

## Article

# The Role of Personal Demands and Personal Resources in Enhancing Study Engagement and Preventing Study Burnout

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### Abstract

Using a 1-year longitudinal design, we examined the role of personal demands and personal resources in long-term health impairment and motivational processes among master students. Based on the job demands-resources theory and transactional model of stress, we hypothesized that students' personal demands (i.e., irrational performance demands, awfulizing and irrational need for control) predict perceived study demands one year later, and indirectly relate to burnout. Furthermore, we predicted that personal resources indirectly associate with study engagement via students' perceived study resources one year later. These hypotheses were tested in a sample of Dutch master students ( $N = 220$  at T1 and T2) using structural equation modelling. As hypothesized, personal demands and personal resources at T1 predicted study demands and study resources one year later (T2,  $\beta = .25-.42$ ,  $p < .05$ ), respectively. Study-home interference [study demand] mediated the association between personal demands and burnout ( $\beta = .08$ ,  $p = .029$ ), whereas opportunities for development [study resource] mediated the association between personal resources and study engagement ( $\beta = .08$ ,  $p = .014$ ). Hence, personal demands and personal resources relate indirectly to students' burnout and engagement one year later via a heightened level of specific study demands and study resources. Accordingly, the present research expands the propositions of the JD-R Theory by proposing personal demands as a relevant factor for students' long-term well-being.

**Keywords:** burnout; higher education; personal demands; personal resources study engagement

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A growing body of evidence indicates that the prevalence of mental health issues among university students is rising. According to recent publications, students increasingly struggle with psychological complaints such as depression, exhaustion and burnout (Hoyt et al., 2021; Meeks et al., 2023; Struijs, 2021). Conversely, there are also studies indicating a simultaneous rise in students' levels of study motivation and perfectionism, as highlighted by Curran and Hill (2019) and Wolfensberger and Pilot (2014). To gain more insight into the underlying processes that can explain why some students develop mental health issues, whereas other students become more motivated, we examine how students' personal characteristics as well as their study characteristics relate to their mental health level (i.e., level of burnout and engagement) over the course of one academic year.

Numerous studies have offered insight into the factors in individuals' work or study environment that predict burnout and engagement (Demerouti et al., 2021; Madigan & Curran, 2021; Schaufeli & Enzmann, 1998). The majority of these studies predominantly examined predictors in the work/study environment,

whereas less attention has been paid to the role of personal factors. For example, although the job demands-resources (JD-R) theory (Bakker & Demerouti, 2017, 2018; Demerouti et al., 2001) recognizes the role of personal resources in relation to burnout and work engagement, it does not explicitly address the role of personal demands. Personal demands are the aspects of the self that force individuals to invest disproportionate effort in their work and/or hamper them to successfully cope with their environment (Zeijen et al., 2021).

Specifically, JD-R based research within an educational setting mostly focuses on study resources and demands within the study setting, such as workload and developmental opportunities (Clements & Kamau, 2018, Lesener et al., 2020) or explores study aspects that contribute to perceived study pressure (e.g., task complexity, Wilson & Sheetz, 2010). The personal factors that are addressed in educational settings mostly represent personal resources, such as personal expertise (Wilson & Sheetz, 2010) and self-efficacy (Clements & Kamau, 2018). To the best of our knowledge, no prior research has been conducted on the role of personal demands among students.

In this study we argue that the role of individual factors needs to be explored in a comprehensive, balanced way, investigating the role of both personal demands and personal resources in predicting both ill- and well-being of students. This does not at all mean that we question the crucial role of situational factors in this respect. In line with, for instance, Barbier et al. (2013) and Swider and Zimmerman (2010), we assume that well-being is not only a

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function of the characteristics of a job and the context that individuals are facing, but that it also depends on the person conducting the tasks. Therefore, in order to gain in-depth understanding of the underlying mechanisms that might explain student's burnout and study engagement, we focus on both personal and situational factors.

Taken together, we zoom in on students' personal demands and personal resources, and examine to what extent these personal variables relate to the perception of study demands and study resources one year later. Furthermore, we investigate whether the perception of study demands and study resources relates to the level of burnout and study engagement one year later. In doing so, we contribute to the literature in three significant ways. First of all, we advance and expand the well-established job demands-resources theory by empirically embedding the concept of personal demands in the model, as proposed by Bakker and Demerouti (2017, 2018; see also Zeijen et al., 2021 for an initial cross-sectional test of the added value of the personal demands concept). Previous studies have investigated the motivating and health impairment associations between personal resources and engagement and burnout in one model (e.g., Garrosa et al., 2011; Kotzé, 2018). However, to date, no study has investigated whether personal demands offer additional predictive value in explaining ill- and well-being above and beyond the already known relationships between personal resources and engagement (Xanthopoulou et al., 2007, 2009) and burnout (e.g., Garrosa et al., 2011; Kotzé, 2018). Secondly, we aim to uncover the extent to which personal demands influence how students perceive their study environment, and how this may result in ill- and well-being. By examining the extent to which these personal beliefs about the self and the environment relate to the perception of study demands, the present study sheds light on the mechanisms that underly the association of personal demands with burnout and engagement. These insights might help students and universities to prevent and combat student burnout and to promote study engagement (Schaufeli et al., 2002, Walburg, 2014). Finally, we contribute to the ill- and well-being literature (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018) by examining whether the concept of personal demands is a relevant factor for students' ill- and well-being longitudinally. So far, hardly any research has been conducted on the role of personal demands on burnout and engagement, and only one cross-sectional study explored the role of personal demands in student burnout using a cross-sectional design (Zeijen et al., 2021). This study contributes by testing the value of personal demands as a predictor of student burnout and study engagement over the course of one year.

### Theoretical Background

Within the job demands-resources (JD-R) theory (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018; Demerouti & Bakker, 2022) the role of job demands and job resources for employee well-being and motivation are emphasized. Job demands are seen as the aspects of the job that require sustained physical or mental effort, such as workload and emotional demands, while job resources refer to the aspects of the job that are functional in achieving goals or stimulate personal growth and development, such as autonomy and social support (Demerouti et al., 2001). High job demands trigger a health-impairment process, leading to exhaustion and burnout when experienced for extended periods, while job resources stimulate motivation and foster high levels of engagement. So far, the basic core assumptions of the JD-R theory have been tested in a large number of longitudinal studies. For instance, according to the

results of the latest meta-analysis (Lesener et al., 2019) job demands lead to burnout ( $\beta = .10$ ;  $p < .001$ ) and job resources lead to work engagement over time ( $\beta = .19$ ;  $p < .001$ ).

The JD-R theory has been applied to a student setting before (Clements & Kamau, 2018; Lesener et al., 2020; Robins et al., 2015; Wilson & Sheetz, 2010; Zeijen et al., 2021). In order to align the wording of the present study among students with general JD-R terminology, we will use the terms 'study demands' and 'study resources' to refer to the demanding and resourceful aspects of students' study context. This means that we build upon the assumption that a study context can be compared to a work context, and that students' health and motivational processes are to a considerable degree comparable to employees' health and motivational processes.

### *Personal Resources and Demands as Predictors of the Perceived Study Environment*

In addition to situational aspects within individuals' work environment, the JD-R theory recognizes personal-level variables that influence health impairment and motivational processes (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018). Specifically, the JD-R theory recognizes personal resources as a relevant factor for the perception of job resources, and as outcomes of job resources (Bakker & Demerouti, 2017, 2018; Xanthopoulou et al., 2007, 2009). In an attempt to include personal impairment tendencies, JD-R researchers have begun to recognize personal demands as a potentially important concept for students' and employees' well-being (Bakker et al., 2023; Zeijen et al., 2021). However, studies that have investigated the construct of personal demands in relationship with work or study related well-being are still scarce (some notable exceptions are Barbier et al., 2013; Zeijen et al., 2021). This is remarkable since the results of these studies suggest that personal demands seem to play a relevant role in the perception of study demands.

Building upon the transactional model of stress (TMS) proposed by Lazarus and Folkman (1984), our study aims to explore how personal demands and personal resources influence the way students perceive the level of study demands and study resources in their study environment. Accordingly, individuals' personal characteristics determine to what extent a situation is perceived as demanding, neutral or challenging (Folkman, 1997, 2008; Lazarus & Folkman, 1984). This means that the information retracted by individuals in identical situations may differ depending on their unique personal demands and resources. Students with high levels of personal demands, such as a strong need to control the environment, may for instance perceive a high workload as threatening, whereas students with high levels of personal resources, such as highly self-efficacious students, may perceive the same workload as challenging.

Stress arises when an individual perceives that situational demands exceed one's personal resources (Holroyd & Lazarus, 1982). This implies that personal perceptions, beliefs and perspectives regarding the self and the (study or work) environment can be regarded as a starting point of health impairment and motivational processes. So far, most JD-R research typically investigated and found evidence for the role of personal resources as moderators and mediators in the relationship between work-related factors and (organizational) outcomes (see for a short overview Bakker & Demerouti, 2017). However, there are also studies that suggest that personal resources play a crucial role in shaping students' understanding, interpretation, and response to their environment (Llorens et al., 2007, Yeager et al., 2022).

Research on student well-being (Luthans et al., 2012) underscores the value of combining diverse personal resources into higher-order constructs, which improves the predictive value for students' academic experiences and behavior. One specific higher-order construct relevant for predicting student well-being is Psychological Capital (PsyCap). PsyCap encompasses self-efficacy, optimism, hope, and resilience. These facets, identified as dynamic and state-like, can be positively influenced and augmented through training, either directly (Luthans et al., 2008) or via the context (Bakker & van Wingerden, 2021). According to previous studies (among employees), these sets of personal resources have a reciprocal relationship with situational resources in enhancing motivation. In addition, they have been found to protect individuals from the detrimental effects of high situational demands (Xanthopoulou et al., 2009; Xanthopoulou et al., 2013).

Considerable empirical evidence supports the assumption that individual's perception of their environment depends, at least partly, on personal characteristics. For instance, previous research has shown that individuals who are more confident about themselves (i.e., with high core self-evaluations), perceive their job characteristics (i.e., autonomy, task identity, skill variety, task significance, and task feedback) as more positive compared to colleagues who are less self-confident (Judge et al., 1998). Hence, depending on employees' personal characteristics, a job is perceived as having more or less resources. In a similar vein, Xanthopoulou and colleagues (2009) found that employees with high levels of optimism, organizational-based self-esteem and self-efficacy perceive more job resources (i.e., social support, feedback and opportunities for development) in their work 18 months later, compared to employees with low personal resources. These findings demonstrate that employees' personal resources can be predictive of the perceived level of job resources over time. Based on this reasoning we hypothesize that, in a similar manner, students' personal resources may be predictive of their perception of study resources. Hence, we predict the following:

**Hypothesis 1:** Personal resources at Time 1 (T1, i.e., optimism, self-efficacy and resilience) are positively associated with the perception of study resources at Time 2 (T2, i.e., feedback, social support, and development opportunities).

However, as indicated above, we do not only expect that students' personal resources affect how study situations are perceived. An analogous line of reasoning leads us to believe that students with high levels of personal demands may experience, perceive and even create greater demands in their study environment. For example, a recent study by Zeijen and colleagues (2021) showed that students who are inclined to set irrationally high standards for themselves or who have an extremely high need for control perceive a higher study load and more emotional demands. In a similar vein, a study by Schaufeli et al. (2009) among young doctors demonstrated that an excessive and obsessive inner work drive is associated with more role conflicts. Finally, Guglielmi and colleagues (2012; based on Machlowitz, 1980) argued and found that workaholic employees (vs. employees scoring low on workaholism) are more likely to develop and experience higher levels of job demands. Both theory and empirical evidence underline the reasoning that students' personal demands have the potential to influence the perception of the study environment, specifically the level of

study demands. Therefore, we assume that students' personal demands predict study demands over time.

**Hypothesis 2:** Personal demands at T1 (i.e., irrational performance demands, awfulizing, and irrational need for control) are positively associated with the perception of study demands at T2 (i.e., study-home interference, study pressure, and emotional demands).

#### *Personal Resources and Demands as Predictors of Study Burnout and Study Engagement*

Personal resources and demands are not only assumed to predict the perception of study resources and demands, they are also assumed to play a role in the development of study engagement (Macey & Schneider, 2008) and student burnout (Demerouti et al., 2021; Madigan & Curran, 2021; Schaufeli & Enzmann, 1998). Firstly, study engagement can be understood as the effort applied to completing a study task and is seen as the active, energetic dimension of motivation (Skinner et al., 2009). Some perspectives highlight study engagement as the visible manifestation of the psychological processes that drive energy, purpose, and endurance in school activities (Wang & Degol, 2014). Instead of being a brief or specific condition, engagement denotes a more enduring and widespread affective-cognitive state that is not concentrated on any particular object or event (Schaufeli et al., 2002). In contrast, student burnout can be considered as the conceptual opposite of study engagement (Schaufeli et al., 2002). Already in the 80's and 90's of the previous century researchers found that burnout exists within student populations (Balogun et al., 1996; Gold & Michael, 1985). Student burnout pertains to the inability to invest energy in one's study (exhaustion, cognitive and emotional impairment), as well as an unwillingness to invest energy (adopting a cynical and detached attitude toward one's studies; Desart et al., 2017; Schaufeli et al., 2020).

Individuals with high levels of personal resources, such as optimism and self-efficacy, seem better able to motivate themselves and perceive reality more lightly as compared to individuals with low levels of personal resources. According to Mäkikangas and colleagues (2013), individuals with high personal resources expect things to go well, accept setbacks as normal and, in general, see life as something that can be influenced and acted upon. It can be expected that such a perspective on life is motivating and energizes employees. Indeed, meta-analyses (Christian et al., 2011; Halbesleben, 2010) and review findings (Mäkikangas et al., 2013) support this expectation and show that optimism, self-efficacy, conscientiousness, positive affect, and proactive personality all relate positively to engagement. We expect a similar relationship between personal resources and study engagement among student.

**Hypothesis 3:** Personal resources at T1 (i.e., optimism, self-efficacy, and resilience) are positively associated with study engagement at T2 via the perception of study resources at T2 (controlled for study engagement at T1).

In contrast, individuals with high levels of personal demands seem less able to manage their energy investment and they perceive reality in a less benign or more threatening way. According to a study of Schaufeli and Enzmann (1998), anxious, externally oriented individuals (i.e., attributing events and achievements to powerful others or to chance), individuals with "type A behavior" (i.e., individuals who display high levels of concentration and alertness, achievement striving, competitiveness, time urgency,

and aggressiveness) and “the feeling type” (i.e., known for their empathy and attentiveness towards others’ well-being and concerns) are more likely to develop burnout. However, the authors emphasize that these results should not be interpreted in the sense that personal characteristics would cause burnout. Instead, Schaufeli and Enzmann (1998) reason, in line with TMS (Folkman, 1997, 2008; Lazarus & Folkman, 1984), that these personal characteristics associate with burnout because they determine what type of situations individuals search for and how they experience these situations. Indeed, earlier studies among employees have found support for this mechanism (Guglielmi *et al.*, 2012; Schaufeli *et al.*, 2009; Taris *et al.*, 2005). For instance, findings of Guglielmi *et al.* (2012) have shown that a compulsive and obsessive working style affects well-being via the perceived level of job demands. Based on this argumentation and supporting empirical findings, we expect that students’ personal demands predict levels of burnout through students’ perceived level of study demands.

**Hypothesis 4:** Personal demands at T1 (i.e., irrational performance demands, awfulizing, and irrational need for control) are positively associated with burnout at T2 via the perception of study demands at T2 (controlled for burnout at T1).

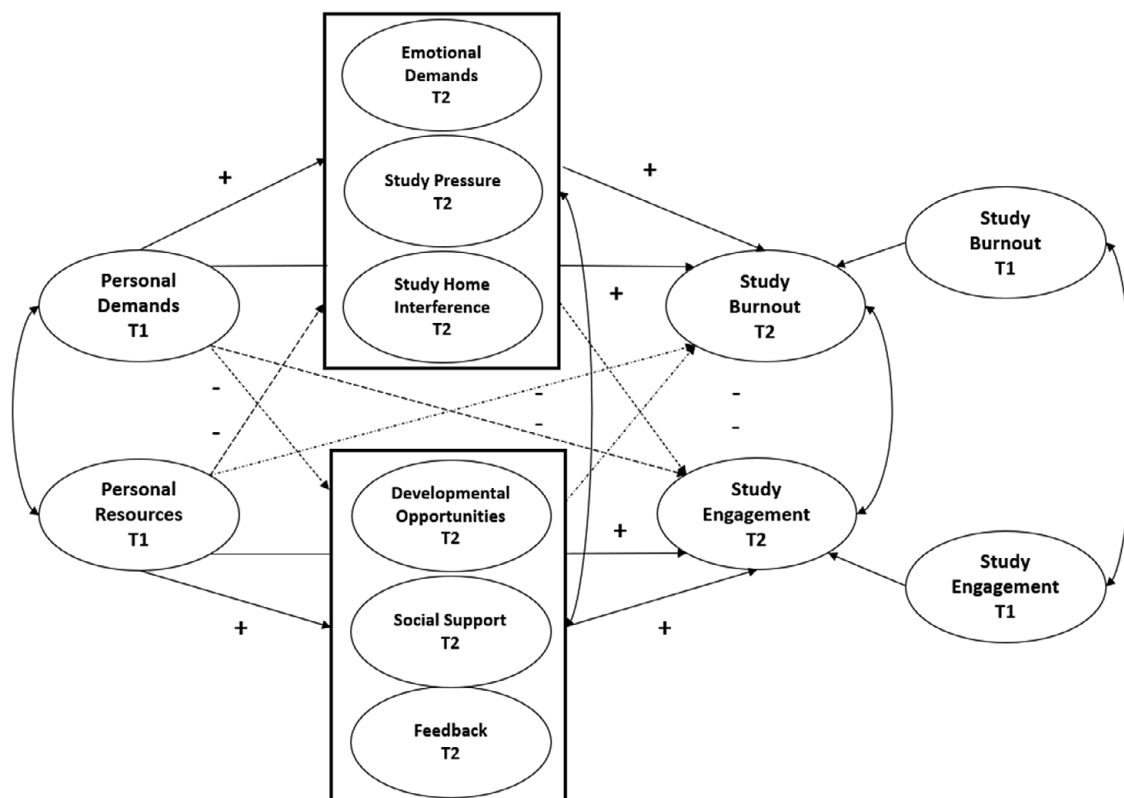
So far, building upon theoretical argumentation as well as on previous research (Guglielmi *et al.*, 2012; Schaufeli *et al.*, 2009; Taris *et al.*, 2005; Zeijen *et al.*, 2021), we have argued that personal demands can be a valuable addition to the JD-R Theory, particularly to the health impairment process. However, just as personal resources appear to play a role in both the health-impairment and motivational process, personal demands may relate to both

processes as well. Therefore, we also explore the cross-relationships between personal resources with students’ perceived level of study demands and students’ burnout, as well as the cross-relationships between personal demands and the perceived level of study resources and students’ engagement. Furthermore, since previous research (Bakker & Demerouti, 2017; Xanthopoulou *et al.*, 2009) contested personal resources as moderators and mediators between situational aspects and organizational outcomes, we will compare our hypothesized model with a reversed causation model, in which the study characteristics are placed as predictors at T1 and personal demands and resources as mediating (or outcome) variables at T2. Finally, we will examine the predictive value of personal demands, over and above the predictive value of personal resources by entering the personal resources and demands in subsequent steps to the models. For a visual overview of our model including all hypothesized and modelled relationships see Figure 1.

## Method

### Participants

Data were collected during the months May and June in 2016, 2017, 2018, 2019 and 2020, among master students at a University in the Netherlands. During the first two years, the study was conducted only at the faculty of veterinary medicine. From 2018 onwards, three more faculties expressed interest to join the study and enrolled (i.e., faculty of law, faculty of medicine and faculty of humanities). In total 1,227 master students from four different faculties participated at least once in the study (i.e., students that have filled in T1). To examine how students’ personal demands



**Figure 1.** The Hypothesized Research Model.



and resources predict study experiences over time, we distributed the survey again exactly one year later. This aligns with the annual commencement of new student cohorts, making a one-year interval the most straightforward option. In the present study we only included students who participated twice and fully completed the questionnaires ( $N = 220$ , 18%). Overall, students filled in the questionnaires one year apart. From students who participated more than twice ( $N = 59$ , 5%), we only used the first two subsequent datapoints (T1 and T2).

Our final sample consisted of 177 students from three veterinary medicine master programs, 7 students from ten law master programs, 24 students from ten biomedical sciences master programs, and 12 students from five humanities master programs ( $N = 220$ ). The male-to-female ratio was 15% to 85%. This ratio was representative of the gender distribution in veterinary medicine, where it was 18% males to 82% females. However, despite an overall higher enrollment of women within these master programs, humanities (30% males to 70% females); biomedical sciences (39% males to 61% females); and law (30% males to 70% females); there was still a slightly higher participation of women in our study. The average age was  $M = 23.71$  ( $SD = 2.68$ ).

### Ethical Approval and Procedure

Ethical approval for this longitudinal study was obtained from the Ethical Review Board of the Dutch association for Medical Education (i.e., Nederlandse Vereniging voor Medisch Onderwijs [NVMO]; reference number 924, 877, 653 and 2020.3.8). Semi-structured group interviews prior to developing the survey were conducted in order to select relevant personal and study characteristics. We held two focus group interviews with 12 veterinary medicine master students and one group interview with six biomedical sciences students, four law students and five humanity students. We analyzed the results using directed content analysis (Hsieh & Shannon, 2005). The results showed that a tendency to awfulize, having irrational performance demands and holding irrational needs for control were among the most important personal demands, whereas optimism, self-efficacy and resilience appeared to be important personal resources mentioned by students. In addition, the results of the group interviews suggested that study pressure, study-home interference and emotional demands were among the most important study demands for students, whereas feedback, social support from peers and teachers, and opportunities to develop themselves were among the most important study resources. Although, we captured and prioritized the study variables that were most prominently mentioned by students, we also noted references to less conventional study resources (e.g., community-based learning or courses having a low-threshold for participation), study demands (e.g., culture of silence, health-related concerns, and the need to be always proactive) and personal aspects serving as either a personal resource or personal demand (e.g., unique coping mechanisms, willingness to communicate limits, and experiencing social pressure as well as feeling shy).

Participants were invited for our survey via their student or other registered email. We sent the questionnaire five consecutive years to all students enrolled in one of the aforementioned master programs. All participants were informed that participation was voluntary and anonymous and that they could quit at any moment. In order to be able to link the subsequent data of students anonymously, we created a unique, anonymous code per student.

### Measurements

The questionnaire was made available in both English and Dutch. Items were slightly adapted to adjust the scales to the specific study setting.

#### Personal Demands

For personal demands, we included three indicators that students reported as relevant to their well-being. To capture these personal demands, we used items from the Work-related Irrational Beliefs Questionnaire (WIB-Q; van Wijhe et al., 2013). Five items captured each personal demand. Irrational performance demands refer to extremely high performance standards that students have about their performance and goals. An example item is "I must do my study-activities flawlessly" ( $T1 \alpha = .85$ ). Awfulizing captures the irrational beliefs students have about failure and its consequences, such as "It is terrible when I do not finish my study-activities on time" ( $T1 \alpha = .84$ ). Finally, irrational need for control captures the irrational beliefs that students have about their need for control. An example item is "I can only cope with study situations when they are predictable" ( $T1 \alpha = .80$ ). Items were rated on a scale ranging from 1 (*completely disagree*) to 5 (*completely agree*).

#### Personal Resources

For personal resources, we included three typical indicators that students reported as relevant (see procedure above) and that are often being used to represent this concept (Bakker & Demerouti, 2017; Xanthopoulou, 2007, 2009; Vogt et al., 2016), namely optimism, self-efficacy and resilience. We measured these personal resources using items from three subscales of the Psychological Capital Questionnaire (Luthans et al., 2007). Considerable research has captured the psychological resources of resilience, self-efficacy, and optimism among academic students using the Psychological Capital Questionnaire (e.g., Luthans et al. 2007, 2012). Optimism was measured with six items and refers to the extent that students have positive expectations of outcomes or events. An example item is "When I experience times of uncertainty in my studies, I always expect the best" ( $T1 \alpha = .73$ ). Self-efficacy was measured with five items and captures students' confidence to take on and put in the necessary effort to succeed at challenging tasks. An example item is "Usually when I'm confronted with a difficult study-situation, I am able to work it out" ( $T1 \alpha = .83$ ). Finally, resilience was measured with six items and refers to students' ability to recover from and bounce back when confronted with problems and adversity, such as "I can get through difficult moments in my studies, because I've experienced difficulty before" ( $T1 \alpha = .76$ ). As resilience was not yet included in the questionnaire in 2016, datapoints for the resilience subscale were  $N = 147$  at T1. All items were measured with an answering scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

#### Study Demands

We operationalized study demands to be consisting of emotional demands, study pressure and study-home interference. Emotional demands were captured with four adapted items from the VBBA (QEEW; van Veldhoven & Meijman, 1994) and represent the degree of emotional strain that students experience from their study. An example item for emotional demands is "Is your study emotionally hard?" ( $T2 \alpha = .87$ ). Study pressure was measured with five items and captures the amount of work and study pressure that students experience. An example item is "Do you have to work

under high time pressure?" ( $T2 \alpha = .82$ ). Study-home interference was measured with four items adapted from the SWING questionnaire (Geurts et al., 2005) and concerns the extent to which the respondent experiences effects from study in their personal life. An example item is: "You find it difficult to fulfil your domestic obligations because you are constantly thinking about your studies" ( $T2 \alpha = .84$ ). This scale has also been found reliable in previous research in a student sample (Hornung et al., 2019). Emotional demands were measured with an answering scale ranging from 1 (*never*) to 4 (*always*), whereas study pressure and study-home interference were both measured using an answering scale ranging from 1 (*never*) to 5 (*always*).

#### Study Resources

We included three study resources: Feedback, developmental opportunities, and social support. Feedback and developmental opportunities were measured with slightly adapted items from the VBBA (QEEW; van Veldhoven & Meijman, 1994). Feedback was measured with three items and refers to the information students receive about their performance. An example item is "Does your study offer to you sufficient opportunities to find out how well you do your work?" ( $T2 \alpha = .69$ ). Developmental opportunities were captured with three items and entail the extent to which students can develop themselves sufficiently. An example item is "My study offers me opportunities for continuing learning" ( $T2 \alpha = .84$ ). Finally, social support was measured with eight adapted items from Peeters et al. (1995; recently measured in a student sample in Baria & Gomez, 2022). It refers to the advice and help that students receive from their peers and teachers. An example item is "If necessary, my fellow students help me with a given task" ( $T2 \alpha = .85$ ). All study resource items were rated on a scale ranging from 1 (*never*) to 5 (*always*).

#### Burnout

We captured student burnout with the student version of the Burnout Assessment Tool consisting of 13 items (BAT; Desart et al., 2017; Schaufeli et al., 2020). This scale has also been used in previous research among undergraduate and graduate students (Fiorilli et al., 2022). The BAT distinguishes four sub-dimensions. First of all exhaustion, which we measured with four items. Exhaustion refers to feeling extremely tired, worn-out and depleted. An example item is "I want to be active in my studies, but somehow I am unable to manage" ( $T1 \alpha = .84$ ,  $T2 \alpha = .80$ ). Secondly, mental distancing reflects the increased resistance and aversion to work, lack of interest and disengagement measured with three items. An example item is "I'm cynical about what my studies mean to others" ( $T1 \alpha = .81$ ,  $T2 \alpha = .88$ ). Moreover, impaired emotional control was captured with three items and refers to the reduced functional capacity to adequately regulate one's emotional processes such as anger or sadness. An example item is "I get upset or sad without knowing why" ( $T1 \alpha = .87$ ,  $T2 \alpha = .84$ ) and finally impaired cognitive control was captured with three items and refers to the reduced functional capacity to adequately regulate one's cognitive processes, such as memory or attention. An example item is "When I'm studying, I struggle to think clearly" ( $T1 \alpha = .88$ ,  $T2 \alpha = .85$ ). Items were rated on a scale ranging from 1 (*never*) to 5 (*always*). We replaced one item from the exhaustion subscale ("At work, I feel physically exhausted") with another item from the elaborate 23 item BAT instrument ("When I exert myself in my studies, I get tired quicker than normal", Schaufeli et al., 2020) to better reflect a student situation. Finally, since the BAT questionnaire was not yet available in 2016 and 2017 the datapoints for burnout at T1 were  $N = 103$  and at T2,  $N = 146$ .

#### Study Engagement

To measure study engagement, we used the student version of the Utrecht Work Engagement scale (Schaufeli et al., 2006), which has been validated in abundant research across multiple countries among students (e.g., Carmona-Halty et al., 2019). The concept of study engagement consists of three indicators that were all captured with three items. Vigor represents high levels of energy, mental resilience while studying and the willingness to invest effort in one's work, and persistence even in the face of difficulties. An example item is "At my study, I feel strong and vigorous" ( $T1 \alpha = .83$ ,  $T2 \alpha = .85$ ). Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge ( $T1 \alpha = .85$ ,  $T2 \alpha = .78$ ). An example item for dedication is "My studies inspire me". Finally, absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work, an example item is "When I am studying, I forget everything else around me" ( $T1 \alpha = .80$ ,  $T2 \alpha = .76$ ). All items are scored on a scale ranging from 0 (*never*) to 6 (*always*).

#### Statistical Analyses

In order to test our hypotheses, we tested six different longitudinal models in Mplus 8.9 (Muthén & Muthén, 1998–2015). Mplus makes use of the full information maximum likelihood (FIML) estimation, which is recommended for social and behavioral science (Muthén & Muthén, 1998–2015; Raykov, 2005) and which allows researchers to use all available information, including partial data, to estimate the parameters of their statistical models. In our first model, we included all study context variables and only modelled the direct associations between study resources and study demands at T2, with burnout, and study engagement at T2 (M0; null model). Since our aim is to examine to what extent personal demands and personal resources contribute to predicting health impairment and motivation, we tested whether including the associations of personal resources and personal demands at T1 with study demands, study resources, burnout and study engagement at T2 would improve the fit of the model. We added the direct and indirect associations between personal resources at T1 with study resources, study demands, burnout and study engagement at T2 in Model 1 (M1; personal resources model). We added the direct and indirect associations between personal demands at T1 with study resources, study demands, burnout and study engagement at T2 in Model 2 (M2; personal demands model). Furthermore, as we wanted to explore whether including both the associations of personal demands and personal resources with study demands, study resources, burnout and study engagement at T2 in one model would further improve the fit of the model, we combined the effects of Model 1 and Model 2 in Model 3 (M3; personal resources and personal demands model, involving cross-relationships). Finally, to test whether our hypothesized model provides a better fit to the data as compared to alternative models, we tested two alternative models. In Model 4 (M4; Alternative Model I) burnout and study engagement at T2 were modeled as mediating variables between personal demands and personal resources at T1 and study demands and study resources at T2. In Model 5 (M5; Alternative Model II) personal demands and personal resources at T2 were modeled as mediating variables between study demands and study resources at T1 and burnout and study engagement at T2.

Before conducting structural analyses, we assessed the correlations among the study demands/resources (T1 and T2) and

personal demands/resources (T1) using SPSS to determine whether these variables were better represented as separate or latent variables. Findings revealed that study resources correlated between .41 and .45 (with one exception of .57 between support and feedback at T2), personal resources correlated between .65 and .68, study demands correlated between .23 and .43, and personal demands correlated between .51 and .59 (with one exception of .39 between irrational need for performance and irrational need for control). Given these results, we concluded that personal demands and personal resources indicators exhibited high correlations (mostly > .50), while study demands and study resources indicators showed more modest correlations (mostly < .50). In line with this pattern, we opted to model study demands and study resources as manifest factors and personal demands and personal resources as two latent factors. Additionally, burnout and study engagement were incorporated as latent factors. This grouping decision was based on the observed correlation patterns, aiming to capture the distinct relationships within each set of variables.

In all tested longitudinal models, autoregressions between burnout and study engagement T1 and T2 were included. Moreover, we correlated between indicators of study demands and study resources (manifest factors), between personal demands and personal resources (latent factors) and between study engagement and burnout (latent factors). Furthermore, we correlated between the indicators of study engagement and burnout (latent factors) and let the residual variance between T1 and T2 correlate for study engagement and burnout.

Model fit was evaluated using goodness-of-fit indices and rules of thumb for their cut-offs. We used the Chi-square ( $\chi^2$ ) test, the root mean square error of approximation (RMSEA), the SRMR (standardized root mean square residual) and the comparative fit index (CFI). For RMSEA and SRMR, values below .08 are indicative of a satisfactory fit (Browne & Cudeck, 1993). For CFI, values greater than .90 indicate a good fit (Byrne, 2010). Finally, we calculated the total and indirect effects in the mediation model (Model 3).

## Results

The descriptive statistics and correlation matrix between the study variables are shown in Table 1. As expected, personal demands and personal resources were negatively associated ( $r = -.48, p < .01$ ). The correlations between personal demands, study demands and burnout were all positive, except for the correlation between the study demand study pressure and burnout. Personal demands also correlated negatively with study engagement at T1 and positively with burnout (both at T1 and T2). Correlations between personal resources, study resources and study engagement were all in the expected direction as well. Personal resources correlated significantly with lower levels of study-home interference and emotional demands, and with lower levels of burnout (both at T1 and T2).

### Measurement Model

Confirmatory factor analyses were conducted to examine the validity of our measurement model. Although the correlations already indicated that the indicators for the personal aspects were better clustered as latent variables, we first tested and found that the model including the two latent factors for personal demands and personal resources indeed fitted better to the data,  $\chi^2(8) = 61.733, CFI = .90, RMSEA = .18, SRMR = .07$ , compared to a model that included the six indicators for personal aspects separately,  $\chi^2(15) = 525.183, CFI = .00, RMSEA = .39, SRMR = .36; \Delta\chi^2(7) = 463.45, p < .001$ . Moreover, the proposed model comprising six latent variables (i.e., personal demands, personal resources, burnout at T1 and T2, and study engagement at T1 and T2) showed a better fit to the data,  $\chi^2(148) = 415.154, CFI = .89, RMSEA = .09, SRMR = .09$ , compared with models that comprised five latent factors or less, such as the model in which burnout and study engagement were merged,  $\chi^2(157) = 543.885, CFI = .84, RMSEA = .11, SRMR = .13; \Delta\chi^2(9) = 128.731, p < .001$ , or the model in which personal resources

**Table 1.** Descriptive Statistics and Correlations for the Study Variables at T1 and T2

	<i>M (SD)</i>	<i>N</i>	1	2	3	4	5	6	7	8	9	10	11
1. Personal Demands T1	3.03 (0.63)	220	–										
2. Personal Resources T1	4.32 (0.61)	220	-.48**	–									
Study Demands T2													
3. Study-Home Interference	2.81 (0.81)	220	.29**	-.27**	–								
4. Study Pressure	2.96 (0.59)	220	.22**	-.01	.43**	–							
5. Emotional Demands	2.10 (0.56)	220	.29**	-.27**	.41**	.24**	–						
Study Resources T2													
6. Feedback	3.07 (0.72)	220	-.13*	.24**	-.07	.17*	-.00	–					
7. Social Support	3.14 (0.67)	220	-.14*	.30**	-.16*	-.00	-.16*	.57**	–				
8. Developmental Opportunities	3.64 (0.75)	220	-.09	.22**	-.35**	.00	-.12	.45**	.45**	–			
Ill- and Well-being													
9. Burnout T1	2.60 (0.67)	102	.45**	-.66**	.35**	.06	.21*	-.22**	-.34**	-.26**	–		
10. Burnout T2	2.54 (0.68)	146	.33**	-.51**	.56**	.11	.35**	-.31**	-.37**	-.52**	.66**	–	
11. Study Engagement T1	5.43 (0.94)	220	-.18**	.55**	-.20**	.03	-.11**	.29**	.34**	.33**	-.49**	-.53**	–
12. Study Engagement T2	5.38 (0.93)	220	-.11	.37**	-.20**	.00	-.08	.37**	.40**	.46**	-.25**	-.62**	.65**

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Table 2.** Model Fit Parameters (N =220)

Model	$\chi^2$	df	CFI	AIC	RMSEA	SRMR	Comparisons	$\Delta\chi^2$	$\Delta df$
M0 Null model	691.307	254	.83	9514.871	.088	.184	–	–	–
M1 PR Model	571.051	252	.89	9398.615	.076	.087	M1–M0	120.256***	2
M2 PD Model	579.860	252	.88	9407.423	.077	.100	M2–M0	111.447***	2
M3 PD & PR Model	549.840	244	.89	9393.403	.075	.085	M3–M1 M3–M2	21.211** 30.02***	8 8
M4 Alternative Model I	553.646	256	.90	9373.210	.073	.082	M4–M3	3.806	12
M5 Alternative Model II	580.835	246	.87	9581.944	.079	.098	M5–M3	30.995***	2

Note. See the explanation in the statistical analyses for a description of how the models are built.  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

and personal demands were merged,  $\chi^2(153) = 478.774$ , CFI = .86, RMSEA = .10, SRMR = .09;  $\Delta\chi^2(5) = 63.45$ ,  $p < .001$ . In addition, all factor loadings in the hypothesized six-factor model exceeded the conventional minimum of .40, and varied between .60 and .89.

### Model Fit Longitudinal Models

First, we examined the fit indices and chi-square difference tests of the six structural models. As can be seen in Table 2, both the personal resources model (Model 1 vs. 0;  $\Delta\chi^2 = 120.256$ ,  $df = 2$ ,  $p < .001$ ) and the personal demands model (Model 2 vs. 0;  $\Delta\chi^2 = 111.447$ ,  $df = 2$ ,  $p < .001$ ) fitted the data better as compared with the null model (M0). Therefore, we conclude that adding the relationships between personal demands and personal resources with the study variables improved the fit of the model significantly. Moreover, Table 2 shows that combining the personal resources model (M1) with the personal demands model (M2) in Model 3 (the personal demands and personal resources model) further improved the fit of the model (compared with M1  $\Delta\chi^2 = 21.211$ ,  $df = 8$ ,  $p < .01$ ; compared with M2  $\Delta\chi^2 = 30.02$ ,  $df = 8$ ,  $p < .001$ ). Of all six models, our hypothesized model (M3) fitted the data acceptably (Model 3;  $\chi^2 = 549.840$ ,  $df = 244$ , CFI = .89, RMSEA = .075; SRMR = .085). In comparison to the alternative models, Model 3 fitted equally well as the first alternative model (Model 4;  $\Delta\chi^2 = 3.806$ ,  $df = 12$ ,  $p = .987$ ), and better than the second alternative model (Model 5;  $\Delta\chi^2 = 30.995$ ,  $df = 2$ ,  $p < .001$ ). Taken together, the fit measures indicate that the personal resources and personal demands model (M3) provided a reasonably good fit with the data and equally or better than the alternative models. We therefore continue testing our hypotheses with the results of M3<sup>1</sup>.

### Direct Effects

Hypothesis 1 posited that personal resources at T1 would be positively associated with the perception of study resources at T2. According to the results presented in Figure 2 there is a positive and significant association between personal resources at T1 and all

<sup>1</sup>The autoregression between study engagement at T1 and T2 was not significant in the final study model (M3), whereas the raw correlations in Table 1 reveal that the correlation between work engagement at T1 and T2 was .65. A possible explanation for this may be that the personal resources and perceived study resources explain the variance of study engagement. Another explanation may be that because burnout can be considered as the conceptual opposite of engagement (González-Romá et al., 2006), the concept of burnout at T1 explained for this variance.

three study resources at T2 (feedback  $\beta = .33$ ,  $p = .001$ ; social support  $\beta = .42$ ,  $p < .001$ ; developmental opportunities  $\beta = .34$ ,  $p = .001$ ). These findings indicate that, in line with Hypothesis 1, students with high levels of personal resources perceive more study resources during the next academic year.

Hypothesis 2 stated that personal demands at T1 associate positively with the perception of study demands at T2. As can be seen in Figure 2, there indeed is a positive and significant relationship between personal demands at T1 and all of the study demands at T2 (study-home interference  $\beta = .25$ ,  $p = .014$ ; study pressure  $\beta = .37$ ,  $p < .001$ ; emotional demands  $\beta = .26$ ,  $p = .011$ ). Results thus show that students who report higher levels of personal demands at T1 are more likely to perceive high study demands in the next academic year. Hypothesis 2 was supported.

The results presented in Figure 2 also show that the personal demands at T1 do not significantly associate with any of the perceived study resources at T2 (feedback  $\beta = .006$ ,  $p = .572$ ; social support  $\beta = .09$ ,  $p = .382$ ; developmental opportunities  $\beta = .11$ ,  $p = .315$ ). Nor were personal resources at T1 associated with any of the study demands at T2 (study pressure  $\beta = .20$ ,  $p = .052$ ; study-home-interference  $\beta = -.17$ ,  $p = .082$ ; emotional demands  $\beta = -.14$ ,  $p = .163$ ).

### Indirect Effects

Hypothesis 3 posited that personal resources at T1 would be positively associated with study engagement at T2 via the perception of high study resources at T2. According to the results, there is a positive and significant indirect relationship between personal resources at T1 and study engagement at T2 through the perception of developmental opportunities in one's study ( $\beta = .08$ ,  $p = .014$ ), controlled for study engagement T1. No indirect relationships were found via the perceived level of feedback or social support. Hence, the data partly support Hypothesis 3.

According to Hypothesis 4 there would be a positive association between personal demands at T1 and burnout at T2 via the perception of study demands at T2. The results show that there is only one study demand (study-home interference) that mediates the relationship between personal demands at T1 and burnout at T2 ( $\beta = .08$ ,  $p = .029$ ), controlled for burnout at T1. No indirect effects were detected via study pressure nor via emotional demands. As such, the results partly support Hypothesis 4.

In addition, although not hypothesized, findings revealed that the study resource developmental opportunities at T2 significantly mediated the relationship between personal resources at T1 and burnout at T2 ( $\beta = -.09$ ,  $p = .009$ ). This means that students with high levels of personal resources perceive more developmental



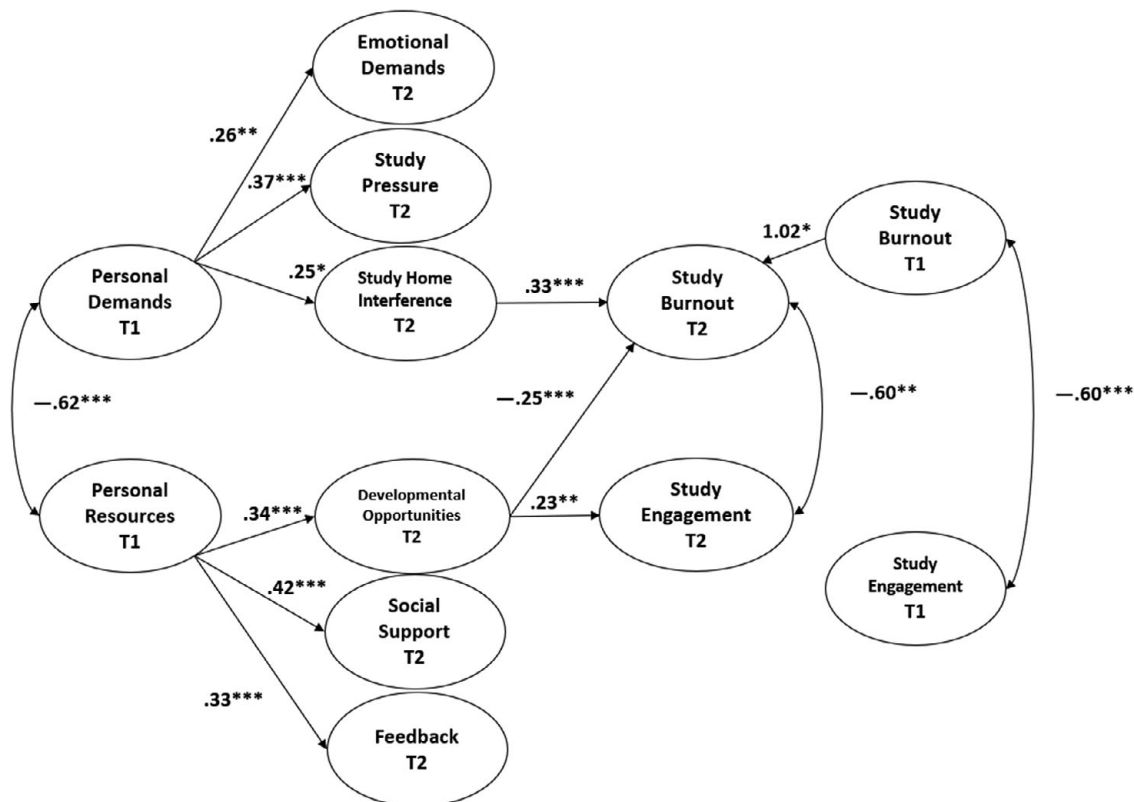


Figure 2. The Model Presenting the Standardized Regression Coefficients for the Significant Relationships between the Study Variables (N = 220).

opportunities, which, in turn protects them from burnout symptoms in the next academic school year.

**The Added Value of Personal Demands**

We investigated to what extent the latent variable personal demands contributed to the explained variance of our research model. As described above and shown in Table 2, Model 3, which includes both the relationships from personal demands and personal resources, fitted the data significantly better than Model 1 including only the relationships from personal resources ( $\Delta\chi^2 = 21.211, df = 8, p = .007$ ). Hence, we conclude that adding personal demands significantly improves the model fit.

When we investigate the explained variance of the intercepts of both the mediating and dependent variables (see Table 3), it can be seen that for the mediating variables (study resources and study demands) most variance is explained (i.e., residual variance is

lowest) in Model 3, which includes the relationships from both personal demands and personal resources. For the dependent variables (study engagement and burnout) most variance was explained in Model 2, which includes only the relationships from personal demands. Taken together, the model fit and explained variance are significantly enhanced when personal demands are added to the model.

**Discussion**

In the present study we examined the role of personal demands and personal resources in long-term health impairment and motivational processes among master students. By combining insights from the JD-R theory (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018) and transactional model of stress (Folkman, 1997, 2008; Lazarus & Folkman, 1984), we theorized that students’ personal demands and

Table 3. Residual Variance Components for the Personal Demands and Personal Resources Models (M1–3, N = 220).

Mediators and Dependent Variables	Study-Home Interference		Study Pressure		Emotional Demands		Feedback		Social Support		Developmental Opportunities		Burnout		Study Engagement	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Intercept variance ( $\tau_{00}$ ) M1	.88***	.04	.99***	.01	.90***	.04	.92***	.04	.88***	.05	.93***	.04	.33*	.15	.58***	.16
Intercept variance ( $\tau_{00}$ ) M2	.86***	.05	.96***	.03	.86***	.05	.96***	.03	.94***	.04	.97***	.03	.26**	.05	.51***	.05
Intercept variance ( $\tau_{00}$ ) M3	.86***	.05	.91***	.05	.87***	.05	.91***	.04	.87***	.05	.92***	.04	.35	.19	.72	.40

Note. Residual variance is reported for the final model (M3) and compared with a similar model in which the relationships from personal demands were excluded (M1) and with a model in which the relationships from personal resources were excluded (M2).

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . Only the indirect relationships that were significant at  $p < .05$  are presented in the table.

personal resources influence the perception of the study situation. Specifically, we expected a positive relationship between students' personal demands and the perceived level of study demands, and between personal resources and the perceived level of study resources, one year later. In turn, we hypothesized that students' personal demands and personal resources would associate positively with students' levels of burnout and study engagement, one year later, via the perceived level of study demands and resources. To test these predictions, multiple surveys were conducted between 2016 and 2020 among master students at a Dutch University ( $N = 220$  at T1 and T2).

Compared to alternative models, the model that included the hypothesized indirect relationships from both personal resources and personal demands (Model 3) received the strongest empirical support (together with Model 4, in which burnout and engagement were the mediators between personal demands and resources at T1 and the perceived study demands and resources at T2). Results from Model 3 showed that, as predicted, students with higher levels of personal demands (i.e., irrational performance demands, awfulizing, and irrational need for control) are more likely to perceive study-home interference one year later, which relates to higher levels of burnout complaints. In addition, students with higher levels of personal resources (i.e., optimism, self-efficacy, and resilience as personal resources) are more likely to perceive developmental opportunities one year later, which relates positively to higher levels of engagement. In addition, we found evidence for one cross-relationship, indicating that opportunities for development mediated the association between personal resources and burnout. Finally, we investigated and found that the latent variable personal demands contributed meaningfully to the research model as the fit and explained variance of the model significantly enhanced when personal demands were added to the model. In what follows, we discuss the theoretical contributions and implications offered by these findings.

The first theoretical contribution of this study regards the added value of personal demands in explaining variance in well-being over and above personal resources in the JD-R theory. In fact, the model with only personal demands (and not personal resources) even appeared to explain the highest proportion of variance of burnout and study engagement. Hence, our study adds to insights on the motivating and health impairment associations between personal resources on the one hand and engagement and burnout on the other hand among students (e.g., Garrosa et al., 2011; Kotzé, 2018). Furthermore, our findings validate previous indications that personal demands may indeed fit into the JD-R framework as instigating factors of the health-impairment process (Barbier et al., 2013; Zeijen et al., 2021). Based on these previous and present findings, personal demands can be regarded as dysfunctional characteristics of the self that increase the risk on burnout among students. On a more general level, the current study shows that personal demands can add predictive value to student stress models explaining ill- and well-being (e.g., Lesener et al., 2020; Houghton et al., 2012).

Second, the present findings shed light on the mechanisms that underly the association between personal demands and student burnout. By combining insights from the transactional model of stress (Lazarus & Folkman, 1984) with insights from the JD-R theory (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018), we provide further insight in how personal demands (and personal resources) serve as lenses through which students perceive their study environment. So far, most empirical studies (Xanthopoulou et al., 2007, 2009) as well as theoretical overviews (Bakker et al., 2023; Bakker & Demerouti, 2017, 2018) predominantly considered

personal resources as outcomes of situational resources, whereby the job resources act as instigators providing individuals with a positive feeling about themselves and/or the environment (Xanthopoulou et al., 2007). Subsequent studies also provided evidence for reciprocal relationships between job resources, personal resources and work engagement, suggesting gain cycles between these concepts (Llorens et al., 2007; Xanthopoulou et al., 2009). The current research adds to these insights that maladaptive personal beliefs about the self and the environment relate to the perception of study demands. Although we did not obtain evidence for reciprocal relations between personal demands and study demands, it seems important to uncover this issue further by using experimental or more elaborate longitudinal designs.

Third, we contribute to the stress-management literature by demonstrating the long-term association between personal demands and students' ill- and well-being. Students who hold unrealistically high standards for their own performance, awfulize their mistakes, and have an extreme need to control their environment appeared to be more likely to perceive their study environment as highly demanding one year later. These students tend to perceive a higher workload and more emotional demands in their studies, and regard their study as harder to combine with their private life. Self-reported personal demands also go hand in hand with a higher risk of developing burnout one year later. Hence, whereas our expectations were partly built upon previous findings from cross-sectional studies (Barbier et al., 2013; Guglielmi et al., 2012; Zeijen et al., 2021), the present study adds to this body of knowledges by demonstrating that personal demands also predict long-term health impairment among students. This is in line with previous research showing that medical students affected by burnout during their studies are more prone to experience feelings of burnout after finishing their studies and are more likely to report mental disorders and suicidal ideation (Ishak et al., 2013). Moreover, the present findings are in line with the idea that the source of burnout and engagement can come as much from within individuals as from their environment (Swider & Zimmerman, 2010). Whereas job demands and job resources are often described as 'the true' instigators of the JD-R processes (Lesener et al., 2019), the results of the present study underline the importance of personal demands and personal resources as relevant instigators in these processes among students as well (see also Pick & Leiter, 1991).

Fourth, our study points at the relevance of the study demand *study-home interference*, as a mediator in the relationship between personal demands and burnout. This mediation effect could imply that study-home interference, rather than being a direct stressor, serves as a proxy for burnout by capturing a portion of the stress reaction caused by work stressors (Allen et al., 2000; Grzywacz & Marks, 2000). Therefore, personal demands may trigger the perception and experience of various study demands, which accumulate and eventually spill over into the home domain. This spillover into one's private life can be viewed as a tipping point indicating that the level of study demands has become excessively high (Allen et al., 2000; Grzywacz & Marks, 2000). To examine the existence of such a tipping point for study-home interference in relation to student burnout, longitudinal research with multiple time points is required.

Fifth, our results point at the relevance of the study resource *opportunities for development* as a mediator in the association between personal resources and study engagement the following year. The more optimistic and efficacious students are, the more opportunities they view or create for themselves to motivate and engage themselves. Such a resource building process may indicate a

gain spiral, implicating that the resource and well-being gains from students' personal resources could lead to even more personal resource gains in the future (Hobfoll, 2001, see also Hakanen et al., 2011; Xanthopoulou, 2009). Nevertheless, given the limited research on this relationship, in particular among university student populations, researchers advocate for more attention to personal factors as potential indicators of study engagement, (Wang & Degol, 2014). For instance, Wang and Degol argue that it is relevant to consider students' 'grit', a characteristic that refers to working passionately and laboriously to achieve a long-term goal, and persisting in the face of challenges.

The study resource *opportunities for development* also appeared to mediate the association between personal resources and student burnout. As such, our findings are in line with the review findings of Mäkikangas et al. (2013). Mäkikangas and colleagues conducted a review of 28 studies focusing on the association between individual-level variables and work engagement, and they observed that individuals with high self-efficacy, optimism, and emotional stability tend to have a positive interpretation of their environment, expecting favorable outcomes, accepting setbacks as normal, and believing in their ability to influence their lives. The authors suggest that this mindset and approach would not only foster work engagement but may also help to prevent burnout. Hence, high levels of personal resources may also protect students from developing burnout symptoms because they perceive more opportunities that enrich, develop and support their motivation and needs, which can help to prevent exhaustion.

For future research it may be interesting to explore other personal aspects that predict the perception of study demands and relate unfavorably to student well-being. For instance, as earlier studies show that having an external locus of control relates to elevated levels of stress when individuals are confronted with demanding situations (Roberts et al., 1997), it seems plausible that an external locus of control may also act as a personal demand and trigger health impairment among students. Furthermore, the orientation state called 'locomotion' possibly impairs students' well-being as well. Locomotors are known to make rapid movements to regulate behavior and prioritize action over critical evaluation as they strive to reach their goals (Falvo et al., 2013; Kruglanski et al., 2000). Falvo and colleagues (2013) found that workaholics tend to work with a locomotion orientation, are inclined to work in a high pace and have difficulties leaving tasks to others (Porter, 2001). Students with a locomotion orientation may therefore perceive and create more study demands. Finally, it may be interesting to examine the role of self-undermining behavior, which has been defined as "behavior that creates obstacles that may undermine performance" (p. 115; Bakker & Costa, 2014) and which is assumed to play a role in the health impairment process (Bakker & Demerouti, 2018). For future research, it may be relevant to examine the role of these personal demands in the health impairment processes of both master students and employees. Moreover, it would be interesting for future research to investigate whether students with varying levels of personal demands and personal resources use different active coping and passive strategies (e.g., Kowalska & Szwamel, 2022) to deal with stress, or whether different coping strategies are more or less effective for students scoring high on personal resources versus personal demands.

Finally, the increasingly demanding social life of students (Wolfensberger & Pilot, 2014) may be a relevant topic to examine. Researchers may want to consider taking the additional strain that social demands add to levels of burnout among student

populations. As previous reports show (Curran & Hill, 2019; Wolfensberger & Pilot, 2014), students nowadays not only experience pressure to excel within their studies, but also in their private, social life. Hence, it may be interesting to gain understanding of how students' personal demands influence the experience of both study demands and private social demands.

This study has some limitations that need to be addressed. Firstly, sample attrition and sample size are issues of concern. However, it is important to acknowledge that the high attrition is influenced by the fact that many master programs within the other three faculties (i.e., biomedical science, law, and humanities) have varying durations (mostly one or two years), and the study lacks specific information on the program duration of each participant. Consequently, we were unable to test a complex three-wave model (Taris & Kompier, 2006). Ideally, mediation effects are tested longitudinally using three time points to separate the predictor, mediator and dependent variables in time (Cole & Maxwell, 2003). Employing a full cross-lagged panel design to examine pairs of cross-lagged associations was therefore not feasible given the limited number of data points and the complexity of our model (Cole & Maxwell, 2003; Taris & Kompier, 2006). Hence, we simplified the model by including the autocorrelations and controlled for the dependent variables at T1. Still, the current semi-longitudinal design is a large improvement on cross-sectional designs that make up for the majority of studies (Zapf et al., 1996).

Another limitation concerns the model fit of our final model and our measurement model, which was for both models not optimal. As a consequence, the current findings need to be interpreted with caution, and a key recommendation for future research is to replicate the role of personal demands within the health-impairment process among students and employees. Moreover, it is a limitation that students filled in the two surveys in different years (i.e., between 2016 and 2020). We examined whether the specific years that students filled in the survey influenced the results, by controlling for it. The year in which students filled in the survey did not matter to our research findings. However, results did reveal a decline in engagement and a rise in burnout over the years. Finally, although we have conducted interviews to validate our measures, and the JD-R theory has been used as a theoretical framework in several previous research studies using student samples (e.g., Clements & Kamau, 2018; Lesener et al., 2020; Robins et al., 2015; Wilson & Sheetz, 2010; Zeijen et al., 2021), we need to be cautious in generalizing our findings to a work context. To design interventions aimed at maximizing employee motivation and well-being, further research using employee samples is useful. Modelling both personal demands (work-related irrational beliefs, van Wijnhe et al., 2013) and personal resources (PsyCap; Luthans, 2007; Xanthopoulou et al., 2009) in one research model can offer valuable insight in whether optimizing personal resources, reducing personal demands, or a combination of both is most effective.

The present findings have several implications for practice. Our study indicates that personal demands can be regarded as a risk factor for burnout. As such, the concept of personal demands may be integrated in primary, secondary, or tertiary interventions (Nielsen & La Montagne, 2024), to promote the mental health of students, in different stages. We would recommend that universities implement primary forms of prevention by educating all students about the role of personal demands and raising awareness of the importance of consolidating personal resources, for instance by offering training or online tools to strengthen their self-efficacy, resilience and optimism (Bakker & van Wingerden, 2021). As a

secondary form of prevention, study counsellors/advisers should be aware of the role of personal demands and personal resources and address these factors during consultations. They could, for instance, actively challenge dysfunctional beliefs and underlying assumptions by engaging in cognitive restructuring techniques (Ahola et al., 2017; Freeman et al., 2015). Finally, universities can consider incorporating personal demands treatment plans for students with more serious complaints, collaborating with mental health professionals and relevant support services as a tertiary form of prevention. Besides these prevention options that target personal demands, it is important to emphasize that priority should be given to designing master programs and curricula that strike a balance between challenge and resources, ensuring a supportive learning environment for all students.

The present study has provided insight into the relevance of personal demands and resources for students' perceptions of their study environment and their long-term well-being. In addition to the contextual aspects of a study, students' personal demands and personal resources should be considered in both research and interventions to promote student well-being. In this way, researchers and practitioners can contribute to an optimal and healthy learning environment for the future workforce.

**Data sharing.** The dataset generated and/or analyzed during the current study, as well as the Mplus Syntax codes, are available from the corresponding author on reasonable request. This study was not preregistered.

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