most to least preferred option is identical between the two clusters. In the high-strain and lower-strain clusters, 47.3% and 50.8%, respectively, preferred resits at the beginning of September, before Q1.

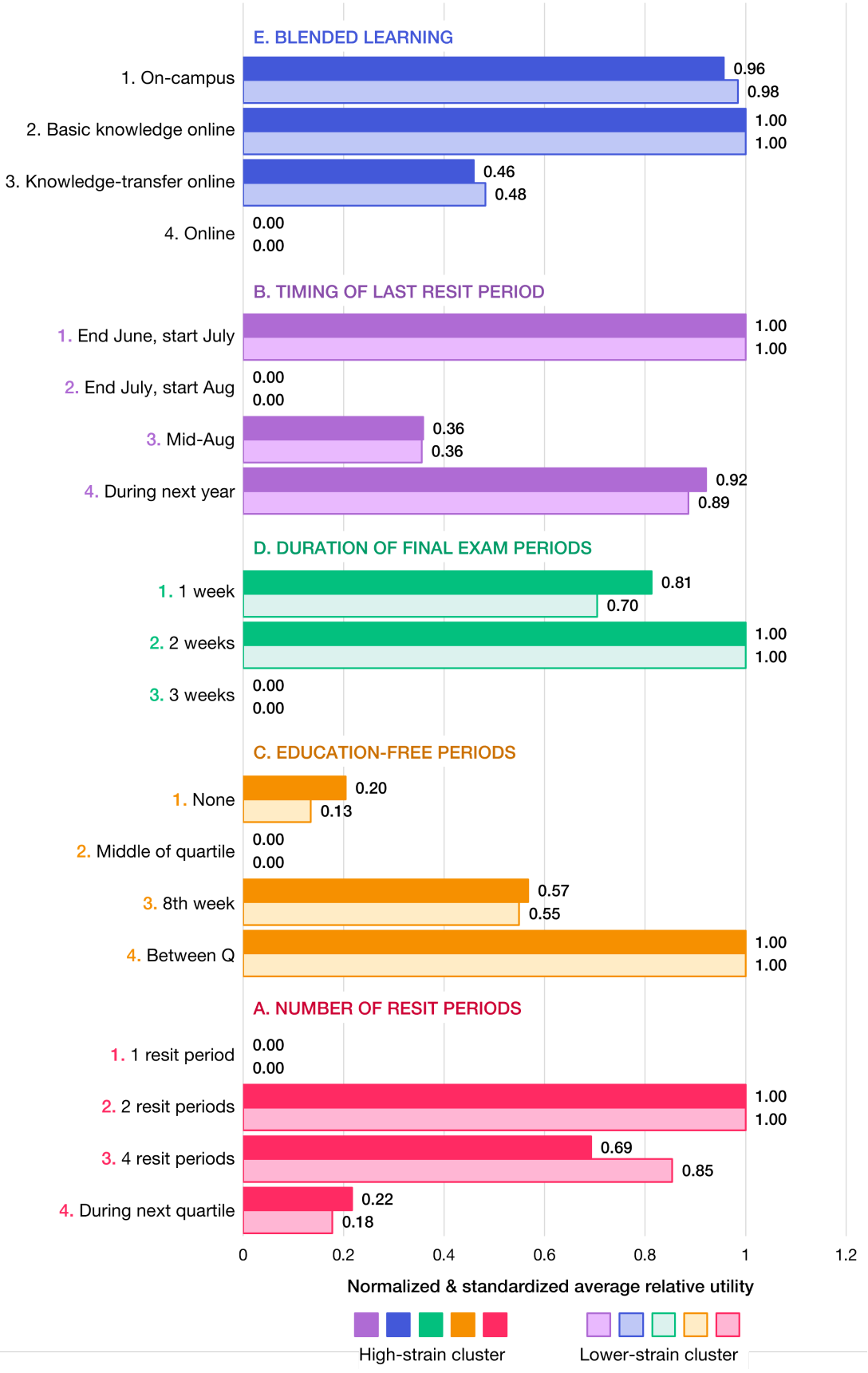


Figure 14

Standardized (Relative to the Other Levels Within the Same Attribute) Average Utility Values According to HB Analysis for Two Strain Clusters, Sorted From Most to Least Important Attribute

Table 18

Differences in the Desirability of Other Calendar Aspects for the Two Strain Clusters and T-Test Results

	Group	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Lengthening Christmas holiday	1[a]	3.18	1.20	2.65	237	**.009**	1.14
	2[b]	2.79	1.08				
No new material-arrangement	1	3.31	1.19	-1.48	238	.140	1.16
	2	3.53	1.13				
Decreasing importance of written final exams	1	2.69	1.17	-0.37	238	.714	1.16
	2	2.75	1.16				
Restricting final exam duration to 2 hours	1	3.03	1.18	1.49	238	.139	1.18
	2	2.80	1.18				
Longer quartile system (current)	1	3.29	1.03	-0.63	236	.529	1.00
	2	3.37	0.97				
Shorter quartile system	1	2.87	1.21	1.07	238	.284	1.19
	2	2.71	1.16				
Longer semester system	1	2.85	1.28	0.80	238	.425	1.27
	2	2.72	1.26				
Shorter semester system	1	3.17	1.33	1.73	238	.085	1.32
	2	2.88	1.31				
Longer flexible system	1	3.11	1.24	1.27	238	.205	1.27
	2	2.90	1.29				
Shorter flexible system	1	2.96	1.35	1.26	236	.209	1.31
	2	2.75	1.27				

[a] Group 1 = high-strain cluster, $N \geq 108$.
[b] Group 2 = lower-strain cluster, $N \geq 128$.

Table 19

Differences Between the Two Strain Clusters for Resits During Next Year

	N		Percentage	
Answer option	1[a]	2[b]	1	2
Beginning of September, before Q1	52	66	47.3%	50.8%
During Q1, possibly in the evening	23	23	20.9%	17.7%
During the Q1 final exam period	34	38	30.9%	29.2%

Note. Chi-square test, $\chi^2 = 1.23, df = 3, p = .747$.
[a] Group 1 = high-strain cluster, *N* = 109.
[b] Group 2 = lower-strain cluster, *N* = 127.

11. Academic Calendar Redesign

Based on the results of the previous four chapters, but specifically the findings of the HB and conjoint subgroup analyses, the academic calendar can be redesigned. This chapter highlights how the preferences of TU/e employees were considered to schedule the academic year according to their needs.

Figure 15 presents two new configurations that can be implemented in the short term (V1 and V4) and one for the longer term (V6). Appendix H shows two additional proposals. Calendar V0 represents the current calendar at TU/e.

11.1. Design Process

The week numbers, dates, and Dutch holidays of the 2023-2024 calendar were mapped out as a first step of the redesign process. TU/e academic calendar (V0) was visualized using this template and used as a starting point for the six new configurations. The trial-and-error design process started with different goals for each configuration, primarily based on the attribute importances and level preferences (i.e., relative utility scores). For example, for V1, the goal was to remove the interim resit period with the slightest changes in the rest of the academic year. Consequent iterations built upon the possibilities for change discovered while designing the previous versions.

Since most preferences did not differ significantly between the high-strain and lower-strain clusters, the redesigns were primarily based on the overall preferences of the sample. In the process, attribute 'E. blended learning' was not taken into account directly as a building block. Instead, its levels were considered as a vehicle to enhance efficiency and flexibility and make the proposed changes possible. For example, if the number of education weeks would be reduced, the blended learning policy might have to prioritize online education more. As employees' opinion was that the largest proportion of all education should take place on-campus, this was assumed during the design process.

11.2. Average Total Utilities

Table 20 shows the average HB utility values for the six new calendar configurations. These measures are oversimplified, as they only considered four conjoint attributes. Preferences for the additional calendar aspects, such as which term system was used (e.g., quartiles vs. semesters), had to be interpreted separately. Moreover, the assumption of fully on-campus education was included for completeness but not considered in the calculation for total utility.

In all versions, removing the Q4 interim resit period was one of the goals due to the relatively high attribute importance of attribute 'B. timing of the last resit period' and low preference for the current scheduling in mid-August. To make this possible, the correction period of the final exams of Q4 is shorter than for the other quartiles. As this might add to lecturers' stress levels, the total average utilities of all calendars could represent them too positively. Nonetheless, according to the interviews, most employees would be willing to make this sacrifice if it allows them to have an uninterrupted summer holiday.

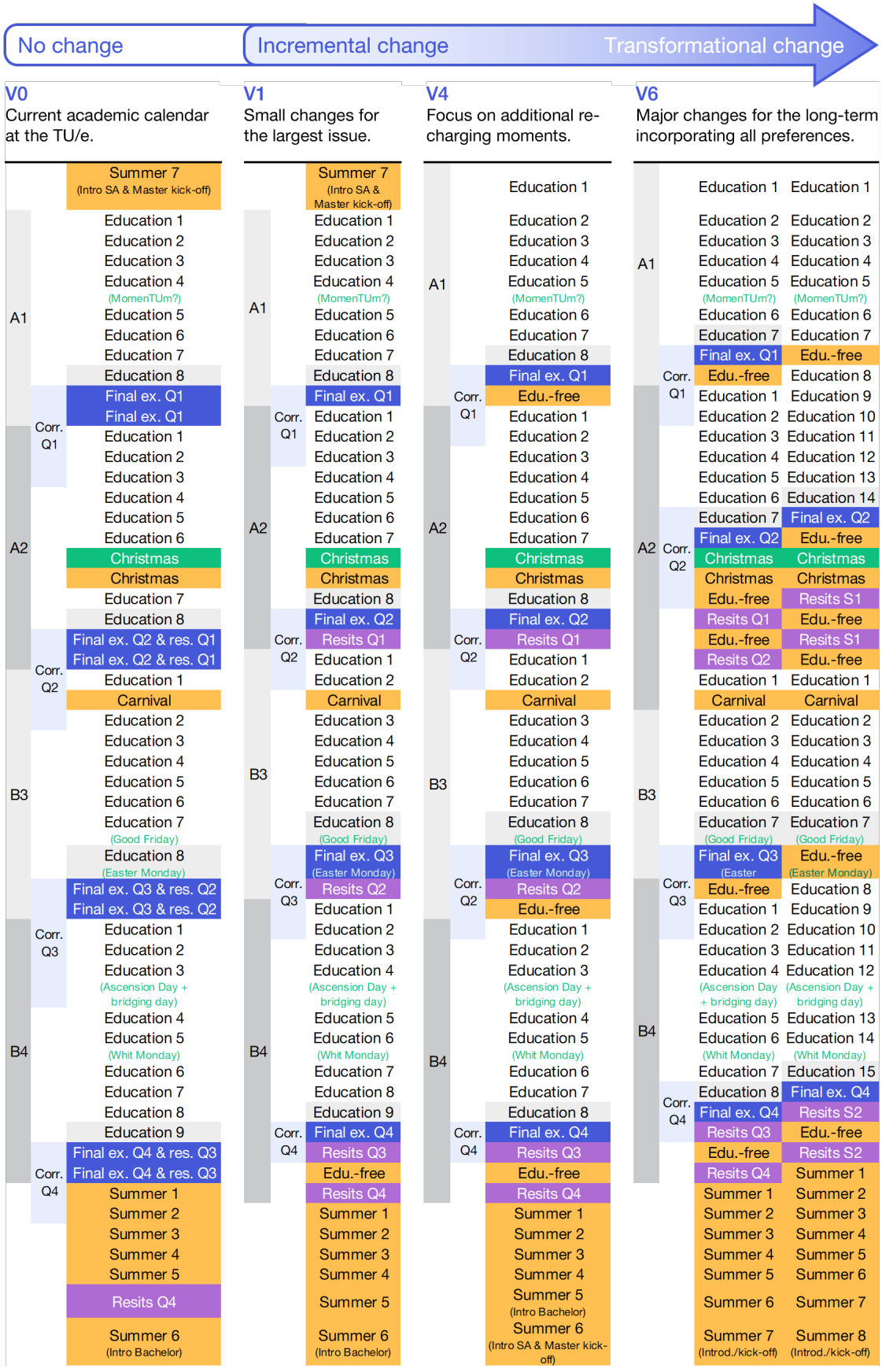


Figure 15

New Academic Calendar Proposals

Table 20

Average Utilities for Six Proposed Calendar Configurations

Configuration	V0	V1	V2	V3	V4	V5 & V6
Timing of last resit period	Mid-Aug	June-July	June-July	June-July	June-July	June-July
Number of resit periods	4 (0.34)	4 (0.34)	2 (0.61)	4 (0.34)	4 (0.34)	2 (0.61)
Education-free periods	None (-0.36)	None (-0.36)	None (-0.36)	None (-0.36)	Betw. Q (0.78)	Betw. Q (0.78)
Dur. of final exam periods	2 wks. (0.57)	2 wks. (0.57)	1 wk. (0.57)	1 wk. (0.57)	1 wk. (0.57)	1 wk. (0.57)
Blended learning	*For all redesigns, fully on-campus education was assumed*.					
Average total utility:						
Overall	1.21	3.01	2.94	2.67	3.81	4.08
High-strain cluster	1.03	2.91	3.02	2.65	3.73	4.11
Lower-strain cluster	1.37	3.10	2.87	2.70	3.88	4.05

Furthermore, positive effects not quantified in the utilities are a less demanding period between Christmas and Carnival (V2) and an extension of the Christmas holiday (V3). Adverse effects that could not be quantified are shortening the summer holiday (V2, V3, and V4); the non-optimal end date of the academic calendar in the third week of June (V2); and only introducing two extra education-free periods while the conjoint study suggested three (V4). Mainly due to the potential adverse effect of a shorter summer holiday, the utilities of all calendars might present them too positively. Because the preference for a 7-week summer holiday was a limiting factor in the redesigns, two more radical configurations (V5 and V6) were proposed based on shorter (7 or 14-week) term systems.

The average total utilities for versions 5 and 6 also give too-positive representations because shorter systems were generally not preferred over longer systems. However, comparing the high-strain and lower-strain clusters, shorter systems were overall more desirable to those with high work strain. This makes these calendars particularly suitable for tackling this issue.

Version 1. After excluding attribute 'E. blended learning' as a building block, attribute 'B. timing of last resit period' was the most important. Therefore, the first calendar redesign focused on removing the current interim resit period in mid-August, resulting in a less interrupted summer holiday. To make this feasible, the Q4 exam period had to be shifted forward, which was achieved by reducing the Q1 exam period to 1 week. This was deemed feasible since no resits were planned during this examination period. After the Q4 resits, the academic calendar ends in the second week of July. Considering the fixed Christmas and Carnival holidays, this is the earliest possible ending date of the calendar, assuming 8-week quartiles.

Moreover, within the 2-week exam periods of Q2, Q3, and Q4, the first week would be dedicated to final exams, and the second week would be only for resits of the previous

quartile. During the interviews, academic staff reported that this type of shuffling of exams within the exam weeks would not matter much to their work pressure. Nonetheless, this arrangement would give students who do not have resits a break of 1 week between the quartiles. Notably, this calendar configuration is similar to a proposal by Dr. ir. Faas Moonen, which received approval from all program directors in 2011 but was never implemented.

Version 2. Attribute 'A. number of resit periods' was the second most important, with a preference for two resit periods per year instead of four as in the current calendar. A potential drawback of this calendar was that the summer holiday would be shortened from 7 to 6 weeks, which is the legal minimum. Some interviewees mentioned that the length of the summer break should not be reduced, as 7 weeks has become a basic expectation and really is the absolute minimum for most employees. In this calendar, this demand could not be satisfied due to the introduction of an extra education-free week between the Q1 and Q2 resits, which was necessary for correcting the Q2 final exams. However, the period between the Christmas and Carnival holidays was made less demanding in terms of education. This would extend the Christmas holiday and make this period a better re-charging moment, especially for employees in the high-strain cluster. Moreover, lectures' focus would be more on examinations for an extended period, potentially reducing the fragmentation of the job—the most demanding aspect, according to academic staff.

The Q4 resits end on the 20th of July, which means the year would end one week later compared to V1. Ending the year any later would be unacceptable, considering the low relative utility of level 'B2. end July, start Aug.'

Version 3. Version 3 of the redesigned academic calendar focused on the only significant difference between the high-strain and lower-strain clusters by extending the Christmas holiday. This option was relatively desirable by employees with high work strain. This calendar is similar to V1 but would start the year one week earlier, in the last week of August. This was deemed feasible as other Dutch universities, like Tilburg University, have previously applied the same practice (Tilburg University, n.d.). In this way, the final education week of Q2 could be finished before the Christmas holiday, allowing for an extra education-free week that would virtually extend the Christmas holiday. A potential drawback is that the summer holiday would be only 6 weeks instead of 7.

Version 4. This calendar focused on introducing additional education-free periods of 1 week between the quartiles. In practice, these would be only introduced after Q1 and Q3, as the end of Q2 was already surrounded by the Christmas and Carnival holidays. To achieve this, some more major concessions had to be made.

Similar to V3, the academic year would have to start one week earlier. The summer holiday was, again, reduced from 7 to 6 weeks, and Q4 was shortened from 9 to 8 weeks to comply with this minimum of 6 weeks. Quartiles of 8 weeks are the default, but due to the many national holidays and bridging days during Q4, it is usually one week longer. This change might require a more efficient way of organizing education, for example, a policy

change that makes basic and fundamental knowledge online self-study. A benefit of this would be that this is generally preferred over fully on-campus education.

Version 5. By adopting a shorter term system, all preferred attribute levels could be adopted in this redesign, which can be applied as a 7-week quartile, 14-week semester, or 7/14-week flexible system. The Christmas break was extended as well. When a flexible system is applied, potential issues with exam room allocation (expected with the 2030 scale jump) could be avoided since exam periods are offset between the quartile and semester schedules. Notably, this calendar configuration—relatively radical for TU/e— is similar to the current academic year planning at Tilburg University (Tilburg University, n.d.).

Version 6. This calendar additionally eliminated another potential work pressure issue by scheduling all Q2 exams before the Christmas holiday. Especially for students with no resits, this is beneficial; they have a 6 or 7-week break starting around Christmas. Moreover, this was the only design in which the academic calendar ends as early as the beginning of July. Finally, the education-free period in October and the summer holiday better matched the Autumn and summer holidays of Dutch primary and secondary education.

11.3. Conclusions on the Design of Academic Calendar

This chapter detailed the process of designing six new academic calendars and proposing V1, V4, and V6 as the most promising. The trial-and-error design process was based on all knowledge the researcher gathered throughout this study. For example, the preliminary literature study, national and organizational regulations, the experience and findings of the interviews, and the results of the conjoint study.

12. Discussion

Through an interview study and a questionnaire, this research first explored the causes of work pressure among TU/e academic staff. Secondly, it aimed to design intervention strategies related to the academic calendar.

12.1. Key Findings

The results indicate that the most critical antecedents of work stress among academic staff at TU/e (RQ1) are general task demands—such as the fragmentation of the job, the pressure to perform to high quality standards, and the number of responsibilities to balance—the pressure to research and publish, and communication activities such as meetings and dealing with emails. Self-imposed demands also affect the stress process (RQ2), particularly perfectionistic work habits and setting high personal goals. They are related to lower cognitive impairment (i.e., work strain related to concentration issues) but have no direct influence on exhaustion.

Considering the current academic calendar, the resits of Q4 exams in mid-August were found particularly undesirable, although a relation with work stress was not necessarily found (RQ3). To balance the demands of their jobs and those from their private lives, TU/e academic staff prefer an academic calendar configuration where the last resit period is around the end of June and the start of July, with two resit periods throughout the year, education-free periods between each quartile, and final exam periods of two weeks (RQ4).

12.2. Discussion on RQ1 and RQ2

12.2.1. Workload Stressors

Many authors in the field of work stress in academia already considered the volume of work (Gillespie et al., 2001; Kinman & Jones, 2008), and Gillespie et al. (2001) and Universities of The Netherlands (n.d.) also mentioned the increased number of responsibilities. However, the fact that jobs in academia consist of many different, isolated tasks (i.e., high job fragmentation) was a novel insight from the interviews at TU/e. Switching between tasks costs time and effort and disturbs concentration, making job fragmentation a major stressor. The survey results indicate that this was the most demanding aspect of employees' jobs.

Unlike the prevailing literature, time pressure was generally not explicitly mentioned during the interviews. While employees may not directly perceive time pressure as a job demand, a lack of time *is* a general theme in both studies. This shows from comments such as "I would need an 80-hour workweek to do my work properly." Academic staff may have gotten used to performing tasks efficiently in short timeframes or have already accepted a high pace as part of their academic careers. This is similar to the stance toward general work pressure; high workloads were not always considered demanding but inherent to the job.

Stressors such as a lack of time for preparing courses and dealing with student queries were partially discussed by Kinman and Jones (2008) and Kinman et al. (2006). That there was a lack of time specifically for education innovation and revising course content

was a new insight. This stressor could originate from a focus on quality assurance by TU/e or even self-imposed quality demands. For example, employees did not have enough time to perform their tasks *as well as they would like*, which could point to both organizational *and* self-imposed demands. While correlations showed significant relations between quality assurance and personal demands, the regression analysis did not confirm these. In discussions on general workload, interviewees primarily focused on its quality aspect, i.e., the expected quality of education and research output. In line with Kinman et al. (2006), and according to the survey, this was the second highest demand.

12.2.2. Psychological Stressors

Kinman et al. (2006) highlighted the adverse effects of several psychological and emotional demands, and the EES also indicated significantly higher emotional strain among academic versus support staff (IVA onderwijs, 2022). However, in the interviews, stressors such as uncertainty about the future, lack of appreciation, and mental support were rarely mentioned. These stressors may thus be hardly present. Alternatively, employees might have felt uncomfortable discussing these in group sessions with a researcher and colleagues present. Some introduced supervisor support and mental support from coworkers, but only as *positive* aspects of the job. Because of different colleagues, supervisors, and work cultures throughout the organization, the questionnaire did not include these psychological aspects. It was expected that these would lead to highly diverse outcomes for different departments and sub-groups and that generalizations would not be possible.

Employee Experience Survey. The EES reported high workloads and work stress. Moreover, emotional stressors were significantly higher for academic staff than support staff. However, the mean values of most stressors were still relatively low. This could mean that the EES missed crucial aspects in uncovering the antecedents of work pressure and might have pointed toward less demanding aspects. The current study included many lower-level demands for more specificity and a better representation of the day-to-day activities, with relatively high mean scores. While the EES had more respondents and might have been more representative of the population, this could confirm its hypothesized flaws.

12.2.3. Work-Home Balance

In the current study, WHI is one of the two job demands that had a negative impact on both work strain outcomes—exhaustion *and* cognitive impairment. This conforms to the works by Winefield et al. (2014) and Zábrodská et al. (2017), who mentioned academic work tends to spill over into the home domain since tasks are often flexible in time and space, continuous, and sometimes never-ending. It was not often brought up during the interviews, but numerous questionnaire comments referred to it. For example, ”work pressure is too high and often conflicts with my personal life, where I’,m too busy or too tired to enjoy time with my family.” While it is not the highest-scoring job demand, its relation to work strain was the most certain, based on the regression analyses; these suggested WHI as a potential moderator, possibly indicating it as a resource instead of a demand. Its exaction function in

the stress process remains to be discovered through further mediation and moderation analyses.

International Employees. Significant for TU/e is that WHI was especially high among non-domestic employees compared to domestic staff. With high general task demands and low job resources—specifically the clarity and transparency of regulations, policies, and procedures—WHI may have resulted in high exhaustion levels for these employees. The acculturation process—the process of cultural and psychological change—is likely to blame for this difference. Among other aspects, Doki et al. (2018) specifically identified communication issues, cultural workplace differences, colleague relationships, and social inequality as antecedents of stress among non-domestic employees.

12.2.4. Interference of Tasks

Education and Research. Following the interview results and confirming the findings by Taris et al. (2001), the 'publish or perish'-dilemma is undoubtedly present at TU/e. There is a trade-off between preparing courses and writing high-quality research proposals. Depending on employees' aspirations, either task takes time away from the other. The prevailing literature sometimes fixates on the interference of education with research tasks (e.g., Gillespie et al., 2001; Taris et al., 2001). While this effect was not directly measured in the current study, having to switch between different tasks, in general, was the most prominent job stressor.

Administrative Tasks. Among peripheral tasks inherent to the academic teaching job, the likes of Gillespie et al. (2001) and Kinman et al. (2006) primarily emphasized the interference of administrative tasks. Together with the interview results, this gave the impression that these tasks were highly intrusive. Nonetheless, the questionnaire results on this topic are more conservative; administrative demands were seen as demanding, but not to an extreme level. There are multiple potential causes for this. Firstly, communication activities were previously often considered as a separate demand and might have been combined with administrative tasks as peripheral tasks. Alternatively, administrative tasks might not inherently be demanding but reported as stressors for other reasons. For example, because they are yet an extra responsibility, or lead to even higher job fragmentation.

12.2.5. Personal Demands

The interview *and* questionnaire results align with the expectation of Coppelmans (2023) that personal demands impact the stress process. However, the expectation that this would add to employees' workload (SoFoKles, 2017) requires some nuance. That is, workaholism-related behaviors (measured through irrational performance demands) were *more* critical for the stress process than perfectionism and goal-setting (measured as dimensions of personal standards). In fact, personal standards were not found to influence any work strain outcomes directly. Moreover, irrational performance demands were not related to work stress in a negative way, as suggested, but to lower levels of cognitive impairment. A possible explanation is that when irrational performance demands are high,

and employees believe they must do their work flawlessly, their effort and concentration might increase to prove their capabilities. Naturally, these people will report fewer problems with staying focused and making mistakes—the conceptualization of cognitive impairment.

Apart from the relationships with strain outcomes, personal standards were generally more demanding than irrational performance demands. Rationally-minded people, such as academics, might not quickly agree with extreme and irrational statements such as ”I have to be the best at work.” Conversely, they might be extra capable of realistically gauging that this is true for only some of their tasks. Referring back to the interference of education and research, they might expect themselves to be flawless in only one of their roles.

Gender Differences. Despite this, whereas personal standards were relatively high for the full sample, irrational performance demands were particularly high for women. The conclusion that women have a less realistic view of their work goals might be impulsive, while there are several other potential reasons. For example, they could be generally more perfectionistic and push their performance higher than men. Alternatively, women might have to perform to higher standards than men for similar rewards, such as appreciation from (male) coworkers and promotion opportunities. The current research finding that the pressure to research and publish is significantly higher for women fortifies this potential conclusion.

Since the pressure to research and publish is one of two demands that increase *both* work strain outcomes, women’s stress levels could be expected to escalate. This is not reflected in the outcome variables, and self-induced personal demands might explain why. Women’s higher job demands may be compensated by low cognitive impairment values resulting from workaholism-related behaviors and higher concentration levels. Following this explanation, women’s work pressure would not be higher than men’s, primarily because they spend more effort to cope with them.

12.2.6. Job and Personal Resources

The discussion of numerous job demands may paint a pessimistic picture of academic work. However, academic TU/e staff are expected to be competent and efficient in coping with them due to their high levels of job resources. Providentially, the combination of *high* demands and *high* resources leads to the highest motivational levels (Bakker et al., 2010; Karasek, 1979). For example, many employees reported high levels of autonomy and independence, promoting high levels of self-efficacy as well. Self-efficacy could buffer the adverse effects of job demands (Bakker & Demerouti, 2017; Bakker et al., 2005; Jex & Bliese, 1999; Jex et al., 2001), and stimulate learning, development, and personal growth, which increases intrinsic motivation (Deci & Ryan, 1985; Hackman & Oldham, 1976). This conforms to statements of Sociaal Fonds voor de Kennissector (2017) referring to high intrinsic motivation, loyalty, and work engagement as characteristics of academic staff. Especially when work goals consider the quality aspect of work pressure, such as in the quality-assurance culture at TU/e, intrinsic motivation could even be instrumental in achieving work goals (Cerasoli et al., 2014; Deci & Ryan, 1985). This effect may also be

strengthened by the presence of self-imposed goals (i.e., personal standards) at TU/e.

Job Functions. With generally low job demands, full and associate professors' job resources were plentiful, leading to the lowest work pressure for those with the highest job functions at TU/e. Conversely, both work strain outcomes were highest for assistant professors, potentially caused by general task demands. That is to say, their other primary stressor—thesis supervision—was related to lower exhaustion levels. This effect may be explained by the intrinsically motivating role of one-on-one coaching or research involvement, compensating for the demands. Alternatively, there may be a relation with fewer other teaching or research duties. Besides assistant professors, teachers also reported particularly high cognitive impairment. Coincidentally, these are the two groups providing the most education at TU/e. Student-related stressors, such as the high number and low motivation of students, cannot explain this effect. Alternatively, cognitive impairment could result from focusing on teaching while more important research tasks are pushed aside. This would only be true for assistant professors and not for teachers with few research duties. Job insecurity could form another explanation that was not explored in-depth.

12.3. Discussion on RQ3 and RQ4

Based on the findings of the interviews and later the conjoint study, it was deduced that the design of the academic calendar does not necessarily impact the perceived work pressure of academic TU/e staff. The following paraphrase of one of the interviewees summarizes the findings of this study: *"Redesigning the academic calendar won't do much to reduce our work pressure. You can do whatever you want if it benefits our students and doesn't make our jobs even more demanding than they already are."*

The argumentation behind these statements is that the calendar is designed around the university's education function, while academic staff have many other non-education tasks. Thus, their jobs are essentially not dictated by the calendar. They are generally highly flexible in their work planning, as confirmed by the questionnaire findings that autonomy and flexibility are high at TU/e. Even if being stuck to the education planning would be an issue, the questionnaire already confirmed statements by Taris et al. (2001) that it is rarely the teaching role alone that results in work stress.

The results of the conjoint study showed that academic calendar preferences are relatively homogeneous at TU/e. They also confirmed that differences in the perceptions of work pressure are unrelated to differences in preferences for the academic calendar. The preferences are similar when differentiating these two groups, and the optimal calendar configuration is identical. The most considerable discrepancy is that high-strain employees emphasize the timing of the last resit period more and the blended learning policy less than those with lower strain levels, but this may primarily point to the current interim resit period as an additional stressor. Moreover, although all attributes impacted employees' preferences, the three most structural attributes of the calendar that were considered (the resit periods, education-free periods, and exam periods) had the lowest attribute importances. The

blended learning policy—not a direct calendar design aspect—had the highest impact.

High-strain employees may have reported desiring an extension of the Christmas holiday because they are more in need of time to catch up on overdue work. Alternatively, they may need a resting period halfway through the year. Both would conform to comments that the Christmas period is often hectic and that there rarely is time to relax.

Academic staff with lower strain levels are more hesitant to change the academic calendar than those with high strain, who seem more open to change. Some options might have been perceived as relatively radical and unsettling, and a potential status-quo bias is more prominent for this lower-strain group. That is, for employees with lower levels of occupational strain, preferences were more biased toward the prevailing options. The higher strain cluster either preferred the more innovative options or was more indifferent to changes.

The quantification of the preferences for the current and redesigned calendars shows that high-strain employees have a relatively low average total utility for the current calendar. This finding supports the idea that they may currently be more disadvantaged. This also means that they could benefit most from the proposed changes.

12.4. Theoretical Implications

This study has contributed to the existing literature in three ways. First, by building on the works of Gillespie et al. (2001), Kinman and Jones (2008), Kinman et al. (2006), Taris et al. (2001), Winefield et al. (2014), and Zábrodská et al. (2017), this study introduced empirical results into the limited literature on work pressure and stress among academic staff. These authors in the field of work stress in academia discussed the impact of three crucial aspects: the volume of work (Gillespie et al., 2001; Kinman & Jones, 2008), the corresponding timeframe (Winefield et al., 2014), and the expected quality (Kinman et al., 2006). The emphasis was often on the workload, with discussions on aspects such as assignment, exam, and thesis assessments, and peripheral jobs such as administrative tasks. Gillespie et al. (2001) and Universities of The Netherlands (n.d.) also mentioned less basic teaching tasks, such as the (increased) number of responsibilities. The current study introduced or further highlighted the importance of job fragmentation, conforming to quality standards, communication activities, the number of responsibilities, the pressure to research and publish, the time available for teaching and education innovation, and the clarity and transparency of regulations, policies, and procedures. Considering WHI, it showed that including living situations and informal caregiving demands as sociodemographic variables did not result in sub-group differences. Its function in the stress process remains to be determined. Moreover, the current study provided nuance to the prevailing literature's focus on the impact of administrative tasks and demands related to students, such as the high number of students and the low motivation and dedication of students. Finally, it establishes previously absent differences between sociodemographic groups in their perceived academic work stress. Notably, it emphasized the differences between academic job functions, domestic and non-domestic employees, and gender differences.

Secondly, this study added to the debate about including self-imposed personal demands in the JD-R model. Empirical research on personal demands as an extension of JD-R theory was minimal (Bakker & Demerouti, 2017). Initial efforts to incorporate this element in the model were flawed due to the discrepancy between the definition and measurements of the construct. This study used new conceptualizations and concluded that workaholism-related behavior (i.e., irrational performance demands) was better related to the stress process in that it reduced cognitive impairment. On the other hand, perfectionism (i.e., personal standards) was generally higher among academic staff.

Finally, the current study connected occupational stress and work design literature by considering how structural changes in the job may impact the health impairment process. It showed that differences in the perceptions of work pressure are unrelated to differences in preferences for academic calendar configuration. Intending to reduce work pressure, an academic calendar redesign may not be the most appropriate intervention strategy for universities similar to TU/e. That is, medium-sized Western universities providing bachelor and master programs in engineering science and technology.

12.5. Limitations

As with all research, the contributions of this study are subject to several limitations. Firstly, the entire study was cross-sectional, so respondents were highly likely to answer questions in relation to the current situation at work. However, the studied phenomena are dynamic, meaning they might change during the academic year. For example, employees' work pressure might be different halfway through Q4 compared to other moments, depending on which courses staff are involved with. This might have resulted in exaggerated differences between participants. This phenomenon was also present during the interviews, as the fragmented nature of the second semester was often mentioned as a stressor. This could be because the interviews were scheduled during this period.

Furthermore, the results of some of the interviews were noticeably different between participant groups. The sample might not have been large enough to be representative of the population and get a complete, saturated overview of the discussed topics. This could have been problematic, especially regarding participant characteristics such as job title and age. Although all job functions were considered in interviews, job functions within the groups were homogeneous. This may have limited the breadth of different perspectives and the depth of the discussions. While the interview findings about the academic calendar were relatively similar between groups, the results about demands, resources, and work pressure were more diverse. Moreover, some might have felt uncomfortable discussing these topics in group interviews with a researcher and colleagues present. A final interview-related limitation is that they were not structurally analyzed in detail due to their supporting function in this study.

Regarding the questionnaire, this study was potentially sensitive to *nonresponse bias*, meaning that, for example, those with higher workloads and work pressure might have been less likely to participate in the research than those with lower levels. Also, *voluntary response*

bias could have been encountered, where only those participants with strong opinions responded. For example, employees with experiences with academic calendars at other institutions might have wanted to present their opinions more eagerly Finally, similar to the interviews, some population subgroups were underrepresented. Specifically, employees from outside the EU/EEA region, with a temporary contract, and from the Departments of BmE and CE&C.

Moreover, many potentially important stressors were omitted from the questionnaire. For example, the time pressure or high pace, the declined status of academic staff, and the lack of appreciation for the profession were stressors, according to the literature. These were never mentioned in the initial interview study at TU/e and were not included in the main study. Conversely, engaging in new teaching modalities (e.g., CBL), blended learning efforts (e.g., preparing video-based lectures), having to work or worrying about work during off-time, the many courses to be involved with simultaneously, and the availability of mental support were touched upon in the interviews. However, these aspects were later disregarded in the questionnaire. They were mentioned less often or expected to yield fewer novel insights into employees' work stress. Furthermore, the relationships between workload, work pressure, work stress, and work strain were not all measured but assumed. The questionnaire focused on demands and resources, which can both be considered stressors at the start of the stress process. The end of the process—work strain—was also measured, although only in two dimensions. Finally, the answers to two open questions in the questionnaire asking for other comments about (1) work pressure and (2) the academic calendar were not structurally analyzed due to time constraints.

The primary methodology of the main study—conjoint analysis—provides additional limitations. Firstly, an additive main effects model was assumed. That is, preferences for levels that only exist in combination with a specific other level (i.e., two-way interactions) were not uncovered. In most studies, the effects of interactions are minimal and mainly apparent when emotional reactions play a role or individual-level model performance is critical (Conjointly, 2012). Therefore, interactions between attributes were not researched or included in the models; this would have substantially complicated the analysis.

Moreover, respondents were asked to indicate their preferences in relation to the balance between private life and the tasks that constitute their primary workload. These preferences could be biased due to the complexity of the choice tasks, the simplified representation of academic calendars, and the difficulty in objectively articulating preferences related to work pressure. The conjoint results are entirely based on employees' expectations of how the attributes and levels would impact their work. Subgroup analyses were performed to minimize the dependency on respondents' judgment of how the conjoint attributes and levels would impact their work pressure. By clustering employees based on work strain variables and analyzing the preference differences between clusters, similar conclusions could be drawn.

12.6. Practical Implications for TU/e

The following recommendations are valuable for the TU/e Executive Board but also for departmental boards, capacity group management, and lower-level managers.

12.6.1. Pilot Studies

Redesigning the academic calendar might not necessarily reduce the work pressure. Still, it could reduce frustration and dissatisfaction with the current planning. In this regard, the proposed new calendars would all be an improvement compared to the current planning. The university should consider the following recommendations that were primarily based on the findings of the conjoint study:

1. Perform pilots within smaller sub-groups of employees, departments, or programs for the four proposed calendar configurations (Figure 15, p. 69). Specifically, separately consider the impact of the following changes before a university-wide roll-out of any of the proposals:
    a. Reducing the examination period of Q1 from 2 weeks to 1 week. Shortening the duration of final exams might be needed. If necessary, decreasing the importance of final written exams in favor of several intermediate feedback moments must be done with caution.
    b. Splitting examination periods (for the remaining quartiles) into two; the first week is dedicated to final written exams, and the second week is dedicated to resits of the previous quartile.
    c. Shortening the correction period of the final written exams of Q4.
    d. Shortening the summer vacation from 7 to 6 weeks in favor of additional education-free periods throughout the year or an extended Christmas holiday.
    e. Starting the academic calendar one week earlier, in the last week of August, instead of the first week of September.
2. Clarify the current Bachelor College policy regarding the eighth education week, in which no new content should be introduced. Either better enforce the current regulations *or* provide lecturers more autonomy in the organization of this week.
3. Schedule final written exams for BSA-associated courses or larger courses with more students as early as possible in the examination periods. This allows assessors more time to correct their exams.

12.6.2. Internal Research

Available Data. Within the *A Smarter Academic Year* project, underused qualitative data could be studied more thoroughly, for example, through thematic content analysis. This mainly concerns the answers to two open questions in the questionnaire asking for other comments about (1) work pressure and (2) the academic calendar. Moreover, Appendix I presents interview details not discussed in this report since they were irrelevant to the current study. It may provide topics for further internal research outside the *A Smarter Academic Year* project.

Instead of differentiating between high and lower work strain, calendar preference differences between sociodemographic sub-groups should also be explored—specifically, the conjoint aspects and levels and the additional calendar aspects. Available data about contractual and self-reported work hours regarding four types of tasks might also be interesting, as well as sub-group analyses based on what staff see as their primary job function (i.e., researcher, teacher, administrator, or manager).

TU/e could research the possibility of scheduling resits *during* the following quartile. The questionnaire included this option as an alternative to one, two, or four fixed resit periods. Because two and four resit periods were preferred over resits during the next quartile, this option was not explored in-depth. However, if this aspect were to be implemented, it would allow for more flexibility and creativity in the calendar design. It may even be possible to consider all other most preferred attribute levels without switching to a 7/14-week term system.

EES. Moreover, TU/e should use the results of the current study to monitor employees' stressors more thoroughly. The EES only includes one composite item for job demands, while the construct requires more nuance. This generalization of work pressure to general job demands and workload is apparent and needs to be addressed.

Long-Term Opportunities. Furthermore, TU/e should research the possibilities of switching to shorter 7/14-week term systems and the introduction of semester courses or projects in addition to quartile courses. Organizing pilot studies for these options is still precarious, and more research regarding feasibility is necessary. Involvement of staff *and* students is crucial. With these previous options, a shift from fully on-campus education to a policy where basic and fundamental knowledge is considered online self-study and regular knowledge transfer activities for more in-depth topics remain on-campus might be necessary. TU/e can inquire with lecturers how this would be organized exactly. As the 2023 Bachelor directive mentions, prior knowledge could also be offered separately in smaller modules.

Collaboration with EWUU, EuroTeq, and EuroTech universities is advised. As the international alignment of examination periods and research efforts is a large-scale challenge, this recommendation is for the long term.

12.6.3. Additional Points of Interest

The second set of recommendations is primarily formulated around the job stressors that were found through the interviews and the questionnaire. This may make them more appropriate for directly targeting the work pressure issue. However, more specific diagnoses and interventions should be formulated before implementation in practice.

First, the university could pay more attention to peripheral and hidden tasks for academic staff; they could be better specified and delineated. Also, the university's priority could be shifted toward more independent teaching methods, focusing more on self-study, less coaching, and less individualized teaching. Moreover, TU/e may address the issue of job

fragmentation in several ways. This could be done by formally limiting the number or diversity of tasks employees are expected to perform. It could be normalized that lecturers are free of education duties in alternating quartiles. Agreements could be made to group similar tasks, such as meetings, together, for example, on a specific day of the week. More synergism between research and education could be created. Two important aspects may be autonomy for lecturers in designing the teaching program and ensuring they can teach closer to their research interests. Finally, TU/e could initiate discussions with new and non-domestic employees about improving the clarity and transparency of regulations, policies, and procedures.

The position paper by The Young Academy (2021) and the pilots developed by The Dutch Ministry of Education, Culture, and Science served as a starting point for the current study. These mainly focused on redesigning the academic calendar, which limited the scope of the given recommendations. Based on another position paper about structural changes to tackle work pressure among academics, additional points of interest are suggested (The Young Academy Leiden, 2021). These are: (1) the role of supervisors in work pressure-related issues such as working overtime, task fragmentation, and fair assessment; (2) less emphasis on the quantity of papers and more on the quality of contributions in evaluating research excellence; (3) endorsement of a communication charter; (4) diversification in the appreciation of talents and accomplishments; (5) fewer short-term contracts to stimulate professional development; (6) support for relocating staff to The Netherlands; and (7) structural changes to obtaining research funding.

12.7. Implications for Future Research

Research on the job and personal demands and resources of academic staff should not stagnate. Researchers should continue the works of, e.g., Taris et al. (2001) and the current study with qualitative methods to reestablish the primary stressors of academic staff. The assumptions of JD-R theory should be tested more formally using these specific demands and resources through more elaborate mediation and moderation analyses. Especially the function of WHI should be explored in this framework (Zábrodská et al., 2017). The common assumption that work pressure is a phenomenon with only adverse effects should be disregarded, and a distinction between challenging and hindrance demands should be made.

Moreover, instead of only measuring stressors and work strain variables, the entire path from stressor (i.e., workload) to work pressure, to work stress, to work strain should be conceptualized and considered in more detail. The second path in JD-R theory leading to motivational outcomes should also be researched in the same context. The effects of administrative tasks and prioritizing research over teaching may be better analyzed in research on the motivational process instead of work strain.

Scholars should also consult the job design literature for new methods of tackling work pressure issues (Parker, 2014). The work pressure literature should extend beyond the application to the motivational process and include approaches targeting the strain process.

Further empirical research in direct collaboration with multiple universities (i.e., their management *and* employees) can help determine different options for organizing academic calendars. Reflections on their formal calendars can also provide new elements that could be adjusted besides those introduced in the current study. These follow-up studies should be performed in the context of work pressure among academic staff at higher education institutions and regions other than the U.S.

Fifth, empirical research is required to test different configurations of the academic calendar and report on subsequent changes in work pressure. This study identified several structural aspects that could be modified and used as a starting point for organizational-level interventions. The effects on the work stress process among academics can be tested over time through longitudinal studies. An experimental study design in which only one group of randomly selected participants will encounter changes in the academic calendar is optimal but may be impractical. Additionally, implications on education quality, student work pressure, and non-academic staff work pressure should be considered in these studies. As interventions on work pressure in academia are contingent on these factors, they should never be designed in isolation. The education quality and well-being of other actors deserve attention and interventions, for which similar future research recommendations hold.

Finally, scholars should advance the conceptualization of personal demands and extend the established JD-R theory by including them, as Bakker and Demerouti (2017) have indicated before. More theoretical research into, e.g., irrational performance demands and personal standards is required. Studies should examine whether these concepts have a positive or negative relationship with the strain process, the motivational process, or both. Moreover, a synergy with job demands can be explored, similar to the interaction effect between job and personal resources already included in the JD-R model.

13. Conclusions

This study aimed to explore how TU/e could reduce the perceived work pressure of academic staff by redesigning the academic calendar. In answering this research question, the study introduced empirical results into the limited literature on work pressure and stress among academic staff, added to the debate about including self-imposed personal demands in JD-R theory, and connected occupational stress and work design literature by considering how structural changes in the job impacted the health impairment process.

Most demands among academic staff originate from the fragmentation of the job, the pressure of high quality standards, the number of responsibilities, the pressure to research and publish, and communication activities. Self-imposed demands such as perfectionistic work habits only have a positive impact and help compensate for the other demands. Differences in the perceptions of the work pressure are not related to differences in preferences for the configuration of the academic calendar.

However, this does not imply that staff are content with the academic calendar. On the contrary, this study proposes various changes—such as removing the resit period in mid-August—that would update the calendar to current standards. It remains to be seen if this results in a truly smarter academic year. For that, the university will have to invest in more radical—at least for TU/e—solutions for the longer term or interventions unrelated to the academic calendar.

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Appendix A. Interview Procedure

A.1. Interview Guidelines

For consistency of the interview sessions, the following guidelines are developed. Because the sessions are centered around the point of view of the participating interviewees, the conversation might go in different directions, and improvisation is necessary. It is important that this is a guideline and not a strict script.

A.1.1. Introduction

In the (more informal) introduction of the interview, the interviewer first explains the purpose of the interview to the interviewees. The goal of the interview is to find out (1) how the interviewees perceive the current academic calendar of TU/e and (2) if and how the interviewees experience high workloads, work pressure, or work stress. It is explained that this information is used in research to reduce the work pressure among students and academic staff of the TU/e.

Furthermore, it is mentioned that the interview is semi-structured since questions have been prepared to encourage the interviewees to speak about his/her personal interests, needs, attitudes, reactions, motives, lifestyles, feelings, and experiences. The discussion is initiated and fostered using the laddering technique in which probes are focused on *why*-questions to find subconscious motives. The researcher should know to establish the general subject and then minimize input into the explanations of the interviewees.

The interviewees should be told that the interview will be approximately 45 minutes in length and that the interview is being recorded by a mobile phone. If the interviewees do not explicitly consent to the latter, the interview will not take place, and the conversation will end.

If the interviewees do consent, the terms of confidentiality and anonymity are addressed. The interviewees are told that it is not obligatory to answer the questions and that questions can be skipped. The interview can even be stopped at any time when requested.

A.1.2. Main questions

The following guidelines are used to initiate and foster input from the interviewee:

1. About the current academic calendar at the TU/e
    1. What do you like?
    2. What do you *not* like?
2. Would you like to see any changes in the academic calendar?
    1. Which changes? Why?
    2. Are there any elements that should definitely *not* change?
3. In how far do you experience work pressure?
    1. Where does this work pressure come from?
    2. Which job tasks/aspects most contribute to this?
4. What do you do to cope with your work pressure?

    1. Which elements of your job reduce work pressure & motivate you?
    2. Which non-work-related aspects help you with this?
5. How can changes in the academic calendar change your work pressure?
    1. Or even reduce your workload?
6. Your job might be divided into the following types of tasks: (1) Academic research and publishing tasks, (2) Education and teaching tasks, (3) Administrative tasks, and (4) Management and leadership tasks.
    1. Which one(s) are your priority?
    2. Which one(s) take the most of your time?
7. Collecting preferences about the academic calendar
    1. Are the dimensions clear & complete?
    2. Are the options clear & complete?
    3. Do they represent the current calendar?
    4. Do they represent your preferred calendar?
8. Any other comments?

A.1.3. End of the Interview

When 45 minutes have passed, when no new significant information can be yielded from the conversation, or when all discrepancies and contradictory statements given by the interviewees can be explained, the interview process is ended. Once again, it will be asked if the interviewees have any questions.

The interviewees are told that they can expect a questionnaire within a month time about similar subjects as discussed in the interview. Participating again would be highly beneficial for them and for their colleagues, so the interviewees are asked to spread the word and encourage them to participate. Finally, the interviewee is thanked for their time and effort.

A.1.4. Other considerations

Other thoughts to consider during the interview sessions are:

- Leading questions that could condition the answers and the discussion with the interviewees should be avoided.
- Steer the answers towards the past and the present (except for questions 5 and 7); discussing the future will lead to predictions that are too uncertain for accurate need identification.
- The researcher should not pitch a possible solution or ask for feedback on proposed solutions or needs; the researcher should just listen and learn.
- It is important to know *what* the problem is (or *what* not a problem is), and thus the need/want (or *what* is not needed/wanted), not *how* this problem will be solved; asking *how* is only a bridge to another *why*-question (like in question 7).

Appendix B. Information Sheet Informed Consent

This appendix provides the information sheet for the research project ”A Smarter Academic Year” that was attached to the online questionnaire.

1. Introduction

You have been invited to take part in the research project, A Smarter Academic Year, because you are an employee at the TU/e with one of the following scientific job positions: full professor, associate professor, assistant professor (tenure track), assistant professor (non-tenure track), teacher, or PhD candidate. You were recruited for this study through contact with the dean and/or program director of your department.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate, we would like to ask you to read the following information so that you know what the research project is about, what we expect from you, and how we go about processing your personal data. Based on this information, you can indicate by way of the consent declaration whether you consent to take part in this research project and in the processing of your personal data.

You may, of course, always contact the researcher via p.a.m.kleingeld@tue.nl if you have any questions, or you can discuss this information with people you know.

2. Purpose of the research

This research project will be managed by dr. ir P.A.M (Ad) Kleingeld (p.a.m.kleingeld@tue.nl), assistant professor at the Human Performance Management research group (IE&IS).

This research project aims to (eventually) reduce the perceived work pressure of students and academic staff at the TU/e by redesigning the academic calendar without sacrificing education quality. The data obtained in this project will be used to provide the TU/e Executive Board with advice for an improved design of the academic calendar. The results will also be discussed in the master thesis project of T.C.J. (Tom) Coppelmans under the supervision of dr. ir. P.A.M. (Ad) Kleingeld (TU/e, IE&IS).

3. Controller in the sense of the GDPR

TU/e is responsible for processing your personal data within the scope of the research. The contact data of TU/e are:

Technische Universiteit Eindhoven
De Groene Loper 3
5612 AE Eindhoven

4. What will taking part in the research project involve?

You will be taking part in a research project in which we will gather information by:

Presenting you with a questionnaire about your preferences for possible new configurations of the academic calendar. Moreover, you will answer questions about the number of contractual, preferred, and actual work hours, your job demands (such as the

amount of work you have to do), your job resources (such as the support you receive), your work-home interference, your personal demands (such as perfectionism-related aspects), your personal resources (such as your level of optimism), and your perceived work strain (such as your level of work-related exhaustion). For your participation in this research project, you will not be compensated.

5. Potential risks and inconveniences

During your participation in this research, you may be asked questions that you may find (very) personal in view of the delicate nature of the subject. These questions concern your mental well-being, i.e., the work pressure, work stress, and work strains your might be experiencing during your job at the TU/e. We ask these questions exclusively in the interest of the research project. However, you do not need to answer questions you do not wish to answer. Your participation is voluntary, and you can end your participation at any moment you choose.

6. Withdrawing your consent and contact details

Participation in this research project is entirely voluntary. You do not have to answer questions you do not wish to answer. You may end your participation in the research project at any moment or withdraw your consent to using your data for the research without specifying any reason. Ending your participation will have no disadvantageous consequences for you.

If you decide to end your participation during the research, the data you already provided up to the moment of withdrawal of your consent will be used in the research.

Do you wish to end the research, or do you have any questions and/or complaints? Then please contact the research manager, dr. ir P.A.M (Ad) Kleingeld (p.a.m.kleingeld@tue.nl).

If you have specific questions about the handling of personal data, you can direct these to the data protection officer of TU/e by sending a mail to functionarisgegevensbescherming@tue.nl. Furthermore, you have the right to file complaints with the Dutch data protection authority: the Autoriteit Persoonsgegevens.

Finally, you have the right to request access, rectification, erasure, or adaptation of your data. Submit your request via privacy@tue.nl.

Appendix C. Questionnaire and Measures

This appendix provides the questionnaire and, thus, a copy of each measurement instrument that was used in the study.

C.1. Introduction

At the TU/e, we aim to reduce the work pressure of researchers, lecturers, and students. One of the opportunities for improvement is the schedule of the academic calendar and we highly value the perspective of academic staff on this project. We need your input to judge if redesigning the academic calendar is desirable and how this could be done to best suit your needs. Thank you for sharing your opinion!

Completing this questionnaire will take about 20-25 minutes.

For more info on this project:

- Cursor article: www.cursor.tue.nl
- Intranet page: www.tuenl.sharepoint.com

C.2. Informed Consent (IC)

By agreeing to the following two items, I acknowledge that:

1. I am sufficiently informed about the research project through a separate information sheet (Appendix B). I have read the information sheet (Appendix B) and have had the opportunity to ask questions. These questions have been answered satisfactorily.
2. I take part in this research project voluntarily. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment without giving any reason. I do not have to answer a question if I do not wish to do so.

I consent to processing my personal data as described in the information sheet; gathering my answers through the questionnaire, and processing them for analysis in the 'A Smarter Academic Year' project. (IC_1)

◯ Yes *(required)*

◯ No

Additionally, I consent to retaining research data gathered from me and using this for education purposes or future research in the field of human performance management, in which recognized ethical standards for scientific research are respected. (IC_2)

◯ Yes

◯ No

C.3. Conjoint Introduction (CI)

You can presumably divide your job into the following four tasks:

1. Research and publishing-related tasks
2. Education and teaching-related tasks
3. Administrative tasks
4. Supervisory and management-related tasks

An optimal balance between these tasks and your private life is important for lowering work pressure. If we were to redesign the academic calendar with this aim, there are many different aspects that can be changed. The following questions will introduce you to 5 of these potential changes and ask you about how desirable the options are.

C.3.1. Resit Periods

The dimension 'resit periods' refers to the number of periods per year in which students can re-take final exams they failed before. For every final exam, students have 1 resit opportunity. The length of the resit periods is not considered in this dimension. Consider your work tasks, private life, and work pressure. Rate the following possibilities on how desirable they are.

		Very undesirable	Undesirable	Neutral/undecided	Desirable	Very desirable
		1	2	3	4	5
CI_resits_1	4 resit periods, as in the current schedule: in Q2, in Q3, in Q4, and after Q4.	◯	◯	◯	◯	◯
CI_resits_2	2 resit periods: halfway through the year and after Q4.	◯	◯	◯	◯	◯
CI_resits_3	1 resit period: after Q4.	◯	◯	◯	◯	◯
CI_resits_4	No dedicated resit periods: resits are during the education period of the following quartile, possibly in the evening.	◯	◯	◯	◯	◯

C.3.2. Timing of Last Resit Period

The dimension 'timing of last resit period' refers to the resits that are currently scheduled during the summer interim period. The length of the resit periods is not considered in this dimension. Consider your work tasks, private life, and work pressure. Rate the following possibilities on how desirable they are.

		Very undesirable 1	Undesirable 2	Neutral/undecided 3	Desirable 4	Very desirable 5
CI_interim_1	Around the end of June and the beginning of July.	○	○	○	○	○
CI_interim_2	Around the end of July and the beginning of August.	○	○	○	○	○
CI_interim_3	Around mid-August, as in the current interim period.	○	○	○	○	○
CI_interim_4	During the following academic year. Exceptions might be made for 1st year BSc courses and BSc students planning to graduate.	○	○	○	○	○

C.3.3. Planning of Education-Free Periods

The dimension 'planning of education-free periods' refers to the introduction of periods in which there will be no examinations, assessment deadlines, no lecturing, and no other teaching activities. Students are free of education. Note that this does not impact the length of the current 8-week education period. Consider your work tasks, private life, and work pressure. Rate the following possibilities on how desirable they are.

		Very undesirable 1	Undesirable 2	Neutral/undecided 3	Desirable 4	Very desirable 5
CI_breaks_1	Introduce no extra education-free periods.	○	○	○	○	○
CI_breaks_2	Introduce education-free periods of 1 week between the quartiles (after each final exam/assessment period).	○	○	○	○	○
CI_breaks_3	Introduce education-free periods of 1 week in the middle of each quartile.	○	○	○	○	○
CI_breaks_4	Formalize education-free periods of 1 week before each final exam-/assessment period.	○	○	○	○	○

C.3.4. Duration of Final Exam Periods

The dimension 'duration of final exam periods' refers to how much time should be scheduled for the final exams/assessments of the courses students attend during 1 quartile. This only refers to courses with final exams. Resits are not considered here. Exams might be scheduled more/less during evenings and the weekend. Note that this does not impact the length of the current 8-week education period. Consider your work tasks, private life, and work pressure. Rate the following possibilities on how desirable they are.

		Very undesirable 1	Undesirable 2	Neutral/undecided 3	Desirable 4	Very desirable 5
CI_bl_1	Students' coursework of 1 quartile is assessed during 1 week of exams (total of 4 final exam weeks per year).	○	○	○	○	○
CI_exdur_2	Students' coursework of 1 quartile is assessed during 2 weeks of exams (total of 8 final exam weeks per year), as in the current schedule.	○	○	○	○	○
CI_exdur_3	Students' coursework of 1 quartile is assessed during 3 weeks of exams (total of 12 final exam weeks per year).	○	○	○	○	○

C.3.5. Blended Learning

The dimension 'blended learning' refers to the way knowledge is transferred to students. Note that the current course material remains unchanged with each of the options. Consider your work tasks, private life, and work pressure. Rate the following possibilities on how desirable they are.

		Very undesirable 1	Undesirable 2	Neutral/undecided 3	Desirable 4	Very desirable 5
CI_bl_1	All course activities are on-campus. Digital resources (such as Canvas) may be used to enhance learning.	○	○	○	○	○
CI_bl_2	Only basic & fundamental knowledge is online self-study. Knowledge transfer activities (such as lectures) for more in-depth topics are on-campus.	○	○	○	○	○
CI_bl_3	Knowledge transfer activities (such as lectures) are online self-study. Teacher-guided practice and projects are on-campus.	○	○	○	○	○
CI_bl_4	The majority of course activities is online self-study. Some complementary sessions with a teacher (such as Q&As) are on campus.	○	○	○	○	○

C.4. Choice Tasks

Based on these 5 aspects that we could change, many configurations of the academic calendar are imaginable. In each of the following 10 questions, you will be presented with 2 of these calendars. Your task is to choose the calendar that has your preference. Sometimes this choice may be easy, and sometimes it may be very difficult. It may occur that the two alternatives are both undesirable to you. In this case, choose the least bad option. Again, consider your work tasks, private life, and work pressure.

C.5. Desirability Questions

		Very undesirable	Undesirable	Neutral/undecided	Desirable	Very desirable
		1	2	3	4	5
RAT_christmas	Instead of the previous options for introducing extra education-free periods, another possibility is lengthening the Christmas recess. How desirable is this option to you?	○	○	○	○	○
RAT_week8	What do you think about the current arrangement of the week before the final exam period (week 8), in which no new material may be introduced?	○	○	○	○	○
RAT_intt	What do you think about decreasing the importance of written final exams in favor of several intermediate course assignments and feedback moments?	○	○	○	○	○
RAT_exdur	What do you think about restricting the duration of all final exams to 2 hours?	○	○	○	○	○

In case resits during the summer interim period (in mid-August) are abandoned, and they are scheduled during the following academic year instead. Which timeslot for these resits has your preference? (RAT_resit)

- ○ Beginning of September, before Q1.
- ○ During Q1, possibly in the evening.
- ○ During the Q1 final exam period.
- ○ Other, please specify: *text input*

The academic calendar is currently divided into four quartiles that each end with a final exam/assessment period. However, there are alternatives to this structure. Rate the following possibilities on how desirable they are. Note that the current course material remains unchanged with each of the options. Again, consider your work tasks, private life, and work pressure.

		Very undesirable	Undesirable	Neutral/undecided	Desirable	Very desirable
		1	2	3	4	5
RAT_terms_1	Current quartile system (4 terms of about 8 education weeks each).	○	○	○	○	○
RAT_terms_2	Shorter quartile system (4 terms of about 7 education weeks each).	○	○	○	○	○
RAT_terms_3	Semester system (2 terms of about 16 education weeks each). The same course material is spread over 16 weeks instead of 8 weeks. More courses run in parallel.	○	○	○	○	○
RAT_terms_4	Shorter semester system (2 terms of about 14 education weeks each). The same course material is spread over 14 weeks instead of 8 weeks. More courses run in parallel.	○	○	○	○	○
RAT_terms_5	Flexible system in which 8-week courses and 16-week courses are both possible.	○	○	○	○	○
RAT_terms_6	Shorter flexible system in which 7-week courses and 14-week courses are both possible.	○	○	○	○	○

C.5.1. Other Calendar-Related Questions

Do you have any other comments related to the re-design of the academic calendar? (COMM_cal)

Text input

C.6. Job Demands (JD)

How demanding are the following aspects of your job currently?

		Not at all	Slightly	Moderately	Very	Extremely
		1	2	3	4	5
JD_1	The number of responsibilities	○	○	○	○	○
JD_2	The fragmentation of the job and switching between tasks	○	○	○	○	○
JD_3	The pressure to perform to high quality standards	○	○	○	○	○
JD_4	The size of classes and the high number of students	○	○	○	○	○
JD_5	The low motivation & dedication of students	○	○	○	○	○
JD_6	Reviewing or grading final examinations & resits	○	○	○	○	○
JD_7	Reviewing or grading course assignments and/or mid-term assessments	○	○	○	○	○
JD_8	Supervising or reviewing master and bachelor theses	○	○	○	○	○
JD_9	The pressure to be involved with research and/or publish	○	○	○	○	○
JD_10	Involvement in grant writing or acquiring funding for research projects	○	○	○	○	○
JD_11	The tasks related to management, such as overseeing teaching assistants	○	○	○	○	○
JD_12	Administrative & organizational tasks such as processing grades and working for committees	○	○	○	○	○
JD_13	Activities related to communication, such as meetings and dealing with emails	○	○	○	○	○
JD_14	The number of work hours	○	○	○	○	○

C.6.1. Work-Home Interference (WHI)

How much are the following statements true of you?

		To a very small extent	To a small extent	Somewhat	To a large extent	To a very large extent
		1	2	3	4	5
JD_whi_1	Do you feel that your work drains so much of your energy that it has a negative effect on your private life?	○	○	○	○	○
JD_whi_2	Do you feel that your work takes so much of your time that it has a negative effect on your private life?	○	○	○	○	○
JD_whi_3	Due to work-related duties, I have to make changes to my plans for private and family activities.	○	○	○	○	○

C.7. Job Resources (JR)

How much do you (dis)agree with the following statements?

		Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
		1	2	3	4	5
JR_1	I have sufficient autonomy & independence	○	○	○	○	○
JR_2	I receive sufficient support from the organization	○	○	○	○	○
JR_3	It is clear to me which tasks are part of my job	○	○	○	○	○
JR_4	I have sufficient time for preparing, revising & further developing courses	○	○	○	○	○
JR_5	I have sufficient time for properly dealing with student questions & individual teaching	○	○	○	○	○
JR_6	Regulations, policies & procedures are clear	○	○	○	○	○
JR_7	I feel valued by the organization	○	○	○	○	○

C.8. Personal Demands (PD)

C.8.1. Irrational Performance Demands (IPD)

How much do you (dis)agree with the following statements?

		Completely disagree	Disagree	Neutral	Agree	Completely agree
		1	2	3	4	5
PD_ipd_1	I must do my work flawlessly	○	○	○	○	○
PD_ipd_2	I have to be the best at work	○	○	○	○	○
PD_ipd_3	I do not allow myself to make mistakes at work	○	○	○	○	○

C.8.2. *Personal Standards (PS)*

How much do you (dis)agree with the following statements?

		Completely disagree	Disagree	Neutral	Agree	Completely agree
		1	2	3	4	5
PD_ps_1	I am very good at focusing my efforts on attaining a goal.	○	○	○	○	○
PD_ps_2	I have extremely high goals.	○	○	○	○	○
PD_ps_3	Other people seem to accept lower standards from themselves than I do.	○	○	○	○	○
PD_ps_4	I expect higher performance in my daily tasks than most people.	○	○	○	○	○

C.9. Personal Resources (PR)

C.9.1. *General Self-Efficacy (GSE)*

How much are the following statements true of you?

		Not at all true	Not really true	Neutral	Mostly true	Exactly true
		1	2	3	4	5
PR_gse_1	I am confident that I could deal efficiently with unexpected events.	○	○	○	○	○
PR_gse_2	Thanks to my resourcefulness, I know how to handle unforeseen situations.	○	○	○	○	○
PR_gse_3	I can solve most problems if I invest the necessary effort.	○	○	○	○	○

C.10. Work Strain (WS)

C.10.1. *Exhaustion (EXH)*

How often do the following items apply to you?

		Never 1	Rarely 2	Sometimes 3	Often 4	Always 5
WS_exh_1	At work, I feel mentally exhausted.	○	○	○	○	○
WS_exh_2	After a day at work, I find it hard to recover my energy.	○	○	○	○	○
WS_exh_3	At work, I feel physically exhausted.	○	○	○	○	○

C.10.2. Cognitive Impairment (COG)

How often do the following items apply to you?

		Never 1	Rarely 2	Sometimes 3	Often 4	Always 5
WS_cog_1	At work, I have trouble staying focused.	○	○	○	○	○
WS_cog_2	When I'm working, I have trouble concentrating.	○	○	○	○	○
WS_cog_3	I make mistakes in my work because I have my mind on other things.	○	○	○	○	○

C.10.3. Other Strain-Related Questions

Do you have any other comments related to stressors & demands at work, or the work pressure & stress you might be experiencing? (COMM_strain)

Text input

C.11. Socio-Demographic Characteristics (DEM)

Age: How old are you? (DEM_age)

- ○ Under 25 years old
- ○ 25-29 years old
- ○ 30-34 years old
- ○ 35-39 years old
- ○ 40-44 years old
- ○ 45-49 years old
- ○ 50-54 years old
- ○ 55-59 years old
- ○ 60+ years old

Gender: How do you describe yourself? (DEM_gen)

- ○ Male

	◯ Female ◯ Non-binary/third gender ◯ Prefer to self-describe: *text input* ◯ Prefer not to say
Living situation: What does your living situation look like? (DEM_home)	◯ Single, without children ◯ Single, with older (>12yr) children ◯ Single, with younger (≤12yr) children ◯ In a partnership, without children ◯ In a partnership, with older (>12yr) children ◯ In a partnership, with younger (≤12yr) children
Caregiving demands: Apart from children, do you have any other informal caregiving demands (i.e., mantelzorg)? (DEM_care)	◯ No, not at all (1) ◯ Yes, very little (2) ◯ Yes, somewhat (3) ◯ Yes, to a great extent (4)
Nationality: What is your nationality (as indicated on your passport or identity card)? If you have dual citizenship, you may choose one. (DEM_nat)	◯ Dutch ◯ Other EU/EEA country, including the UK and Switzerland ◯ Other nationality ◯ Prefer not to say

C.12. Work-Related Characteristics (WRK)

Function: What is your job title? (WRK_title)	◯ Full professor ◯ Associate professor ◯ Assistant professor ◯ Assistant professor (tenure/development track) ◯ Teacher ◯ PhD candidate (paid) ◯ Other, please specify: *text input*
Primary function: What do you personally see as your main job function? Please drag and drop the items in order from most important to least important job function.	**1.** Being a researcher: obtaining research funding, doing research, publishing & supervising PhD candidates. **2.** Being a teacher: providing education and teaching & supervising students. **3.** Being an administrator: handling administrative & organizational tasks (such as working for committees). **4.** Being a manager or supervisor: managing people & supervising others.

Department: At which department are you (primarily) formally employed? (WRK_dept)

- ◯ Applied Physics and Science Education (APSE)
- ◯ Biomedical Engineering (BmE)
- ◯ Built Environment (BE)
- ◯ Chemical Engineering and Chemistry (CE&C)
- ◯ Electrical Engineering (EE)
- ◯ Industrial Design (ID)
- ◯ Industrial Engineering and Innovation Sciences (IE&IS)
- ◯ Mathematics and Computer Science (M&CS)
- ◯ Mechanical Engineering (ME)
- ◯ Jheronimus Academy of Data Science (JADS)
- ◯ Other, please specify: *text input*

Tenure: For how many years have you been working at the TU/e? (WRK_ten)

- ◯ Less than 1 year
- ◯ 1 to 3 years
- ◯ 3 to 5 years
- ◯ 5 to 10 years
- ◯ 11 to 15 years
- ◯ More than 15 years

Contract type: What type of employment contract do you have at the TU/e? (WRK_emp)

- ◯ Temporary contract
- ◯ Permanent contract
- ◯ Other

Actual work hours: On average, how many hours do you typically spend on the following tasks per week? (WRK_acthrs)

1. Research and publishing-related tasks (WRK_acthrs_res): *integer (0-60) input*
2. Education and teaching-related tasks (WRK_acthrs_edu): *integer (0-60) input*
3. Administrative tasks (WRK_acthrs_admin): *integer (0-60) input*
4. Supervisory and management-related tasks (WRK_acthrs_mngmnt): *integer (0-60) input*

Work hours demands: How demanding is the number of work hours for you? (JD_14)

- ◯ Not at all (1)
- ◯ Slightly (2)
- ◯ Moderately (3)
- ◯ Very (4)
- ◯ Extremely (5)

Contractual work hours: What are the formal weekly working hours according to your contract? (WRK_contrhrs)

integer (0-60) input

Appendix D. Conjoint Analysis Design Iterations

In addition to the final conjoint study design discussed in Chapter 6.4, Tables 23, 24, and 25 provide three earlier iterations.

Table 23

Design Iteration 1 (Preliminary Version) Of the Conjoint Study With Four Attributes and 19 Possible Levels

Attribute	Levels
A. Number of terms	**1.** 2 terms (on average, 20 weeks per term)
	2. 3 terms (on average, 13 weeks per term)
	3. *4 terms (on average, 10 weeks per term) [current]*
B. Configuration of examination periods	**1.** Final exams and resits at the end of the year
	2. Final exams and resits halfway through the year and at the end of the year
	3. Final exams after each term and resits only at the end of the year
	4. Final exams after each term and resits halfway through the year and at the end of the year
	5. *Final exams and resits after each term [current]*
C. Introduction of extra education-free periods or breaks	**1.** Extension of the current Christmas recess
	2. Extension of the current Carnival break
	3. Additional education-free periods between terms
	4. Additional education-free periods before examinations and/or resits
	5. Additional break between September & December
	6. Additional break between January & July
	7. *No extra education-free periods or breaks [current]*
D. Length of regular rest periods, or non-education weeks (excluding the summer break)	**1.** Very short breaks (about 1-3 days each)
	2. *Short breaks (about 1 week each) [current]*
	3. Medium breaks (about 2 weeks each)
	4. Long breaks (about 3 weeks each)

Table 24

Design Iteration 2 (Substantiated Version) Of the Conjoint Study With Five Attributes and 17 Possible Levels

Attribute	Levels
A. Planning of resits	**1.** Once, at the end of the year
	2. Twice, halfway through the year and at the end of the year
	3. *Four times, after each quartile, combined with final exams (on average, 10 weeks per term) [current]*
B. Planning of breaks	**1.** *Schedule no extra breaks [current]*
	2. Schedule breaks of about 1 week between the four quartiles
	3. Schedule breaks of about 1 week in the middle of each quartile
	4. Schedule an extra break of about 2 weeks halfway through the year, or extend one of the current breaks
	5. Extend the summer holiday by about 1 or 2 weeks
C. Planning of official education-free weeks	**1.** *The last week before an examination period remains open for education and lectures [current]*
	2. The last 2-3 days before an examination period become strictly education-free
	3. The last week before an examination period becomes strictly education-free
D. Final exams	**1.** Final exams (excluding resits) take up 1 week at the end of each quartile
	2. Final exams (excluding resits) take up 1.5 weeks at the end of each quartile
	3. *Final exams (excluding resits) take up 2 weeks at the end of each quartile [current]*
E. Blended learning policy	**1.** Equal distribution of on-campus & online education
	2. $\leq$25% on-campus & the rest is online
	3. *$\leq$25% online education & the rest is on-campus [current]*

Table 25

Design Iteration 3 (Interview Version) Of the Conjoint Study With Five Attributes and 19 Possible Levels

Attribute	Levels
A. Number of resit periods per year	**1.** 1 resit period: at the end of the academic year
	2. 2 resit periods: after Q2 and at the end of the academic year
	3. *4 resit periods: after Q2, after Q3, after Q4, and at the end of the academic year [current]*
	4. Resits during the next quartile: during evenings or on Saturdays
B. Timing of resits at the end of the academic year	**1.** 2 weeks after the Q4 final exam period (mid July)
	2. 4 weeks after the Q4 final exam period (end of July)
	3. *6 weeks after the Q4 final exam period (mid August) [current]*
	4. During the following academic year
C. Planning of breaks	**1.** *Introduce no extra breaks [current]*
	2. Introduce 1-week breaks between the four quartiles (after the exam periods)
	3. Introduce 1-week breaks in the middle of each quartile
	4. Introduce 1-week breaks before each final exam period
D. Duration of final exam periods	**1.** Students' coursework of 1 quartile is assessed during 1 week of exams (4 total final exam weeks per year)
	2. *Students' coursework of 1 quartile is assessed during 2 weeks of exams (8 total final exam weeks per year) [current]*
	3. Students' coursework of 1 quartile is assessed during 3 weeks of exams (12 total final exam weeks per year)
E. Blended learning	**1.** Fully on-campus & no online education
	2. 75% on-campus & 25% online education
	3. Equal distribution of on-campus & online education
	4. $\leq$25% on-campus & $\geq$75% online education

Appendix E. Analysis of Academic Calendars

E.1. Eindhoven University of Technology (TU/e)

The current academic calendar of the TU/e starts at the beginning of September and lasts until the beginning of July (Eindhoven University of Technology, n.d.-a). It consists of four educational periods of about 10 weeks each. The last period is one week longer (9 weeks of education instead of 8) to compensate for the large number of official public holidays between April and June. The final 2 weeks of each period are dedicated to final examinations of the ongoing period and resits from the previous period. Resits of the final period are scheduled 6 weeks into the summer break, just 3 weeks before the new academic year starts. The calendar incorporates a Christmas recess in weeks 52 and 1 and a one-week Carnival break at the beginning of February.

E.2. Dutch Universities

Figure 16 presents a comparison of academic calendars from several universities in The Netherlands.

E.2.1. EWUU Alliance

TU/e students are able to take study components at other (inter)national universities. Here, the EWUU Alliance plays an important role. The EWUU Alliance is a collaboration between the Eindhoven University of Technology (TU/e), Wageningen University (WUR), Utrecht University (UU), and the University Medical Center Utrecht (UMCU). these institutions promote multidisciplinary, interdisciplinary, and transdisciplinary education by removing administrative burdens and exchanging students and teachers (EWUU Alliance, n.d.). For example, students can simply enroll in courses at any of the other universities through an online platform.

Utrecht University (UU) and University Medical Center (UMC) Utrecht. Similar to the TU/e, the academic calendars of UU and the UMC Utrecht start at the beginning of September and last until the beginning of July (UMC Utrecht, n.d.; Utrecht University, n.d.). They consist of four educational periods of about 10 weeks each. The third period is one week longer (10 weeks of education instead of 9) to compensate for the large number of official public holidays between April and June. Final examinations take place at the end of each period, but it is unclear how exactly they are arranged. The online resources also do not state how and when resits are scheduled. The most important reason for this is that assessments and schedules differ between different faculties. Finally, the calendars incorporate a Christmas recess in weeks 52 and 1.

Wageningen University & Research (WUR). Similar to the TU/e, the academic calendar of the WUR starts at the beginning of September and lasts until the beginning of July (Wageningen University & Research, n.d.). It is divided into six educational periods; the first two and final two periods last 8 weeks, while the middle two periods last 4 weeks. The final week of each period is dedicated to the final examinations of the ongoing period. The

second to last weeks of each period can be dedicated either to regular education activities or self-study, depending on the study program. However, during the final period, there is no option for a self-study week before the examination week to compensate for the large number of official public holidays between April and June. Resits are scheduled for one week halfway through the year and two weeks after the last education period of the year. The calendar incorporates a Christmas recess in weeks 52 and 1. At WUR, exams are scheduled before the Christmas break, while at most other Dutch universities, they are scheduled at the beginning of the new year.

E.2.2. Dutch Technical Universities

The Netherlands counts four universities of technology, as per the *4TU.Federation*; Delft University of Technology (TUD), Eindhoven University of Technology (TU/e), University of Twente (UT), and Wageningen University & Research (WUR) (4TU.Federation, n.d.). The University of Groningen (UG) also offers some technical studies (e.g., applied physics and artificial intelligence) and is therefore also considered in the following analysis of the academic calendars (2023-2024) of technical universities in The Netherlands.

University of Groningen (UG). Similar to the TU/e, the academic calendar of the UG starts at the beginning of September and lasts until the beginning of July (University of Groningen, n.d.). It consists of four educational periods of about 10 weeks each. The last period is one week longer (8 weeks of education instead of 7) to compensate for the large number of official public holidays between April and June. The first two periods form the winter semester, while the last two periods form the summer semester. The final 3 weeks of each period are dedicated to examinations. For the second and third periods, the first of these 3 weeks is for resits, and the last two are for final examinations. For the last period, there are 2 weeks for final examinations, followed by 2 weeks for resits. The calendar only incorporates a Christmas recess in weeks 52 and 1. This is compensated for by the relatively many, and presumably slower, examination weeks.

University of Twente (UT). Similar to the TU/e, the academic calendar of UT starts at the beginning of September and lasts until July (University of Twente, n.d.). It consists of four educational periods of about 10 weeks each. The third period is one week longer (9 weeks of education instead of 8) to compensate for the large number of official public holidays between April and June. The final 2 weeks of each period can be dedicated to examinations, but this depends on the study program. The final examinations of the last period are followed by 2 self-study weeks and one week of resits. The calendar incorporates a Christmas recess in weeks 52 and 1 and a one-week Spring break in February.

Delft University of Technology (TUD). Similar to the TU/e, the academic calendar of TUD starts at the beginning of September and lasts until July (TU Delft, n.d.). It consists of four educational periods of exactly 10 weeks each. There is no exception to compensate for the large number of official public holidays between April and June. The final week of each period is only dedicated to final examinations and resits, while the second to last week can

also be used for extra education or self-study. The third to last week can only be used for extra education activities or self-study. The final examinations of the last period are followed by 2 free weeks and one week for more final examinations or resits. This is a rough estimation of the planning of examinations; the exact schedule depends on the study program. The calendar incorporates a Christmas recess in weeks 52 and 1 and a one-week Spring break in February.

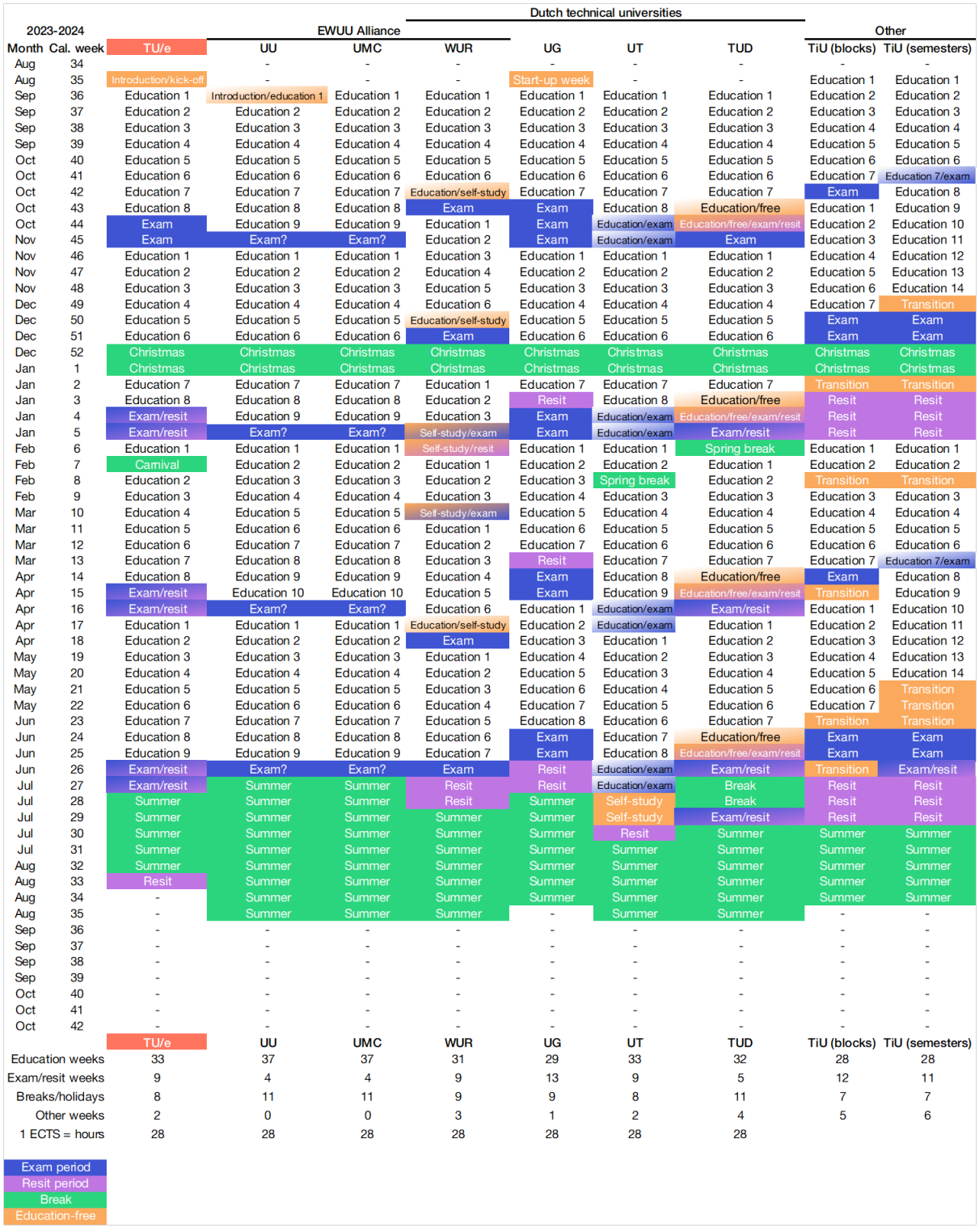
E.2.3. Other Dutch Universities

Following feedback from TU/e employees, an analysis of the academic calendar of Tilburg University is also interesting due to the regular collaborations.

Tilburg University (TiU). The academic calendar of TiU starts one week earlier compared to the TU/e, at the end of August, and lasts until July (Tilburg University, n.d.). It consists of either two or four educational periods, depending on the study program.

When a study program employs the blocks system, the four educational periods are about 8 weeks each. For the first and third periods, the final week of each period is dedicated to final examinations. For the second and final periods, there are 2 final examination weeks. Resits are scheduled for 3 weeks halfway through the year and 3 weeks at the end of the year. The calendar only incorporates a Christmas recess in weeks 52 and 1. However, 5 so-called transition weeks are scheduled throughout the year: between the Christmas recess and the first resit period, halfway through the third period, between the examination period of the third period and the start of the fourth period, before the final examinations of the fourth period, and between the final examinations of the fourth period and the resit period at the end of the year.

When a study program employs the semester system, the two educational periods are between 17 and 20 weeks each. The final two weeks of each period are dedicated to final examinations. For the first period, these are preceded by one transition week, and for the second period, these are preceded by three transition weeks. Resits are scheduled for 3 weeks halfway through the year and 3 weeks at the end of the year. Every seventh education week can also be used as an examination week. The calendar only incorporates a Christmas recess in weeks 52 and 1. Transition weeks are also scheduled between the Christmas recess and the first resit period, and halfway through the third period.



2023-2024			EWUU Alliance			Dutch technical universities			Other	
Month	Cal. week	TU/e	UU	UMC	WUR	UG	UT	TUD	TiU (blocks)	TiU (semesters)
Aug	34	-	-	-	-	-	-	-	-	-
Aug	35	Introduction/kick-off	-	-	-	Start-up week	-	-	Education 1	Education 1
Sep	36	Education 1	Introduction/education 1	Education 1	Education 1	Education 1	Education 1	Education 1	Education 2	Education 2
Sep	37	Education 2	Education 2	Education 2	Education 2	Education 2	Education 2	Education 2	Education 3	Education 3
Sep	38	Education 3	Education 3	Education 3	Education 3	Education 3	Education 3	Education 3	Education 4	Education 4
Sep	39	Education 4	Education 4	Education 4	Education 4	Education 4	Education 4	Education 4	Education 5	Education 5
Oct	40	Education 5	Education 5	Education 5	Education 5	Education 5	Education 5	Education 5	Education 6	Education 6
Oct	41	Education 6	Education 6	Education 6	Education 6	Education 6	Education 6	Education 6	Education 7	Education 7/exam
Oct	42	Education 7	Education 7	Education 7	Education/self-study	Education 7	Education 7	Education 7	Exam	Education 8
Oct	43	Education 8	Education 8	Education 8	Exam	Exam	Education 8	Education/free	Education 1	Education 9
Oct	44	Exam	Education 9	Education 9	Education 1	Exam	Education/exam	Education/free/exam/resit	Education 2	Education 10
Nov	45	Exam	Exam?	Exam?	Education 2	Exam	Education/exam	Exam	Education 3	Education 11
Nov	46	Education 1	Education 1	Education 1	Education 3	Education 1	Education 1	Education 1	Education 4	Education 12
Nov	47	Education 2	Education 2	Education 2	Education 4	Education 2	Education 2	Education 2	Education 5	Education 13
Nov	48	Education 3	Education 3	Education 3	Education 5	Education 3	Education 3	Education 3	Education 6	Education 14
Dec	49	Education 4	Education 4	Education 4	Education 6	Education 4	Education 4	Education 4	Education 7	Transition
Dec	50	Education 5	Education 5	Education 5	Education/self-study	Education 5	Education 5	Education 5	Exam	Exam
Dec	51	Education 6	Education 6	Education 6	Exam	Education 6	Education 6	Education 6	Exam	Exam
Dec	52	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas
Jan	1	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas
Jan	2	Education 7	Education 7	Education 7	Education 1	Education 7	Education 7	Education 7	Transition	Transition
Jan	3	Education 8	Education 8	Education 8	Education 2	Resit	Education 8	Education/free	Resit	Resit
Jan	4	Exam/resit	Education 9	Education 9	Education 3	Exam	Education/exam	Education/free/exam/resit	Resit	Resit
Jan	5	Exam/resit	Exam?	Exam?	Self-study/exam	Exam	Education/exam	Exam/resit	Resit	Resit
Feb	6	Education 1	Education 1	Education 1	Self-study/resit	Education 1	Education 1	Spring break	Education 1	Education 1
Feb	7	Carnival	Education 2	Education 2	Education 1	Education 2	Education 2	Education 1	Education 2	Education 2
Feb	8	Education 2	Education 3	Education 3	Education 2	Education 3	Spring break	Education 2	Transition	Transition
Feb	9	Education 3	Education 4	Education 4	Education 3	Education 4	Education 3	Education 3	Education 3	Education 3
Mar	10	Education 4	Education 5	Education 5	Self-study/exam	Education 5	Education 4	Education 4	Education 4	Education 4
Mar	11	Education 5	Education 6	Education 6	Education 1	Education 6	Education 5	Education 5	Education 5	Education 5
Mar	12	Education 6	Education 7	Education 7	Education 2	Education 7	Education 6	Education 6	Education 6	Education 6
Mar	13	Education 7	Education 8	Education 8	Education 3	Resit	Education 7	Education 7	Education 7	Education 7/exam
Apr	14	Education 8	Education 9	Education 9	Education 4	Exam	Education 8	Education/free	Exam	Education 8
Apr	15	Exam/resit	Education 10	Education 10	Education 5	Exam	Education 9	Education/free/exam/resit	Transition	Education 9
Apr	16	Exam/resit	Exam?	Exam?	Education 6	Education 1	Education/exam	Exam/resit	Education 1	Education 10
Apr	17	Education 1	Education 1	Education 1	Education/self-study	Education 2	Education/exam	Education 1	Education 2	Education 11
Apr	18	Education 2	Education 2	Education 2	Exam	Education 3	Education 1	Education 2	Education 3	Education 12
May	19	Education 3	Education 3	Education 3	Education 1	Education 4	Education 2	Education 3	Education 4	Education 13
May	20	Education 4	Education 4	Education 4	Education 2	Education 5	Education 3	Education 4	Education 5	Education 14
May	21	Education 5	Education 5	Education 5	Education 3	Education 6	Education 4	Education 5	Education 6	Transition
May	22	Education 6	Education 6	Education 6	Education 4	Education 7	Education 5	Education 6	Education 7	Transition
Jun	23	Education 7	Education 7	Education 7	Education 5	Education 8	Education 6	Education 7	Transition	Transition
Jun	24	Education 8	Education 8	Education 8	Education 6	Exam	Education 7	Education/free	Exam	Exam
Jun	25	Education 9	Education 9	Education 9	Education 7	Exam	Education 8	Education/free/exam/resit	Exam	Exam
Jun	26	Exam/resit	Exam?	Exam?	Exam	Resit	Education/exam	Exam/resit	Transition	Exam/resit
Jul	27	Exam/resit	Summer	Summer	Resit	Resit	Education/exam	Break	Resit	Resit
Jul	28	Summer	Summer	Summer	Resit	Summer	Self-study	Break	Resit	Resit
Jul	29	Summer	Summer	Summer	Summer	Summer	Self-study	Exam/resit	Resit	Resit
Jul	30	Summer	Summer	Summer	Summer	Summer	Resit	Summer	Summer	Summer
Jul	31	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Aug	32	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Aug	33	Resit	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Aug	34	-	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Aug	35	-	Summer	Summer	Summer	-	Summer	Summer	-	-
Sep	36	-	-	-	-	-	-	-	-	-
Sep	37	-	-	-	-	-	-	-	-	-
Sep	38	-	-	-	-	-	-	-	-	-
Sep	39	-	-	-	-	-	-	-	-	-
Oct	40	-	-	-	-	-	-	-	-	-
Oct	41	-	-	-	-	-	-	-	-	-
Oct	42	-	-	-	-	-	-	-	-	-
		TU/e	UU	UMC	WUR	UG	UT	TUD	TiU (blocks)	TiU (semesters)
Education weeks		33	37	37	31	29	33	32	28	28
Exam/resit weeks		9	4	4	9	13	9	5	12	11
Breaks/holidays		8	11	11	9	9	8	11	7	7
Other weeks		2	0	0	3	1	2	4	5	6
1 ECTS = hours		28	28	28	28	28	28	28		

Exam period
Resit period
Break
Education-free

Figure 16

A Comparison of the Academic Calendars of Relevant Universities in the Netherlands

E.3. Comparing Dutch Universities

Generally, the academic calendars of the eight considered Dutch universities are rather similar. At most universities, the academic calendars are study-dependent; TU/e and Groningen University (UG) are exceptions. Therefore, the following analysis is based on generalizations of these schedules.

They mostly start their academic calendars in the first full week of September (week 36). Tilburg University (TiU) is an exception and starts one week earlier.

Seven of the universities offer calendars that are divided into four periods of about 6 to 9 education weeks. Besides this quartile or blocks-system, TiU also offers a calendar based on two 14-week semesters for some study programs. Wageningen University & Research (WUR) has a different system consisting of two long periods of 6 weeks, followed by 2 three-week periods, followed by two long periods of 6 and 7 weeks. Except for Delft University of Technology (TUD) and TiU, the universities have one longer period to compensate for the large number of official public holidays between April and June.

The number of education weeks ranges from 28 at TiU to 33 at TU/e and UT, and possible even more at Utrecht University (UU) and University Medical Center Utrecht (UMC Utrecht). With 33 weeks, the number of educational weeks at the TU/e is not exceptionally long compared to the other Dutch universities.

At all universities, all educational periods end with final examinations that take between 1 and 3 weeks. At TU/e and TUD, resits are scheduled in the same period as these final examinations, while at WUR, UG, UT, and TiU, final examinations and resits are strictly separated. In some instances, resits follow final examinations, and in others, it is the other way around. WUR and TiU only offer two periods for resits, halfway through the year and at the end of the year. UT only offers 1 one-week resit period at the end of the year.

Only WUR finishes its final examination period before the Christmas break. At most other universities, students have two or three more education weeks before the examination period. At TiU, final examinations finish before the Christmas break, and resits are planned after the break.

Only TU/e plans examinations during the summer break. For the other universities, there is an education-free period of no longer than 2 weeks, followed by the resit period.

Compared to the rest, UG and TiU have relatively many examination and resit weeks (13 and 11-12 weeks, respectively). The total of 9 examination weeks at the TU/e is average.

Even though in The Netherlands, no mandatory or recommended vacation periods exist for higher education, all universities have a two-week Christmas break from week 52 to week 1. Besides this, only TU/e, UT, and TUD have an additional one-week break in February. Rest periods are offered differently at WUR, TUD, and TiU through self-study weeks, education-free weeks, and transition weeks, respectively. At WUR and TUD, these are conveniently planned before examinations.

E.4. International Universities

Figure 17 presents a comparison of academic calendars from several international universities.

E.4.1. EuroTeQ Alliance

Besides the EWUU Alliance, the EuroTeQ Alliance is also important for students taking study components at other (inter)national universities. EuroTeQ is an alliance of six universities of science and technology in Europe; Technical University of Munich (TUM), Technical University of Denmark (DTU), Eindhoven University of Technology (TU/e), École Polytechnique (l'X), Czech Technical University in Prague (CTU), and Tallinn University of Technology (TalTech). It is a so-called *European University* — a transnational alliance of universities, which offers, among other things, curricula jointly delivered across inter-university campuses (EuroTech Universities Alliance, 2022).

Czech Technical University in Prague (CTU). The academic calendar of CTU starts much later compared to the TU/e, at the end of September, and lasts until the end of June (Czech Technical University in Prague, n.d.). It consists of two educational periods of about 18 weeks each. For the first semester, the final 4 weeks are dedicated to examinations, and for the second semester, the final 5 weeks are for examinations. From the online resources, it does not become clear how exactly resits are scheduled. The calendar only incorporates a Christmas recess in weeks 52 and 1. Between the two semesters, there is an orientation week without educational activities for new students.

Talinn University of Technology (TalTech). Similar to the TU/e, the academic calendar of TalTech starts at the beginning of September, but it ends earlier, at the beginning of June (Talinn University of Technology, n.d.). It consists of four educational periods of about 8 weeks each. Final examinations of the first two periods are scheduled during 3 weeks after the second period, and final examinations of the final two periods are scheduled during 3 weeks after the final period. From the online resources, it does not become clear how exactly resits are scheduled. The calendar only incorporates a Christmas recess in week 52. Between the two semesters, there is an interim week without educational activities.

Technical University of Munich (TUM). The academic calendar of TUM starts much later compared to the TU/e and lasts until the end of August (Technische Universität München, n.d.). It consists of two educational periods of about 17-18 weeks each. Final examinations of the first semester are scheduled during 3 weeks at the end of February, and final examinations of the second semester are scheduled during 3 weeks at the end of the year. From the online resources, it does not become clear how exactly resits are scheduled. The calendar only incorporates a Christmas recess in weeks 52 and 1. However, between the two semesters, there is an interim period without educational activities of 6 weeks.

Technical University of Denmark (DTU). The most divergent academic planning is that of DTU since they provide year-round education (Technical University of Denmark, n.d.). The academic calendar of DTU starts one week earlier compared to the TU/e, at the end of

August, and lasts for an entire year, until the following August (Technical University of Denmark, n.d.). It is divided into six educational periods; two longer periods and three short periods. The first period lasts 16 weeks. The second period starts at the beginning of the new year and lasts only 3 weeks. The third period is longer again and lasts 17 weeks. Three short three-week periods follow to conclude the year. For the first long period, the final 2 weeks are dedicated to the final examinations of the ongoing period. The preceding week can either be used for extra examinations or self-study. For the second long period, the final 3 weeks are dedicated to final examinations and resits. The preceding week is free of educational activities. The four shorter periods do not incorporate examination weeks, although the final 3-week period in August can be used for resits. The calendar incorporates a one-week Autumn break in October, a Christmas recess in week 52, a one-week Winter break in January, and a one-week Easter break in March. These are perfectly scheduled between the educational periods. Moreover, extra education-free weeks are scheduled between the shorter periods during June and July.

L'École Polytechnique (L'X). At L'X, the academic calendar differs heavily from year to year and between undergraduate and graduate programs. Therefore, in this analysis, three approximations are made based on the limited information that is available online.

For undergraduates, the academic calendar of L'X starts somewhat later compared to the TU/e, at the end of September, and lasts until the end of June (École Polytechnique, n.d.). It is divided into two semesters of about 16-18 educational weeks. Both end with a short examination period. From the online resources, it does not become clear how exactly resits are scheduled.

For graduates, the academic calendar of L'X starts one week earlier compared to the TU/e, at the end of August, and lasts until the end of May (École Polytechnique, n.d.). It is divided into three periods of about 10-12 educational weeks. Each trimester ends with a short examination period. From the online resources, it does not become clear how exactly resits are scheduled.

The last year of the graduate school programs at L'X starts one week earlier compared to the TU/e, at the end of August, and lasts until the end of an internship. It is divided into three periods of about 9-12 educational weeks. The first two periods end with a short examination period. In April, students will start with an internship to finish their studies. From the online resources, it does not become clear how exactly resits are scheduled.

The three types of calendar each incorporate a one-week Halloween break in October, a Christmas recess in weeks 52 and 1, a one-week Winter break in February, and a one-week Easter break in March. These are perfectly scheduled between the educational periods.

E.4.2. EuroTech Alliance

École Polytechnique Fédérale de Lausanne (EPFL). The academic calendar of EPFL starts much later compared to the TU/e, at the end of August, and lasts until the end of May (EPFL, n.d.). It consists of two educational periods of about 14 education weeks each. Final

examinations are scheduled during 3 weeks after each semester. The examination period of the first semester is preceded by one week without educational activities. From the online resources, it does not become clear how exactly resits are scheduled. The calendar incorporates a Christmas recess in weeks 52 and 1, a two-week break between the two semesters, and an Easter break in April.

Israel Institute of Technology (IL). The academic calendar of IL starts much later compared to the TU/e, at the end of October, and lasts until the end of July (Technion Israel Institute of Technology, n.d.). It consists of two educational periods of 12 and 14 education weeks. For the first semester, the final 3 weeks are dedicated to the final examinations of the ongoing period. A one-week semester break and 3 resit weeks follow. For the second semester, the final 4 weeks are dedicated to the final examinations. Resits for this period are scheduled for 4 weeks (including a one-week break for Sukkot) after the summer break, before the start of the new academic year. The calendar incorporates a Hanukah break in weeks 51 and 52 and a two-week Easter break in April.

E.4.3. Other International Universities

Via topuniversities.com, three additional European universities were selected for comparison; the Swiss Federal Institute of Technology Lausanne (EPFL) in Switzerland, the Technical University of Denmark (DTU), and the Heriot-Watt University (HW) in Scotland. Like the TU/e, they offer bachelor programs *and* master programs in similar disciplines, are medium-sized, publicly funded, and demonstrate high research contributions. Their scores in the *QS World University Ranking* are similar as well; #16 (EPFL), #104 (DTU), and #281 (HW), compared to #138 for the TU/e ("University Search," n.d.).

Heriot-Watt University (HW). The academic calendar of HW starts somewhat later compared to the TU/e, halfway through September, and lasts until the end of July (Heriot-Watt University, n.d.). It consists of three educational periods of 11 education weeks each. At the end of the first and second trimesters, 2 weeks are dedicated to the final examinations. For the third trimester, this is only one week. From the online resources, it does not become clear how exactly resits are scheduled. The calendar incorporates a four-week Christmas recess from week 51 until week 2 and a two-week break in April. Moreover, halfway through each of the trimesters, there is a consolidation week without educational activities.

E.5. Comparing International Universities

The analysis of other international universities highlights other differences.

Firstly, they provide more variation in start dates. While most universities start their academic calendars at the end of August or the beginning of September, some only start halfway through September (CTU) or even October (TUM and IL).

internationally, there is a diversity of academic calendars divided into two, three, and four educational periods of 14-18 weeks, 10-12 weeks, or 7-8 weeks, respectively. DTU and IL specifically provide clear possibilities for education during the summer months.

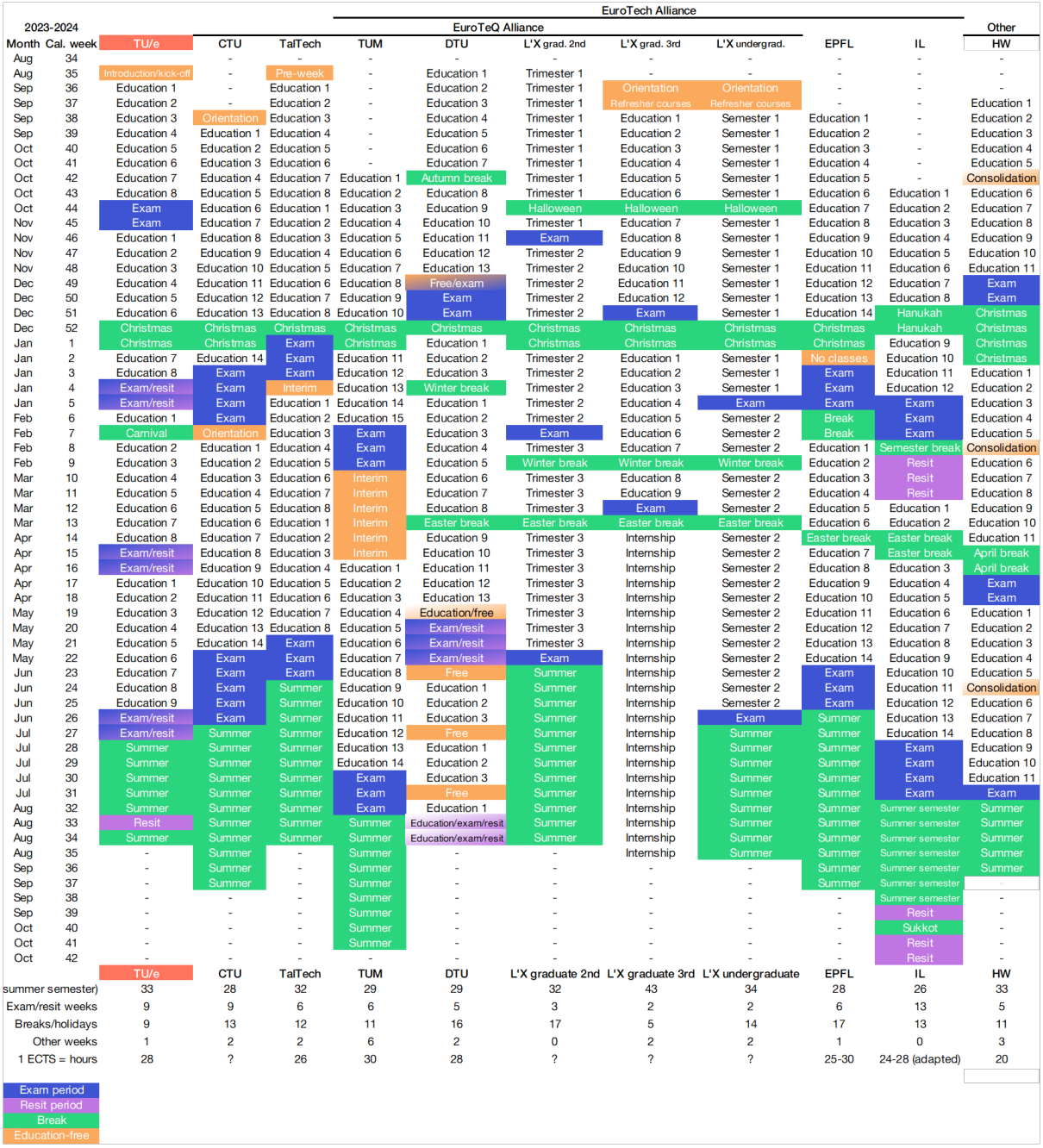
Not many universities offer consistent education-free periods before examinations, with DTU as an exception. At many universities, the Christmas (or Hanukah) break is well isolated from final examinations; there are at least three more educational weeks before the following exam week. However, at CTU, TalTech, and EPFL, the Christmas breaks are directly followed by examinations. Similar to the TU/e, IL schedules resits right before the start of the new academic year. There are seven weeks of summer break before the resit period starts; at the TU/e there are six weeks.

The only identical aspect of all international calendars is the break in week 52. Most universities extend this Christmas break to include the first week of the new year, while DTU only has a one-week Christmas break, HW has a four-week Christmas break, and IL has a two-week Hanukah break which starts one week earlier.

At almost all universities, except for the TU/e, educational periods are separated by education-free periods. TUM is an extreme example, with a six-week interim period between the two semesters. At DTU and HW, the Christmas break separates educational periods. CTU and TalTech only offer one-week interim periods between semesters, while EPFL offers two weeks.

DTU, L'X, and HW consistently break up educational periods by scheduling one-week breaks or consolidation weeks halfway through educational periods. These are also the only universities with a break in the first half of the year before the Christmas break.

From an international perspective, the TU/e has relatively many education weeks (33). TalTech, L'X, and HW also offer longer programs of 32-34 weeks, but the others have calendars of only 26-29 weeks.



			EuroTech Alliance									
2023-2024			EuroTeQ Alliance									Other
Month	Cal. week	TU/e	CTU	TalTech	TUM	DTU	L'X grad. 2nd	L'X grad. 3rd	L'X undergrad.	EPFL	IL	HW
Aug	34	-	-	-	-	-	-	-	-	-	-	-
Aug	35	Introduction/kick-off	-	Pre-week	-	Education 1	Trimester 1	-	-	-	-	-
Sep	36	Education 1	-	Education 1	-	Education 2	Trimester 1	Orientation	Orientation	-	-	-
Sep	37	Education 2	-	Education 2	-	Education 3	Trimester 1	Refresher courses	Refresher courses	-	-	Education 1
Sep	38	Education 3	Orientation	Education 3	-	Education 4	Trimester 1	Education 1	Semester 1	Education 1	-	Education 2
Sep	39	Education 4	Education 1	Education 4	-	Education 5	Trimester 1	Education 2	Semester 1	Education 2	-	Education 3
Oct	40	Education 5	Education 2	Education 5	-	Education 6	Trimester 1	Education 3	Semester 1	Education 3	-	Education 4
Oct	41	Education 6	Education 3	Education 6	-	Education 7	Trimester 1	Education 4	Semester 1	Education 4	-	Education 5
Oct	42	Education 7	Education 4	Education 7	Education 1	Autumn break	Trimester 1	Education 5	Semester 1	Education 5	-	Consolidation
Oct	43	Education 8	Education 5	Education 8	Education 2	Education 8	Trimester 1	Education 6	Semester 1	Education 6	Education 1	Education 6
Oct	44	Exam	Education 6	Education 1	Education 3	Education 9	Halloween	Halloween	Halloween	Education 7	Education 2	Education 7
Nov	45	Exam	Education 7	Education 2	Education 4	Education 10	Trimester 1	Education 7	Semester 1	Education 8	Education 3	Education 8
Nov	46	Education 1	Education 8	Education 3	Education 5	Education 11	Exam	Education 8	Semester 1	Education 9	Education 4	Education 9
Nov	47	Education 2	Education 9	Education 4	Education 6	Education 12	Trimester 2	Education 9	Semester 1	Education 10	Education 5	Education 10
Nov	48	Education 3	Education 10	Education 5	Education 7	Education 13	Trimester 2	Education 10	Semester 1	Education 11	Education 6	Education 11
Dec	49	Education 4	Education 11	Education 6	Education 8	Free/exam	Trimester 2	Education 11	Semester 1	Education 12	Education 7	Exam
Dec	50	Education 5	Education 12	Education 7	Education 9	Exam	Trimester 2	Education 12	Semester 1	Education 13	Education 8	Exam
Dec	51	Education 6	Education 13	Education 8	Education 10	Exam	Trimester 2	Exam	Semester 1	Education 14	Hanukah	Christmas
Dec	52	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Christmas	Hanukah	Christmas
Jan	1	Christmas	Christmas	Exam	Christmas	Education 1	Christmas	Christmas	Christmas	Christmas	Education 9	Christmas
Jan	2	Education 7	Education 14	Exam	Education 11	Education 2	Trimester 2	Education 1	Semester 1	No classes	Education 10	Christmas
Jan	3	Education 8	Exam	Exam	Education 12	Education 3	Trimester 2	Education 2	Semester 1	Exam	Education 11	Education 1
Jan	4	Exam/resit	Exam	Interim	Education 13	Winter break	Trimester 2	Education 3	Semester 1	Exam	Education 12	Education 2
Jan	5	Exam/resit	Exam	Education 1	Education 14	Education 1	Trimester 2	Education 4	Exam	Exam	Exam	Education 3
Feb	6	Education 1	Exam	Education 2	Education 15	Education 2	Trimester 2	Education 5	Semester 2	Break	Exam	Education 4
Feb	7	Carnival	Orientation	Education 3	Exam	Education 3	Exam	Education 6	Semester 2	Break	Exam	Education 5
Feb	8	Education 2	Education 1	Education 4	Exam	Education 4	Trimester 3	Education 7	Semester 2	Education 1	Semester break	Consolidation
Feb	9	Education 3	Education 2	Education 5	Exam	Education 5	Winter break	Winter break	Winter break	Education 2	Resit	Education 6
Mar	10	Education 4	Education 3	Education 6	Interim	Education 6	Trimester 3	Education 8	Semester 2	Education 3	Resit	Education 7
Mar	11	Education 5	Education 4	Education 7	Interim	Education 7	Trimester 3	Education 9	Semester 2	Education 4	Resit	Education 8
Mar	12	Education 6	Education 5	Education 8	Interim	Education 8	Trimester 3	Exam	Semester 2	Education 5	Education 1	Education 9
Mar	13	Education 7	Education 6	Education 1	Interim	Easter break	Easter break	Easter break	Easter break	Education 6	Education 2	Education 10
Apr	14	Education 8	Education 7	Education 2	Interim	Education 9	Trimester 3	Internship	Semester 2	Easter break	Easter break	Education 11
Apr	15	Exam/resit	Education 8	Education 3	Interim	Education 10	Trimester 3	Internship	Semester 2	Education 7	Easter break	April break
Apr	16	Exam/resit	Education 9	Education 4	Education 1	Education 11	Trimester 3	Internship	Semester 2	Education 8	Education 3	April break
Apr	17	Education 1	Education 10	Education 5	Education 2	Education 12	Trimester 3	Internship	Semester 2	Education 9	Education 4	Exam
Apr	18	Education 2	Education 11	Education 6	Education 3	Education 13	Trimester 3	Internship	Semester 2	Education 10	Education 5	Exam
May	19	Education 3	Education 12	Education 7	Education 4	Education/free	Trimester 3	Internship	Semester 2	Education 11	Education 6	Education 1
May	20	Education 4	Education 13	Education 8	Education 5	Exam/resit	Trimester 3	Internship	Semester 2	Education 12	Education 7	Education 2
May	21	Education 5	Education 14	Exam	Education 6	Exam/resit	Trimester 3	Internship	Semester 2	Education 13	Education 8	Education 3
May	22	Education 6	Exam	Exam	Education 7	Exam/resit	Exam	Internship	Semester 2	Education 14	Education 9	Education 4
Jun	23	Education 7	Exam	Exam	Education 8	Free	Summer	Internship	Semester 2	Exam	Education 10	Education 5
Jun	24	Education 8	Exam	Summer	Education 9	Education 1	Summer	Internship	Semester 2	Exam	Education 11	Consolidation
Jun	25	Education 9	Exam	Summer	Education 10	Education 2	Summer	Internship	Semester 2	Exam	Education 12	Education 6
Jun	26	Exam/resit	Exam	Summer	Education 11	Education 3	Summer	Internship	Exam	Summer	Education 13	Education 7
Jul	27	Exam/resit	Summer	Summer	Education 12	Free	Summer	Internship	Summer	Summer	Education 14	Education 8
Jul	28	Summer	Summer	Summer	Education 13	Education 1	Summer	Internship	Summer	Summer	Exam	Education 9
Jul	29	Summer	Summer	Summer	Education 14	Education 2	Summer	Internship	Summer	Summer	Exam	Education 10
Jul	30	Summer	Summer	Summer	Exam	Education 3	Summer	Internship	Summer	Summer	Exam	Education 11
Jul	31	Summer	Summer	Summer	Exam	Free	Summer	Internship	Summer	Summer	Exam	Exam
Aug	32	Summer	Summer	Summer	Exam	Education 1	Summer	Internship	Summer	Summer	Summer semester	Summer
Aug	33	Resit	Summer	Summer	Summer	Education/exam/resit	Summer	Internship	Summer	Summer	Summer semester	Summer
Aug	34	Summer	Summer	Summer	Summer	Education/exam/resit	Summer	Internship	Summer	Summer	Summer semester	Summer
Aug	35	-	Summer	-	Summer	-	-	Internship	Summer	Summer	Summer semester	Summer
Sep	36	-	Summer	-	Summer	-	-	-	-	Summer	Summer semester	Summer
Sep	37	-	Summer	-	Summer	-	-	-	-	Summer	Summer semester	-
Sep	38	-	-	-	Summer	-	-	-	-	-	Summer semester	-
Sep	39	-	-	-	Summer	-	-	-	-	-	Resit	-
Oct	40	-	-	-	Summer	-	-	-	-	-	Sukkot	-
Oct	41	-	-	-	Summer	-	-	-	-	-	Resit	-
Oct	42	-	-	-	-	-	-	-	-	-	Resit	-
		TU/e	CTU	TalTech	TUM	DTU	L'X graduate 2nd	L'X graduate 3rd	L'X undergraduate	EPFL	IL	HW
summer semester)		33	28	32	29	29	32	43	34	28	26	33
Exam/resit weeks		9	9	6	6	5	3	2	2	6	13	5
Breaks/holidays		9	13	12	11	16	17	5	14	17	13	11
Other weeks		1	2	2	6	2	0	2	2	1	0	3
1 ECTS = hours		28	?	26	30	28	?	?	?	25-30	24-28 (adapted)	20

Exam period
Resit period
Break
Education-free

Figure 17

A Comparison of the Academic Calendars of Three Other European Universities Similar to the TU/e

Appendix F. Item-Level Descriptive Statistics

Table 26 provides additional descriptive statistics on an item level, as already briefly discussed in Chapter 8.1.

Table 26

Item-Level Descriptive Statistics

Construct	Scale	Item	*N*	*M*	*SD*	Min.	Max
Job demands	Work-home interference	Work drains energy	240	3.1	1.2	1.0	5.0
		Work takes time	240	3.0	1.3	1.0	5.0
		Change private plans	240	3.2	1.3	1.0	5.0
	Secondary activities	Research funding	237	3.2	**1.5**	1.0	5.0
		Management tasks	237	2.7	1.2	1.0	5.0
		Administrative/organizational tasks	238	3.0	1.2	1.0	5.0
		Communication activities	240	**3.6**	1.1	1.0	5.0
	General task demands	Number of responsibilities	241	**3.6**	1.1	1.0	5.0
		Fragmentation	240	**3.7**	1.1	1.0	5.0
		Quality standards	241	**3.6**	1.0	1.0	5.0
		Work hours	236	**3.2**	1.0	1.0	5.0
	Teaching demands	Number of students	240	2.8	1.2	1.0	5.0
		Exam/resit assessment	240	3.1	1.1	1.0	5.0
		Assignment/midterm assessment	240	3.2	1.0	1.0	5.0
Personal demands	Irrational performance demands	Do work flawelessly	237	2.9	1.1	1.0	5.0
		Be the best	239	3.0	1.1	1.0	5.0
		No mistakes	239	2.9	1.1	1.0	5.0
	Personal standards	High goals	239	3.4	1.0	1.0	5.0
		Others have lower standards	239	3.3	1.0	1.0	5.0
		High performance expectation	239	3.3	0.9	1.0	5.0
Personal resources	General self-efficacy	Confidence	239	**3.7**	0.8	1.0	5.0
		Resourcefulness	239	**3.8**	**0.7**	**2.0**	5.0
		Effort	239	**4.1**	**0.7**	**2.0**	5.0
Job resources	Task & organizational resources	Autonomy/independence	240	**4.2**	1.0	1.0	5.0
		Organizational support	240	3.3	1.2	1.0	5.0
		Task clarity	240	**3.8**	1.1	1.0	5.0
		Valued by organization	240	3.1	1.2	1.0	5.0
	Education time sufficiency	Course time	239	**2.3**	1.1	1.0	5.0
		Student time	239	2.8	1.1	1.0	5.0
Work strain	Exhaustion	Mental exhaustion	240	2.9	0.9	1.0	5.0
		Energy recovery difficulty	238	3.1	1.0	1.0	5.0
		Physical exhaustion	240	**2.6**	1.0	1.0	5.0
	Cognitive impairment	Focus trouble	240	2.8	0.9	1.0	5.0
		Concentration trouble	240	2.8	0.9	1.0	5.0
		Mind on other things	240	**2.4**	0.8	1.0	5.0

Note. Noteworthy positive values were emphasized in green and negative values in red. Noteworthy standard deviations were emphasized in orange.

Appendix G. Subgroup Analysis Results

G.1. Latent Class Analysis

Table 27 provides more details on the LCA solutions discussed in Chapter 10.

Table 27

LCA Results Based on the Conjoint Levels Included in Individuals' Preferred Calendar Configurations

					Class population share				
Classes	Max. log-likelihood	χ^2	*AIC*	*BIC*	1	2	3	4	5
1	-15984.8	1002.682	31997.59	32078.79	1				
2	-15684.05	491.6451	31426.09	31594.29	0.8018	0.1982			
3	-15676.51	476.7567	31441.02	31696.21	0.246	0.3603	0.3937		
4	-15665.98	454.9538	31449.96	31792.15	0.1967	0.7077	0.0729	0.0227	
5	-15657.48	441.8804	31462.96	31892.14	0.1383	0.2049	0.3532	0.0337	0.27

G.2. K-Means Clustering on Preferences

Table 28 provides more details on the k-means clustering solutions discussed in Chapter 10.

Table 28

K-Means Clustering Results Based on Individual Utility Scores

Clusters	Cluster	Compactness	Within cluster sum of squares	Size	Average silhouette width
2		21.90%			0.19
	1		2799.027	130	0.14
	2		1933.9	114	0.24
3		30.00%			0.17
	1		1556.699	83	0.15
	2		1238.971	68	0.1
	3		1444.22	93	0.19
4		38.10%			0.15
	1		805.5939	61	0.22
	2		930.4731	55	0.1
	3		936.3587	54	0.15
	4		1078.3587	74	0.15
5		41.90%			0.15
	1		685.3286	57	0.24
	2		666.1944	40	0.1
	3		591.8331	42	0.13
	4		543.9387	35	0.16
	5		1030.8576	70	0.11

G.3. K-Means Clustering on Work Strain

Table 29 provides more details on the k-means clustering solutions discussed in Chapter 10.

Table 29

K-Means Clustering Results Based on Work Strain

Clusters	Cluster	Compactness	Within cluster sum of squares	Size	Average silhouette width
2		49.40%			0.41
	1		86.50303	110	0.35
	2		72.19252	130	0.46
3		64.00%			0.35
	1		32.27832	103	0.41
	2		41.25628	84	0.32
	3		39.30818	53	0.31
4		71.50%			0.34
	1		13.85859	55	0.41
	2		20.67335	54	0.39
	3		27.08747	47	0.34
	4		27.7963	84	0.26
5		78.40%			0.38
	1		17.424658	73	0.36
	2		14.265583	41	0.37
	3		16.866213	49	0.31
	4		8.318658	53	0.47
	5		10.851852	24	0.37
6		82.10%			0.38
	1		8.119883	38	0.33
	2		12.206553	39	0.36
	3		10.774411	33	0.31
	4		8.318658	53	0.43
	5		9.400966	23	0.38
	6		7.31893	54	0.44

Appendix H. Academic Calendar Proposals

Figure 18 presents the three proposed configurations for the academic calendar at TU/e, and Figure 19 presents three additional proposals.

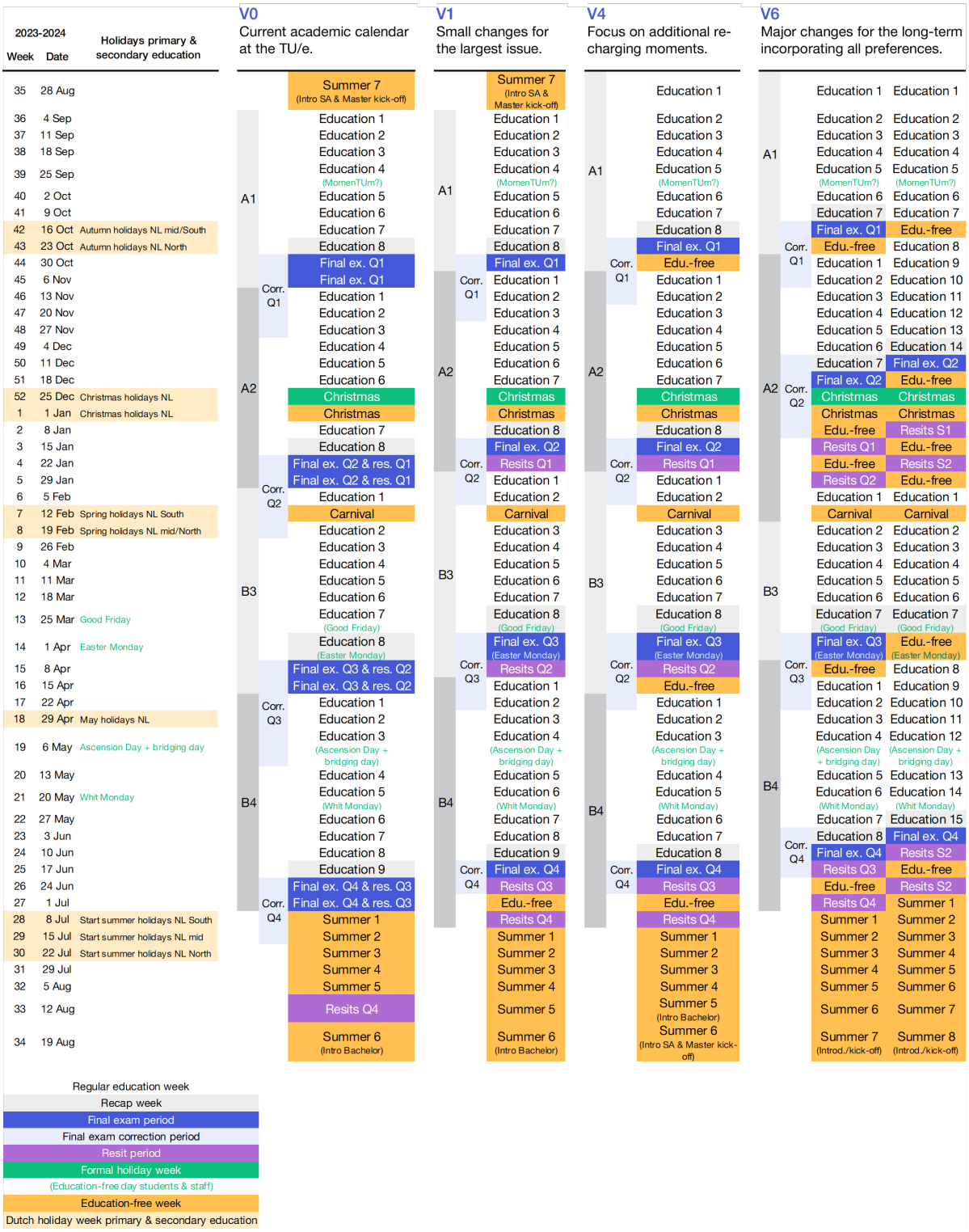


Figure 18

Proposed New Academic Calendars

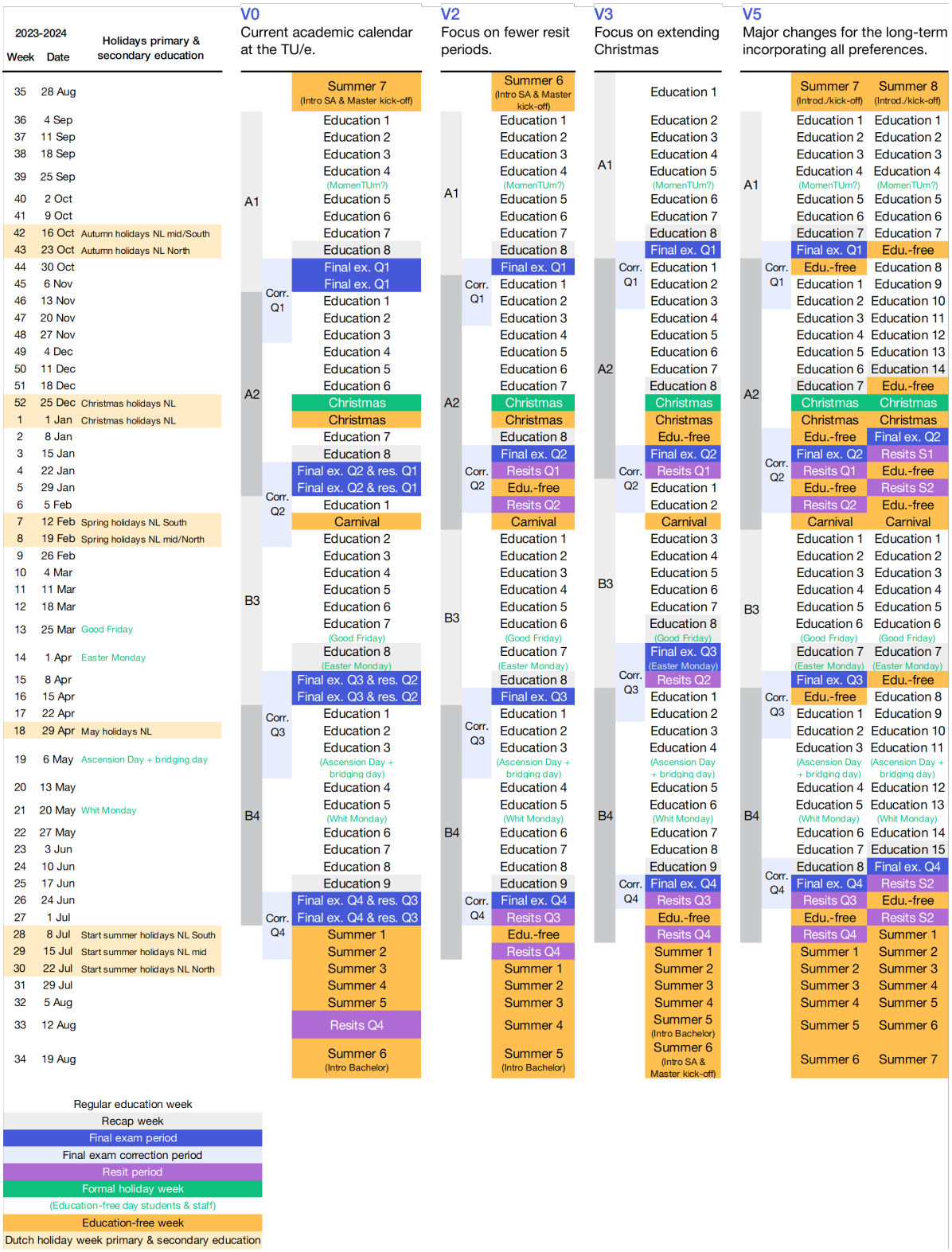


Figure 19

Additional New Academic Calendars

Appendix I. In-Depth Interview Results

I.1. Work Pressure Among Academic TU/e Staff

Lecturers experience work pressure to some degree, but most do not experience it exclusively negatively. Work pressure is seen in different ways:

1. The workload (i.e., the amount of work) is high, but lecturers have accepted this already. However, the fact that this type of work pressure is assumed normal is a problem.
2. How tasks are progressing is potentially more important than workload.
3. ”How you feel” is potentially more important than workload.
4. Internal ”performance pressure” is potentially more important than workload or other, more external pressures. This performance pressure is mainly related to doing research at a high standard but can also refer to providing high-quality education.

Changes in the academic calendar are not directly related to these issues considered work pressure.

I.2. Indifference Toward (Changing) The Academic Calendar

Opinions about the current academic calendar range from neutral to ”terrible.” There is no real appreciation. However, lecturers are generally indifferent to changing the academic calendar. It is unnecessary to shorten the academic year or make changes to the calendar because the issues related to work pressure are unrelated to the yearly planning. The structure of the calendar is generally less critical for lecturers than for students:

- Lecturers are more flexible in breaks than students. They plan their vacations considering (1) the courses they are involved with and (2) their home situations. Vacations in the academic calendar are less important.
- The academic calendar is built around education, and lecturers have many other tasks besides education:
    - Some activities, like attending conferences and supervising students, are relatively evenly spread throughout the year. Therefore, they are a constant pressure. While including these other tasks in the new definition of the academic calendar is essential, it will be impossible to timebox them.
    - Evenly distributing the education-related workload over the quartiles does not matter much to lecturers. Courses and exams must be designed anyway, and the timing matters to a lesser extent.
- Lecturers are primarily concerned about how changes in the academic calendar impact students. If a redesign helps students, it is accepted. Minor changes will probably not be detrimental to lecturer work pressure anyway.

Scheduling can be improved on multiple levels and not only on the basis of the academic calendar; different tasks have different time horizons. For example, for doing research, it can

be nice to have one day per week completely free, some weeks free, or an entire quartile free. However, catching up on emails is best done on an hourly level (e.g., one hour free). Restructuring a course is best done on a weekly level (e.g., one week free). Innovating a program is best done on a monthly level (e.g., one month free).

I.3. Opinions on the Current Academic Calendar

1. Lecturers appreciate the structure of the current 10-week system, which is also seen as an 8+2-week structure or a 7+1+2-week structure. Lecturers know well in advance when they have teaching duties, and the structure predetermines deadlines to some degree. This leads to clarity, certainty, and predictability.
2. For lecturers, the 8th education week is appreciated but not crucial. It is often a quiet week (students are often not on-campus), in which they can focus on tasks not directly related to teaching. It is also used as a backup lecture week in case of illness of the lecturer (for lectures) or illness of students (for practical work). This week is ”free time” for students to work on projects, and especially for CBL courses, this is useful. Lecturers’ workload is often not different from other weeks.
3. The fragmented nature of the 2nd semester (due to the national holidays & bridging days) is annoying. The work pressure is generally higher than during the rest of the year, which makes these holidays feel like extra demands instead of extra breaks.
    a. The regular amount of work needs to be finished in fewer working days resulting in time pressure. The extra 11th week in Q4 is appreciated but not really noticed because only part of the lost time is recovered.
    b. Rescheduling is an extra demand that costs a lot of time, mainly because the holidays differ each year. Lectures and meetings might also have to be rescheduled during evenings to win back lost time. This is non-ideal.
4. Structure is appreciated, but flexibility is crucial. This flexibility is missing because the university does not consider that different departments have different needs. Especially in the bachelor college, lecturers are missing autonomy in programming according to the needs of their courses.
    a. On a weekly level, 4-week modules (in which students focus on one topic/project for 4 weeks) would work well for some Industrial Design learning goals, but programmers are bounded by mandatory courses.
    b. On a daily level, the schedule based on timeslots may lead to frustration.
        1. Each timeslot contains evening hours. Even though they are often not used, this policy gives the impression that work in the evening is expected. Incidental evening exams are okay, but structural lectures are not.
        2. It is not flexible enough to account for the needs of different departments. For example, 4-hour blocks are too short for some Industrial Design project work. At the same time, 4-hour blocks are too long for most lectures, leading to exhaustion/fatigue for students

and lecturers. The daily planning becomes too fragmented when only 2-hour blocks are used within the 4-hour blocks.

3. It is also not flexible enough when students want to attend elective courses at other departments. Timeslots are often overlapping.

5. The Carnival break is appreciated but only crucial for some. Some lecturers use it to finish overdue work, and others take a vacation.
    a. Because the Carnival break is soon after the Christmas break, it is less useful for resting or catching up; this was done during Christmas already.
        - It would be better if the Carnival break overlaps with some of the national holidays or bridging days in the 2nd semester.
    b. Because students are often not on-campus, it is often a quiet week in which lecturers can focus on other tasks such as research and focus on the grading of Q2 assignments and final exams.
    c. However, students lose momentum, especially when working on assignments in groups. This could lead to an increased workload for lecturers helping students catch up at the end of Q3.
6. The scheduling around the Christmas recess is terrible for three reasons:
    a. Students lose momentum in the middle of Q2, leading to an increased workload for lecturers at the end of Q2 (similar to the Carnival break).
    b. The Q1 final exam/assessment period is too soon after the Christmas break. Lecturers often sacrifice the break to give feedback and grade assignments.
    c. The 1st week of the Christmas recess is not seen as a break due to the holidays and family visits. This break does not allow for resting a lot.
7. The summer period/vacation does not feel like a break because the workload in this period has increased over the years. Students planning to graduate before September work on their projects during the summer period. It is expected that lecturers support them during this time, which leads to high workloads during the summer break. For example, prohibiting graduations in July & August could be a solution.
8. After the interim exam period, before the start of the new year, there are ”golden opportunity” moments for exceptions made by the examination committee. These are annoying and could be combined with the interim resit period.
9. The academic calendar should be more representative of the diverse society:
    a. Adhering to the national holidays in the 2nd semester, the Christmas recess, and the Carnival break do not fit the university’s international character.
    b. The academic calendar should be aligned with other European universities, mainly regarding education but also regarding research. Alignment in examination periods would be especially beneficial.

I.4. Different Term Systems

Lecturers do generally not prefer shorter-term systems (or shorter courses):

- For some courses, 1-week modules could be appropriate. However, for most material, students need time to think about the theory and let it sink in. Time on task is critical, and seven weeks of education (as in the current system) is insufficient. This also highlights the required flexibility in scheduling.

There are diverging opinions on longer-term systems (such as trimesters & semesters):

- Most lecturers were either indifferent or positive toward a semester system because it is similar to the current quartile system.
    - A semester system allows for longer (e.g., 16-week) and shorter (e.g., 4-week) courses, which is more flexible than the current quartile system, in which courses cannot exceed 8 weeks.
    - When there are fewer terms, there are fewer official final exam/assessment periods, which reduces assessment pressure for both students & lecturers.
    - Time on task is critical for students. Lengthening courses (even though the material remains unchanged) provides students time to think about and reflect on the theory better. This is especially important for complex topics and projects.
- However, longer-term systems can also have negative consequences:
    - They could eliminate the modularity of the current quartile system because longer periods are more difficult to move around in a yearly planning. This will probably make it more difficult to efficiently schedule courses for lecturers such that they have dedicated periods to focus on research.
    - Some projects at the Department of Industrial Design span multiple quartiles and take an entire semester. This results in peak workloads at the end of Q2 and at the end of Q4, where the assessment of semester projects (including report deadlines & competence assessments), ordinary exams, resits, bachelor graduations, and master graduations all come together.
    - This will also be difficult for student deadline workers; they might need more guidance throughout the semester. Developing students' professional identity, studying behavior, and self-directedness will become crucial. Moreover, intermediate assessment might be required, which would make the system similar to the quartile system. More formative (ungraded) instead of summative assessments could also be beneficial.
    - There will be more final exams in one final examination/assessment period because more courses run in parallel, which increases the peak workload for grading them. Spreading this workload over more examination periods is probably more beneficial. More formative (ungraded) instead of summative assessments could also be beneficial.

I.5. Free Time and Taking Breaks

It is not uncommon that lecturers do not spend their free days; they do not have the time to take breaks. Especially when teaching obligations are on Mondays or Fridays, it is not possible to extend the weekends.

- Lecturers sometimes work during weekends (or on national holidays). Work during off-time is often related to fun research or simple administrative tasks. Since work is mostly seen as enjoyable, there are no negative consequences of working during off-time.
- While some almost always work during the evenings, others are strict in ending their workday when they leave the office. If something needs to be finished, it is good practice to stay at work longer and not take work home.
- Work is almost always present in some way during evenings, weekends, and vacations. The best free days are during Christmas because almost nobody is working then; the temptation to work is absent, partly due to planned family visits, for example.

I.6. Demands of Teaching and Research

1. There is generally too little time to do research due to peripheral tasks and issues. For many lecturers, being involved with education might feel like wasted time because it is often not related to the main task of the lecturer (i.e., doing research). For (the smaller group of) lecturers who prioritize teaching, this is not an issue. A more extended period without teaching duties (e.g., a free summer period or quartile) would be a solution.
2. Most workload (not necessarily work pressure) comes from teaching-related tasks. There are generally too many courses to be involved with simultaneously. However, most lecturers have accepted dealing with this ”extra” workload. Only for those passionate about teaching, this extra workload does not matter. For most lecturers, education is well-distributed throughout the year, but sometimes, quartiles with a high education workload result in lecturer” burnout.” The first few weeks of the consequent quartile are then used to recover, reducing overall education quality.
3. Management tasks, research-related tasks, and administrative tasks rarely suffer from high workloads. Often, education is the first sacrifice.
    a. Management tasks are fixed, and too much time spent here might reduce the time spent on teaching tasks, reducing education quality.
    b. Research tasks are crucial for professional and career development, and too much time spent here might reduce the time spent on teaching tasks, reducing education quality.
4. Lecturers are mainly rewarded based on obtaining financial resources. This is not a bad thing per se, but it results in a priority shift (for most lecturers) from education toward, e.g., grant writing and attending conferences. The chance for grants to be

accepted is low, so a lot of time (3-5 research proposals, 1-2 weeks per proposal) is lost without any results, which is frustrating. This type of work is often done during off-time because there is not enough time during the workday to complete these tasks. The quality of publications and lectures decreases because of these issues.

I.7. Other Job Demands

1. Career pressure (i.e., pressure to build a career) a. Some lecturers like teaching; they must sacrifice their academic careers. b. Some lecturers focus more on their careers. They must be more involved with writing research proposals to obtain research grants, leading to lower education quality. Especially among younger lecturers, this is a prevalent stressor.
2. Fragmentation of the job and switching between different tasks (i.e., teaching and research) costs time and effort.
3. Developing and switching between different teaching modes cost time and effort, although it not necessarily leads to work pressure directly.
4. Policy (changes):
    a. Regulations and policies from top management result in frustration because they take away flexibility. For example, mandatory intermediate tests in the bachelor college forced lecturers to spend time & effort to change their courses.
    b. The extreme drive for innovation results in frustration because it leads to changes (in the bachelor college). For example, intermediate tests were previously mandatory in the bachelor college, and there was a focus on multidisciplinary courses at the expense of fundamental courses. Later, both decisions were reversed.
5. Pressure from managers & supervisors: hierarchical differences lead to higher workloads, as it might be difficult to say no to extra requests from supervisors.
6. Emails take a lot of time to answer, resulting in stress during off-time. Answering emails during off-time is not a good practice, but not bothersome either. Ultimately, it results in less email stress during off-time and fewer emails when returning to work.
7. Unnecessary meetings: many meetings are not about research or teaching.
8. Students:
    a. The increasing number of students sometimes leads to extra workload, and sometimes not; this depends on the course and the activity. For example, emails increase with the number of students, leading to a higher workload. However, how lectures are given is mostly independent of the number of students. Only the course setup might have to be different. Keeping education quality high is difficult with an increasing number of students.
    b. Irregularity in the number of students leads to last-minute changes in the course setup, leading to work pressure (i.e., time pressure due to last-minute work).

   c. Insufficient prior knowledge of students results in bad starts to courses. Lecturers lose valuable time supporting HBO students or students from other departments. Less in-depth and complex course material can be introduced, leading to lower education quality.
   d. Increasing complaints from students about, for example, minor grade changes. They think it is easy to pass a course or get cum laude without extra effort.
   e. Low motivation & dedication of students leads to more resits and more grading work for lecturers. It also decreases motivation for teaching.
9. Lecture & meeting rooms:
   a. This aspect should not add to the workload, but in some departments, it sometimes does. In other departments, there are enough adequate employees to avoid these issues.
   b. Sometimes, lecture rooms are not available, or not enough rooms are available. This is often communicated last-minute to lecturers (and even later to students), which results in a bad start to the course and frustrated students. The first few days/weeks are needed to solve organizational issues like this. Moreover, evening lectures are more likely, and then, online education is preferred.
   c. Sometimes, a lecture is split over multiple rooms, making teaching (especially interaction with students) more difficult.
   d. When lecture rooms are on the other side of the campus, this leads to lost time and confusion among students. There is no logical planning.
   e. The availability of rooms will be a larger issue with the introduction of more CBL courses.
10. Assessment: the assessment periods are seen as peak workload moments. There is generally not enough time in these periods to spend on other teaching tasks. Preparing the assessment periods (e.g., submitting final exams on time) is not so much of a burden.
11. Blended learning pressure: the TU/e and students keep emphasizing how great online course content (i.e., short video lectures or pencasts) are, leading to an implicit pressure to invest more time in blended learning.
12. Individual supervision of BSc & MSc theses and PhD projects takes a lot of time, and this work continues during the summer.
13. Having additional support staff (for example, extra TAs to help with grading) leads to additional management & administrative tasks.
14. Responsibility for education and research results in internal performance pressure. Sharing responsibility reduces the pressure, but at the TU/e, most research is individual.
15. Management tasks such as hiring, supporting, and meeting with TAs cost time and

effort; sometimes, this loss is not worth it.

16. Preparing & attending conferences takes time and results in scheduling problems with education. There is not one peak congress period, from December to March, but also May to June. Administrative tasks related to conferences, such as filing receipts, add to the administrative workload.
17. Work-home interference: sometimes, lecturers cancel private/social events because the workday costs them too much energy (specifically, other social encounters, such as engaging with students, networking events, and conferences). Moreover, evening lectures and high workloads result in changes in private life to accommodate work.
18. Research deadlines that are often just after Christmas (NWO deadlines) and after the summer (conference deadlines). Still, there is a lot of variation in these tasks.
19. Other:
    a. Randomly being asked to do presentations or guest lectures.
    b. Performance reviews & corresponding administrative burden.
    c. Incidental tasks, like hiring new people or TAs (when the number of students increases, for example).
    d. Attending PhD-level or PdEng-level courses.
    e. Lunch meetings; they take away 'free time.'
    f. Setting up Canvas pages (takes about 4 hours per course).
    g. Incidental events disturbing the education schedule, such as graduation ceremonies, check-your-match events, or MomenTUm.

I.8. Positive and Available Job Resources

1. Autonomy is generally appreciated and makes the perception of work pressure positive instead of negative.
2. General freedom & flexibility. Specifically for planning free days & spreading them out over the year, freedom is crucial.
3. Support from coworkers: having a social group of colleagues and sharing similar struggles & issues.
4. Supervisor support in the form of research-related feedback, help with planning and structuring, and thinking about career prospects.
5. Digital & online resources:
    a. Knowing that some lectures are recorded to use as a backup in case of illness or extreme workloads is a relief.
    b. Communication channels between students to help each other (e.g., Discord or Canvas) reduce workload. The lecturer only has to monitor.
    c. Ans is excellent for correcting exams together with colleagues or TAs. It takes less time and allows more flexibility in the time spent on grading. It is an excellent example of where flexibility can reduce work pressure.

I.9. Negative and Lacking Job Resources

1. Recognition, appreciation & rewards:
    a. The current rewards policy leads to the feeling that education is not valued as much as research, leading to frustration. Rewards should be more dependent on education, such that research and education become valued equally.
    b. The recognition & rewards (’erkennen & waarderen’) pilot focuses on education innovation, not education quality. Being valued by students and providing good education should be far more important than being novel. This is not reflected in the policy.
2. Financial resources: there is a structural shortage of financial resources for education; some of the research grants are even used to keep the primary education function of the university going.
3. Synergism between education & research is lacking. Education will feel less useless, and lecturers will be more motivated to teach when there is an overlap between their research and education topics. Students help them with their research by thinking about the topics and developing new ideas. This could be a benefit of Challenge-Based Learning (CBL).
4. Time for reflection & innovation: there is no time to reflect on how courses went and the course content. Making changes and improvements (i.e., innovation in education) is impossible. Over time, education quality will decrease. A similar issue is apparent on a program level. - There is not enough time for assessment tasks, such as grading final exams. After the interim exams, the assessment period is even shorter (5 or 10 working days instead of 15). This period cannot be shortened, especially when considering fewer resit periods or longer-term systems with fewer final exam periods.
5. Support from the organization. There are too few people in the overloaded support functions (e.g., secretaries) that did not grow enough with the growing number of students.
    a. This makes (ICT) support slow and bothersome.
    b. There is not enough possibility for assistance with research (i.e., research assistant as a job function). Only for education is there support.
    c. Because the TU/e does not provide enough support, external support is sought from the industry & company professionals. This helps in reducing the workload, and students appreciate it as well. However, external parties do not have any authority on administrative matters, such as ERB forms.
    d. There is no planning or scheduling support, for example, on how to deal with the fragmented 2nd semester.
    e. Faculty management support is lacking: lecturers feel they are on their own.
    f. Blended learning support is lacking. It takes years to introduce ’proper’ blended learning (e.g., professional-looking video lectures), and the university does not offer enough support.

   g. Support related to overworking is missing: lecturers have to ”protect their own time.”
6. Digital & online tools:
   a. Reporting final results in Osiris costs a lot of time and leads to frustration. The conversion and reporting processes are unclear, and lecturers do not have the authority to change grades more than once.
   b. The connection of all the IT systems is lacking. For example, Osiris and Canvas are two separate systems, which leads to double the work or confusion.
   c. There is no integrated student-follow system like Hora Finita, which is used for tracking PhD candidates.
   d. It is unclear where to find information on the website (i.e., intranet).
7. Administrative tasks:
   a. The TU/e is a bureaucracy. For example, all possibilities for support are locked behind non-transparent complex procedures that change too often.
   b. Specifically, ERB forms are confusing and take a lot of time.
   c. Arranging things like internship assignments and graduation committees always results in too many additional administrative tasks.

I.10. The Number of Resit Periods

This attribute generally does not matter much to lecturers. There are often only a few students in the resits. Lecturers design the exam at the end of the course, so delaying the resit date does not matter for this task. Other lecturers might be less structured and design the exam last minute, but because they are experts on the topics, the delay does not matter. For younger/starting lecturers, this might be more difficult.

- It might be easier and more convenient to prepare for fewer resit periods.
- However, having fewer resit periods increases the peak workloads. Scheduling more resits in one period increases the workload for grading the resits and increases (time) pressure.
- When there is no dedicated resit period, scheduling will become an issue. Also, it is essential to bundle similar types of activities. For example, combining examinations and resits in larger blocks of time without other tasks is preferred instead of mixing them with lectures.

I.11. Timing of the Last Resit Period

Lecturers mentioned the timing of the last resit period most often and as the most crucial element when considering a redesign of the academic calendar. The timing of the last resit period does not impact workload directly but influences work-home interference.

There is no ”good” option among those presented:

1. Having resits as soon as possible after the Q4 exams is probably the best option. It is

nice to ”finish everything” (”ready for a fresh start”) before a quieter summer period. However, there needs to be enough time for grading the Q4 exams.

2. The options of planning Q4 resits at the end of July and during August are both terrible; these are both during the vacation period. To avoid this, earlier is better, but then the assessment period might run through the vacation period anyway.
3. Resits during the next year might be a good option because it solves issues regarding planning vacations with family. However, it will lead to problems for BSA students and graduating students. Doing away with the bachelor-before-master rule (’harde knip’) is a solution. There are 3 options:
    a. The first week of the subsequent year (1st week of September), followed by a free week, before starting the new year.
    b. During the Q1 education period, possibly in the evening. Incidental evening exams are okay.
    c. During the Q1 exam period.

I.12. Introducing Extra Education-Free Periods

Extra ”breaks” (in which staff are free of work) should be optional as they are unnecessary. Lecturers are flexible in planning free days anyway and might prefer to spend some ”free” time on research tasks. The Carnival break is a good example. Vacations are often scheduled as one longer break during the summer and some free days evenly spread throughout the year. For those with children, it would be nice if breaks overlapped with the vacations of lower education (i.e., Autumn and Spring break), but this is not a necessity.

Extra vacations might be more beneficial for students, but periods without lecturing duties also benefit lecturers. A potential drawback is that this allows for relatively empty agendas for lecturers; it is then easier for others to schedule meetings with them, taking away the freedom. There are 2 strategies for education-free periods:

1. Lengthen the summer period to use it as (1) a period to take a break and (2) a period to focus solely on research. Lecturers generally like this option. Being free of education duties for one quartile per year has a similar effect.
2. Introduce extra (shorter) breaks throughout the year to avoid being burned out when the summer period finally starts.
    - Extra education-free periods between the quartiles result in breathing space in the calendar, which is currently lacking. These periods, as well, can be used for research.
        - This is an excellent opportunity for students to plan trips and activities (with study associations). Fewer students will be absent, which makes teaching easier.
        - Grading final exams generally takes 3 weeks, which overlaps with the start of the new quartile. A break between these 2 periods may relieve this issue and lead to a better start to the new quartile.

        - These weeks would be beneficial for reflecting on courses and improving lectures for the following year. There is no better time to do this than right after the course has finished.
    - Extra education-free periods halfway through each quartile have no real benefit. It makes intermediate assessments less flexible; it results in losing momentum halfway through the course; and there will always be students still looking for support.

I.13. Duration of Final Exam Periods

- The duration of final exam periods generally does not matter to lecturers except when it helps to create more room elsewhere.
- An option generally received positively was one in which all final exams are scheduled in week 9 and all resits in week 10. This last week is a ”reward” for students who passed their courses on the first try. This can be seen as a break between quartiles.
- If there is a trade-off between (1) shorter final exam weeks in which lecturers must be available in the evenings and (2) a free week between the quartiles to have more time for assessment, some evenings can be sacrificed to have a break.

I.14. Blended Learning

Blended learning might reduce work pressure but definitely reduces work pleasure. Teachers are best able to decide about blended learning; the TU/e should not have a policy related to this. For example, blended learning works better for master courses than for bachelor courses. Some courses are suited for blended learning; others are not.

- Online education should always remain optional; everything must be available on campus. However, the option of online education (up to about 25%) is always appreciated by students. Flip-the-classroom concepts, pencasts, and videos like Khan Academy are good examples. Too much online education will not be accepted by students, which leads to lower passing rates.
- More/less blended learning could impact the availability of lecture rooms; there might be an indirect effect to further research.
- Reasons for more online education:
    - It reduces the distance between lecturers and students; the hurdle to ask questions is lower. On the other hand, there is less face-to-face contact.
    - Accommodating the increasing number of students and supporting the scale jump.
    - Simpler learning goals can be done through online self-study so that there is more time for complex learning goals during the on-campus activities. This could lead to more in-depth and higher-quality education.
    - The following types of structures are also possible:
    - X weeks on-campus, then X weeks online. This is a radical option but might

have financial benefits for international students.
    - Mornings on-campus, then afternoons online. When alternated per program, it could serve as a solution for the shortage of lecture rooms.
- Besides online lecturing, there are also possibilities for online examinations, especially considering the shortage of lecture rooms and the potential shortening of exam periods.

I.15. Other comments

- Maintain the current study load of courses (5 ECTS). Some lecturers are still dealing with the consequences of restructuring their courses from 3 ECTS to 5 ECTS.
- The attitude of students is changing. For example, they complain more about high workloads and might be less motivated. At the same time, there is a regulation that between 60-90% of them should pass the course. This will lead to a lower education quality.
- Resits are generally too soon after the final exam: if students cannot pass the exam the first time, they will not be able to do so only 2-10 weeks later. One reason is that this requires autonomous studying, and most course content is not designed for this. Another view is that sooner resits are better. Then, students retain a lot of the information from the first time studying and do not have to start from scratch.
- Lecturers sometimes feel forced to let students pass courses/programs while they are not yet at a sufficient level. Entrance exams might be a good idea to counter this issue and help keep education quality high among the scale jump.
- Problems with project groups at the start of projects lead to a bad start to the course. The first few days/weeks are needed to solve organizational issues like this. This issue will become more prevalent with more Challenge-Based Learning.

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