

Improving Student Well-Being: Theoretical Extensions
and Practical Application of the Study Demands-
Resources Framework

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Overview of Publications

This dissertation is based on three studies that have already been published or are in press in a peer-reviewed journal. They are referred to in the text as Study 1, Study 2, and Study 3. Author contributions are described on the next page.

Study 1:

Körner, L. S., Rigotti, T., & Rieder, K. (2021). Study crafting and self-undermining in higher education students: A weekly diary study on the antecedents. *International Journal of Environmental Research and Public Health*, 18(13), Article 7090.

<https://doi.org/10.3390/ijerph18137090>

Study 2:

Körner, L. S., Mülder, L. M., Bruno, L., Janneck, M., Dettmers, J., & Rigotti, T. (2023).

Fostering study crafting to increase engagement and reduce exhaustion among higher education students: A randomized controlled trial of the STUDYCoach online intervention. *Applied Psychology: Health and Well-Being*, 15(2), 776-802.

<https://doi.org/10.1111/aphw.12410>

Study 3:

Körner, L. S., Kortsch, T., Rieder, K., & Rigotti, T. (in press). Evaluation of two study demands-resources-based interventions: A randomized controlled trial. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2024.1368267>

Study 1:

Conceptualization: L.S.K., K.R., T.R. Data curation: L.S.K. Formal analysis: L.S.K., T.R.

Investigation: L.S.K., K.R. Methodology: L.S.K., K.R., T.R. Project administration: L.S.K.

Supervision: T.R. Validation: L.S.K., T.R. Visualization: L.S.K. Writing—original draft:

L.S.K. Writing—review & editing: K.R., T.R.

The manuscript has been read and approved by all named authors.

Study 2:

Conceptualization: L.M.M., L.S.K., L.B., J.D. Data curation: L.M.M., L.S.K., L.B. Formal

analysis: L.S.K., L.M.M., L.B., T.R. Investigation: L.B. Methodology: L.S.K., L.M.M., L.B.,

T.R. Project administration: L.S.K., L.M.M. Resources: M.J., J.D. Software: L.S.K., L.M.M.,

L.B. Supervision: T.R. Validation: L.S.K., L.M.M. Visualization: L.S.K. Writing—original

draft: L.S.K. Writing—review & editing: L.M.M., L.B., M.J., J.D., T.R.

The manuscript has been read and approved by all named authors.

Study 3:

Conceptualization: L.S.K., T.K., K.R. Data curation: L.S.K. Formal analysis: L.S.K., T.K.

Investigation: L.S.K. Methodology: L.S.K., T.K., K.R. Project administration: L.S.K., T.K.

Resources: T.K. Supervision: T.R. Visualization: L.S.K. Writing—original draft: L.S.K.

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Summary

The growing research interest in exhaustion and engagement among students (e.g., Gusy, Wörfel, & Lohman, 2016) can be addressed using the recently introduced study demands-resources (SD-R) framework (Lesener, Pleiss, et al., 2020), which was derived from the established job demands-resources (JD-R) model in the work context (Bakker & Demerouti, 2007; Demerouti et al., 2001). The overarching aim of this dissertation is to theoretically and methodologically expand the SD-R framework while simultaneously evaluating its practical applicability in interventions.

Compared to the JD-R model, the SD-R framework remains relatively underexplored, and certain variables of the JD-R model have not yet been investigated in this framework. Therefore, the first research goal of this dissertation is to expand the SD-R framework by integrating three variables of the JD-R model—personal resources (see Xanthopoulou et al., 2007), study crafting (see Tims & Bakker, 2010), and self-undermining (see Bakker & Wang, 2020)—and to examine their role within the SD-R framework.

Based on the research trend of within-person designs, studies confirm that the JD-R model is also valid at the intraindividual level, with variables fluctuating on a daily or weekly basis (Bakker, 2015). Thus, the second research goal of this dissertation is to test the extended SD-R framework at the weekly within-person level by examining the effects of short-term fluctuations in study characteristics on student well-being, study crafting, and self-undermining.

Increasing levels of student exhaustion and decreasing engagement among students (e.g., Grützmacher et al., 2018; Olson et al., 2023; Techniker Krankenkasse, 2023) underscore the need for evidence-based and low-threshold support programs (e.g., Mülder et al., 2022). Based on the practical application of the JD-R model in interventions (see Bakker, Demerouti, & Sanz-Vergel, 2023), the third research goal of this dissertation is to develop a series of SD-

R-based interventions and evaluate their effects on the variables of the SD-R framework both in the short and long term.

Related to this is the fourth research goal, which aims to examine the underlying mechanisms that mediate the effects of the SD-R-based interventions over time, with demands and resources, as well as study crafting as potential mediators. This also contributes to the longitudinal validation of the processes within the SD-R framework (Lesener, Pleiss, et al., 2020).

To achieve these four research goals, three empirical studies were conducted. Study 1 introduced the variables of study crafting and self-undermining into the SD-R framework and examined the extended motivational path and the extended health-impairment path at a weekly within-person level. A total of 205 higher education students provided weekly diary data over a period of four weeks. Results of multilevel structural equation modeling, controlling for autoregressors, demonstrated the validity of the two extended paths at the intraindividual level. Consistent with the hypotheses, a positive relationship was found between study resources and study crafting, mediated by engagement, and between study demands and self-undermining, mediated by exhaustion, at the weekly within-person level.

Study 2 evaluated the effects of a study crafting intervention on study crafting, engagement, and exhaustion. A randomized controlled trial was conducted with an intervention group ($n = 149$) and a waiting-list control group ($n = 60$). Three measurements (pre, post, and 20-week follow-up) were used to examine the sustained effects of the intervention. Further, mediation effects through study crafting were examined. Results of repeated measures analyses of variance indicated that the intervention increased study crafting, the study crafting strategy of decreasing hindering demands, and engagement both post-intervention and at follow-up. Furthermore, a time effect on exhaustion was observed in the intervention group, which was significantly reduced at follow-up. Study crafting mediated the relationship between the intervention and engagement as well as exhaustion.

Study 3 evaluated the effects of two additional SD-R-based interventions on the variables of the framework, one aimed at adjusting demands and the other aimed at enhancing resources. Another randomized controlled trial was conducted with two intervention groups ($n_{IG1} = 64$, $n_{IG2} = 70$) and a waiting-list control group ($n = 71$), together with three measurements (pre, post, and 5-week follow-up). Mediation effects of demands and resources were also examined. Results of repeated measures analyses of variance showed intervention effects on the personal resource of mindfulness, on exhaustion, on the study crafting strategies of increasing structural resources, increasing challenging demands, and decreasing hindering demands, and on self-undermining. Mindfulness mediated the relationship between the intervention and the variables of increasing structural resources, increasing challenging demands, engagement, and self-undermining.

The combined results of the three studies demonstrate that the JD-R model is well transferable to the higher education context. The studies confirm the expandability of the SD-R framework to include personal resources, study crafting, and self-undermining, as well as its validity at the within-person level and longitudinally. They further confirm the practical applicability of the framework in interventions to improve study and personal characteristics, well-being, study crafting, and self-undermining, highlighting the central role of study crafting and mindfulness as mediators of intervention effects. This dissertation thus provides a solid theoretical foundation for a comprehensive examination of exhaustion and engagement among students, including their antecedents and consequences, as well as initial evidence for the effectiveness of SD-R-based interventions that should be used and further developed in future research.

Chapter 1: General Introduction

An increasing number of school graduates in Germany are enrolling in higher education. In the winter semester of 2022/2023, the number of students in higher education reached approximately 2.9 million, marking a substantial increase from the 2.5 million recorded a decade earlier in the winter semester of 2012/2013 (Statistisches Bundesamt [Destatis], 2022). This increase underscores the growing significance of students as a pivotal group within society, destined to assume influential roles as future leaders and decision makers (Dietz et al., 2020).

However, alongside this academic expansion, there is a concerning trend regarding the health and well-being of students. A recent representative survey of German higher education students conducted in 2023 has shown a notable decline in their overall health compared to the previous survey in 2015, particularly with regard to their mental health. More than a third of students reported experiencing high or very high levels of emotional exhaustion, which is the primary symptom of burnout. Furthermore, the prevalence of frequent stress has nearly doubled in recent years, rising from 23% in 2015 to 44% in 2023 (Techniker Krankenkasse, 2023).

Besides research on adverse indicators of student health and well-being, such as stress and exhaustion, there has been a more recent research trend toward positive indicators, such as engagement (e.g., Gusy et al., 2019; Robins et al., 2015; Salmela-Aro & Read, 2017). This shift stems from the growing prominence of positive psychology, which redirects the focus from pathology to human functioning (Seligman & Csikszentimihaly, 2000).

As the interest and relevance of researching exhaustion and engagement among students continues to grow (Lesener, Pleiss, et al., 2020), it is imperative to establish a solid theoretical foundation to examine the interplay between these two concepts, their antecedents, and outcomes (Robins et al., 2015). In addition, it is critical to provide evidence-based support programs for students, given their compromised mental health, which has been

exacerbated by the COVID-19 pandemic (e.g., Keyserlingk et al., 2022; Mülder et al., 2022; Okado et al., 2023; Tsiouris et al., 2023). One such theoretical foundation is the study demands-resources (SD-R) framework (Lesener, Pleiss, et al., 2020), which was derived from the well-established job demands-resources (JD-R) model in the work context (Demerouti et al., 2001). The JD-R model allows for the exploration of both pathogenic and salutogenic effects of job characteristics (i.e., job demands and job resources) on employee well-being (i.e., exhaustion and engagement; Bakker & Demerouti, 2007). Furthermore, the JD-R model has already been successfully applied in interventions aimed at improving employee well-being (Bakker & Demerouti, 2017). However, compared to the JD-R model, research on the SD-R framework is limited in at least four ways.

First, given that the SD-R framework has only recently been introduced into the higher education context, it is significantly less empirically researched than the JD-R model. The two core processes of the JD-R model have been confirmed within the SD-R framework: study demands increase burnout within the health-impairment path, while study resources increase engagement and decrease burnout within the motivational path (e.g., Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Mokgele & Rothmann, 2014). The JD-R model has undergone substantial extensions since its original formulation. Personal resources have been incorporated into the motivational path alongside job resources, and two self-regulation behaviors—job crafting and self-undermining—have been integrated into the model (Bakker & de Vries, 2021; Bakker & Demerouti, 2017; Bakker et al., 2014). Job crafting describes proactive efforts by employees to adapt their own demands and resources (Tims & Bakker, 2010), whereas self-undermining describes maladaptive employee behavior that creates obstacles (Bakker & Costa, 2014; Bakker & de Vries, 2021). However, there is a research gap in the higher education context. Personal resources, study crafting (analogous to job crafting), and self-undermining have not yet been systematically examined within the SD-R framework, despite the theoretical applicability of these concepts to students. Therefore, the first research

goal of this dissertation is to expand the SD-R framework by integrating (a) personal resources, (b) study crafting, and (c) self-undermining.

Second, organizational psychology research on employee well-being within the JD-R model has traditionally conducted cross-sectional studies that explore interindividual differences. However, this approach ignores dynamic fluctuations of well-being within individuals (Ohly et al., 2010). Thus, there has been a shift toward diary designs in research on the JD-R model (Bakker, 2015; Bakker, Demerouti, & Sanz-Vergel, 2023). This intrapersonal research approach improves the understanding of short-term variations in well-being, as well as their antecedents and consequences (Bakker, 2015; Ilies et al., 2015). Diary studies have provided empirical evidence that the JD-R variables fluctuate at both daily (e.g., Breevaart & Bakker, 2018; Gordon et al., 2015; Shin & Hur, 2019) and weekly levels (e.g., Caesens et al., 2016; Geldenhuys et al., 2021; Lopper et al., 2023; Rofcanin et al., 2019). However, another gap in research on the SD-R framework is the lack of diary studies. Previous research has primarily employed cross-sectional between-person designs, which precludes conclusions about short-term within-person variation in SD-R variables. Therefore, the second research goal of this dissertation is to examine dynamic fluctuations and relationships between study resources, engagement, and study crafting within the motivational path, and between study demands, exhaustion, and self-undermining within the health-impairment path at the within-person level.

Third, the practical application of the JD-R model in terms of optimizing job demands, increasing job and personal resources, or promoting job crafting shows potential for enhancing employee well-being (Bakker et al., 2014; Galanakis & Tsitouri, 2022). Consequently, several JD-R-based interventions have been developed and evaluated in recent years. In particular, job crafting interventions have gained prominence (e.g., Devotto & Wechsler, 2019; Mukherjee & Dhar, 2023) because they have yielded positive effects on job and personal resources, employee well-being, and job crafting (e.g., Gordon et al., 2018; van

Wingerden, Bakker, & Derks, 2017a, 2017b). However, there is a research gap with regard to the practical application of the SD-R framework. To the best of my knowledge, no interventions based on this framework have been evaluated to date. Therefore, the third research goal of this dissertation is to develop three different SD-R-based online interventions and evaluate their impact on (a) study demands, study resources, and personal resources; (b) engagement and exhaustion; and (c) study crafting and self-undermining, both in the short and long term.

Fourth, to understand what may cause or amplify intervention effects, it is necessary to investigate the underlying mediating processes (Mukherjee & Dhar, 2023). The current version of the JD-R model confirms reciprocal relationships between job and personal resources, engagement, and job crafting in the motivational path, as well as reciprocal relationships between job demands, exhaustion, and self-undermining in the health-impairment path (Bakker, Demerouti, & Sanz-Vergel, 2023; Lesener et al., 2019; Lichtenthaler & Fischbach, 2019). In addition, there are interrelations between variables in the motivational path and the health-impairment path (Bakker & Demerouti, 2014). Resources and job crafting can impact variables of the health-impairment path (e.g., Bakker et al., 2005; Lichtenthaler & Fischbach, 2019), while demands can influence variables of the motivational path (e.g., Bakker & Demerouti, 2007). Given these relationships among JD-R variables, several underlying mediating processes for JD-R-based intervention effects are conceivable. In their review of job crafting interventions, Mukherjee and Dhar (2023) identified job crafting as a key mediator, but they hypothesize additional mediators such as job characteristics. However, in the absence of SD-R-based interventions, mediating processes have not yet been investigated in this context. In general, another research gap is the lack of longitudinal studies examining the relationship between SD-R variables over time (Gusy et al., 2021; Lesener, Pleiss, et al., 2020). Therefore, the fourth research goal of this dissertation is to investigate the underlying mechanisms that mediate the effects of the SD-R-based

interventions on the SD-R outcomes over time, with a focus on the mediating role of (a) demands and resources and (b) study crafting.

To address these research goals, three empirical studies were conducted within this dissertation. Figure 1 provides an overview of the overall research model. Study 1 utilized a weekly diary approach to investigate an extended SD-R framework at the within-person level. It examined whether the inclusion of the variables study crafting in the motivational path and self-undermining in the health-impairment path is supported by empirical evidence. Weekly engagement was expected to mediate the relationship between weekly study resources and weekly study crafting, whereas weekly exhaustion was expected to mediate the relationship between weekly study demands and weekly self-undermining.

Study 2 developed and evaluated an online study crafting intervention. The study was a randomized controlled trial with an intervention group and a waiting-list control group and a 20-week follow-up. It was hypothesized that the intervention would increase study crafting and engagement and decrease exhaustion both immediately post-intervention and at follow-up. Additionally, it was hypothesized that study crafting would mediate the effects of the intervention on engagement and exhaustion.

Study 3 developed and evaluated two SD-R-based online interventions, one aimed at adjusting demands and the other aimed at increasing resources. The study was a randomized controlled trial with two intervention groups and a waiting-list control group and a 5-week follow-up. It was hypothesized that both intervention groups would show increases in study resources, personal resources, engagement, and study crafting, as well as decreases in study demands, exhaustion, and self-undermining. These effects were expected to be observed post-intervention and at follow-up. Furthermore, demands and resources were expected to mediate the relationship between the interventions and engagement, exhaustion, study crafting, and self-undermining.

Taken together and based on the defined research goals, this dissertation aims to narrow the gaps in research on the SD-R framework, both in terms of theoretical and methodological foundations and practical application. In doing so, this dissertation makes four important contributions. First, it extends the literature on self-regulation behavior (see Bakker & de Vries, 2021) and specifically on job crafting by transferring the concepts of job crafting and self-undermining to the higher education context. Consequently, it broadens the scope of research on these behaviors beyond their occupational origins and contributes to a broader theoretical and practical understanding in a new context.

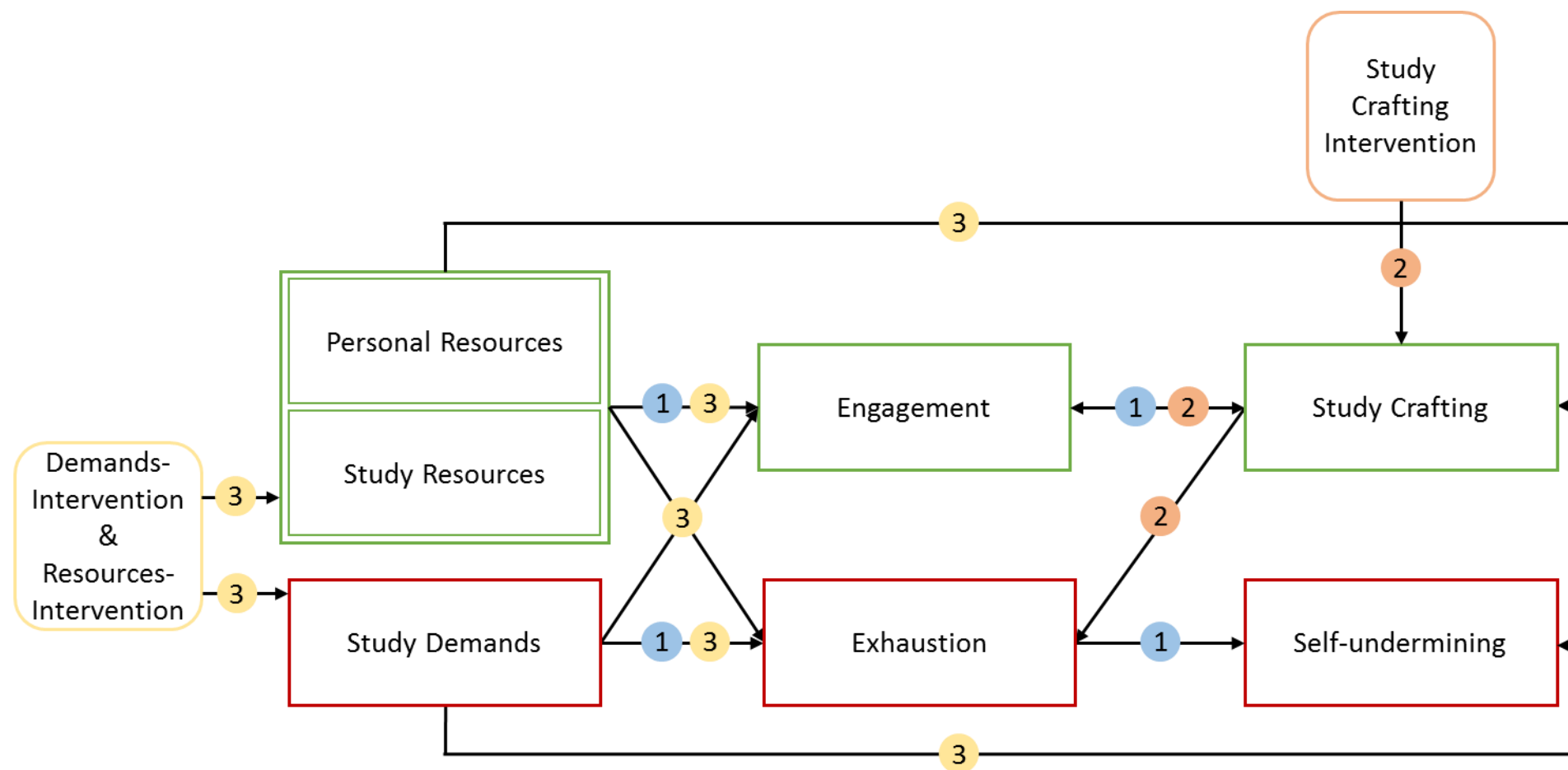
Second, this dissertation adds upon previous research on the SD-R framework by incorporating personal resources, study crafting, and self-undermining into the framework. This extension contributes to a more comprehensive theoretical foundation for the study of exhaustion and engagement by considering personal characteristics and adaptive and maladaptive self-regulation as their predictors and/or outcomes, in addition to study characteristics.

Third, this dissertation makes methodological contributions to the SD-R framework. Consistent with the shift toward intraindividual and longitudinal research in organizational psychology (Bakker, 2015; Ilies et al., 2015; Lesener et al., 2019), it responds to the current call to apply these research approaches to the higher education context (Bakker et al., 2015; Lesener, Pleiss, et al., 2020; Rodríguez-Muñoz et al., 2021). By conducting a weekly diary study, this dissertation provides a more nuanced understanding of short-term fluctuations in exhaustion and engagement and their proximal predictors and outcomes. At the same time, it sheds light on the longitudinal interplay between demands and resources, student well-being, and self-regulation behavior by examining the underlying mediating processes in an intervention context over time.

Fourth, by implementing the SD-R framework in three different interventions, this dissertation contributes to its practical application and thus to the body of research on

interventions aimed at improving student well-being. The introduction of this novel theoretical intervention approach directly addresses the pressing need for evidence-based student support services (e.g., Mülder et al., 2022; Tsiouris et al., 2023).

The following sections provide an overview of the relevant theoretical background underlying this dissertation. Beginning with an explanation of the SD-R framework, potential extensions of the SD-R framework are derived from the JD-R model. I then provide an overview of the current situation regarding exhaustion and engagement among students, as well as existing interventions aimed at promoting student well-being. Next, I explain the potential of interventions based on the SD-R framework, derived from interventions based on the JD-R model. Finally, I provide an overview of the research goals and explain how each of the three empirical studies comprising this dissertation contributes to achieving these.

Figure 1*Overall Research Model*

Note. The numbers indicate which of the three empirical studies investigates which path of the research model. Constructs encircled with green lines are part of the motivational path. Constructs encircled with red lines are part of the health-impairment path.

The Study Demands-Resources Framework

The JD-R model, from which the SD-R framework was derived, is one of the most popular models in the work context for researching employee well-being (Lesener, Pleiss, et al., 2020). Given the growing interest in researching student well-being (Gusy et al., 2019; Wörfel et al., 2015) and the similarities between study and work (Ouweneel et al., 2011; Pluut et al., 2015), the JD-R model has recently been introduced into the higher education context as the SD-R framework (Lesener, Pleiss, et al., 2020). Analogous to the JD-R model, the SD-R framework distinguishes two categories of study characteristics: study demands and study resources (Bakker & Demerouti, 2007; Lesener, Pleiss, et al., 2020).

Study demands—like job demands—occur at the social, psychological, physical, or organizational level and are associated with physical and mental effort, resulting in physiological and psychological costs (Bakker & Demerouti, 2007; Lesener, Pleiss, et al., 2020). According to the challenge-hindrance model of stress, these demands can be further divided into challenging and hindering demands (Cavanaugh et al., 2000; LePine et al., 2004). While challenges are motivating and foster personal growth and mastery, hindrances tend to obstruct personal growth and goal achievement (Crawford et al., 2010; LePine et al., 2005). Study resources—like job resources—also occur at the social, psychological, physical, or organizational level and can help achieve study goals, reduce study demands and associated costs, and foster students' personal growth and development (Bakker & Demerouti, 2007; Lesener, Pleiss, et al., 2020).

Based on the distinction between study demands and study resources, the SD-R framework further posits two psychological processes: the health-impairment path, in which study demands increase burnout, and the motivational path, in which study resources increase engagement and decrease burnout (Lesener, Pleiss, et al., 2020). Burnout and engagement are in turn related to various health- and performance-related outcomes, such as satisfaction with life and performance (e.g., Gusy et al., 2021; Salanova et al., 2009).

Burnout, the outcome of the health-impairment path, is defined as a state of mental fatigue that encompasses three dimensions: exhaustion, cynicism, and professional efficacy. Exhaustion is a sense of being overextended and represents the central symptom and most obvious manifestation of burnout (Maslach et al., 2001; Schaufeli & Taris, 2014). This dissertation focuses on this core dimension. Cynicism indicates a detached attitude toward one's studies, while professional efficacy refers to feelings of incompetence (Schaufeli, Martínez, et al., 2002).

Engagement, the outcome of the motivational path, is described as a fulfilling and positive state that also encompasses three dimensions: vigor, dedication, and absorption. Vigor describes a high level of energy and motivation, along with strong perseverance in one's work. Dedication includes feelings of significance, pride, and enthusiasm. Absorption is characterized by a sense of being fully immersed in one's work and high levels of concentration (Schaufeli, Martínez, et al., 2002).

There is broad empirical evidence supporting the two processes of the SD-R framework. Research confirms a positive relationship between study demands and burnout (e.g., Gusy, Wörfel, & Lohman, 2016; Kim et al., 2021; LePine et al., 2004; Lesener, Pleiss, et al., 2020), a positive relationship between study resources and engagement (e.g., Cilliers et al., 2017; Gusy, Wörfel, & Lohman, 2016; Luruli et al., 2020; Mokgele & Rothmann, 2014; Robins et al., 2015), and a negative relationship between study resources and burnout (e.g., Gusy, Wörfel, & Lohman, 2016; Kim et al., 2021; Lesener, Pleiss, et al., 2020). However, most studies examining the SD-R framework have employed cross-sectional between-person designs (e.g., Cilliers et al., 2017; Gusy, Wörfel, & Lohman, 2016; Lutz-Kopp et al., 2019; Mokgele & Rothmann, 2014). Initial studies with student samples using a weekly diary design confirm the validity of the motivational path at the within-person level (Bakker et al., 2015; Robayo-Tamayo et al., 2020).

In line with the trend toward within-person research in organizational psychology (Ilies et al., 2015), Bakker et al. (2015) recommend that future research in educational contexts should also employ more diary designs to better understand short-term fluctuations in student well-being. This dissertation addresses this recommendation by validating the processes within the SD-R framework through a weekly diary study. Based on the findings from cross-sectional studies, I hypothesize a positive relationship between study resources and engagement, and between study demands and exhaustion at the weekly within-person level (Study 1).

Introducing Personal Resources into the Study Demands-Resources Framework

In an extension of the original version of the JD-R model, personal resources were added to the motivational path in addition to job resources (Bakker & Demerouti, 2014). Personal resources are positive self-aspects associated with resilience, characterized by a sense of being able to successfully control and influence one's environment (Hobfoll et al., 2003). Similar to job or study resources, personal resources can facilitate goal achievement, protect against threats and their associated costs, and promote personal growth (Xanthopoulou et al., 2009a). In the work context, meta-analytic evidence confirms strong positive relationships between personal resources and engagement (Mazzetti et al., 2023). Similarly, initial studies in the higher education context confirm that personal resources are positively related to engagement (Bakker et al., 2015; Ouweneel et al., 2011) and negatively related to burnout (Robins et al., 2015). Furthermore, there is evidence of a reciprocal relationship between study resources and personal resources (T. Lee et al., 2022; Reis et al., 2015). However, personal resources have not yet been systematically examined within the SD-R framework, which is why this dissertation integrates personal resources in addition to study resources into the SD-R framework.

Specific Demands and Resources in Higher Education

The motivational path and the health-impairment path can be initiated by different demands and resources. Xanthopoulou et al. (2009b) emphasize that those characteristics that are particularly relevant to the target group studied should be selected to match the specificity of the setting. For this reason, in this dissertation, I examine those study demands, study resources, and personal resources that have been found to be particularly relevant to students in previous research.

In terms of study demands, time pressure, workload, and overload have been identified as the strongest positive predictors of burnout (e.g., Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Robins et al., 2015). Therefore, I examine two study demands: psychological demands and overload. Psychological demands encompass time pressure and workload, and thus are more likely to represent a challenging demand (see LePine et al., 2004; LePine et al., 2005). Overload includes qualitative excessive demands, and thus is more likely to represent a hindering demand (see LePine et al., 2004; LePine et al., 2005). These two study demands primarily cover the organizational and psychological levels of demands.

In terms of study resources, qualification potential, social support, and decision latitude have been identified as the strongest positive predictors of engagement and other positive outcomes such as study satisfaction (e.g., Cilliers et al., 2017; Gusy, Wörfel, & Lohman, 2016; Lutz-Kopp et al., 2019; Mokgele & Rothmann, 2014; Robins et al., 2015). Furthermore, social support has been identified as a strong negative predictor of exhaustion (e.g., Gusy, Wörfel, & Lohman, 2016; Lutz-Kopp et al., 2019). Therefore, I examine three study resources: decision latitude, social support from lecturers, and social support from fellow students. Decision latitude describes the autonomy and flexibility to decide which skills to use in tasks (Schmidt et al., 2019), and therefore primarily covers the organizational and psychological level of resources. Social support from lecturers and social support from fellow students primarily cover the social level of resources.

In terms of personal resources, mindfulness has been identified as a strong positive predictor of engagement and a strong negative predictor of exhaustion in both the work context and the higher education context (e.g., Guidetti et al., 2019; Robins et al., 2015). Due to its significant role in the JD-R model, mindfulness has already been incorporated into this model (Grover et al., 2017). Therefore, I examine the personal resource of mindfulness.

Recent studies have validated the motivational path and the health-impairment path during the COVID-19 pandemic. Distance learning study demands, such as technical problems, were associated with higher burnout and lower engagement. Distance learning study resources, such as supportive lecturers, were associated with higher engagement and lower burnout (Salmela-Aro et al., 2022). Personal resources, such as emotional resilience, were also positively associated with engagement (Koob et al., 2021). Therefore, the SD-R framework appears to be applicable even during the COVID-19 pandemic, during which the studies of this dissertation were conducted.

Introducing Study Crafting and Self-Undermining into the Study Demands-Resources Framework

Initially, the JD-R model adopted a top-down approach, assuming that job demands and job resources are determined by management. In contrast, more recent versions have adopted a bottom-up perspective, recognizing that employees can also actively modify their work environment through job crafting (Bakker & Demerouti, 2017). Wrzesniewski and Dutton (2001) first defined job crafting as employees' redefinition and redesign of their own work and distinguished three job crafting strategies: changing task boundaries, changing relational boundaries, and changing cognitive task boundaries. Changing task boundaries entails, for example, altering the scope of tasks, while changing cognitive task boundaries involves modifying one's perception of the own work. Changing relational boundaries includes actions such as adjusting the scope of interaction at work (Wrzesniewski & Dutton, 2001).

Tims and Bakker (2010) integrated job crafting into the JD-R model by defining it as the employees' proactive adjustment of their own job demands and job resources. This adjustment aims to better align work to one's own skills, strengths, and preferences, thereby improving the fit between job and person (Tims et al., 2012). Within the JD-R model, four job crafting strategies have been distinguished: increasing structural resources, increasing social resources, increasing challenging demands, and decreasing hindering demands (Tims et al., 2013). Increasing structural resources refers to work design and includes behaviors such as taking on more responsibility or increasing development opportunities (Tims et al., 2012). Increasing social resources focuses on social aspects and interactions at work, incorporating behaviors such as seeking social support, coaching from supervisors, or feedback (Tims et al., 2012). Increasing challenging demands is employed when employees feel that their job does not fully utilize their abilities, and includes behaviors such as taking on new tasks or projects (Tims & Bakker, 2010). Decreasing hindering demands is applied when employees perceive their work as overwhelming and includes actions such as reducing demanding interactions or reducing emotional and cognitive demands (Tims & Bakker, 2010; Tims et al., 2012, 2015b).

Several recent studies have attempted to integrate the two job crafting approaches proposed by Wrzesniewski and Dutton (2001) and Tims and Bakker (2010) by defining hierarchical structures of job crafting (T. Ebert & Bipp, 2022; Tims et al., 2021). For example, Bindl et al. (2019) and Lichtenthaler and Fischbach (2019) differentiated between promotion-focused job crafting and prevention-focused job crafting. Promotion-focused job crafting encompasses the strategies of increasing resources and challenging demands, as well as expansion-oriented task, relational, and cognitive crafting. Prevention-focused job crafting includes the strategies of decreasing hindering demands, as well as contraction-oriented task and relational crafting (Lichtenthaler & Fischbach, 2019). Bruning and Campion (2018) and F. Zhang and Parker (2019) adopted a similar approach by distinguishing between approach and avoidance crafting. Approach crafting refers to proactive behavior aimed at achieving

positive outcomes, whereas avoidance crafting describes behavior aimed at preventing negative outcomes (F. Zhang & Parker, 2019).

The concept of job crafting has received increasing attention in recent years, with numerous studies examining its role within the JD-R model (Tims et al., 2021). Regarding the relationship between job crafting and job characteristics, F. Zhang and Parker (2019) confirm positive relationships between approach crafting and several job resources, such as social support or feedback, in their review. In line with this, Rudolph et al. (2017) confirm in their meta-analysis that overall job crafting, as well as the strategies of increasing structural and social resources and increasing challenging demands, are positively related to job resources such as job autonomy, and challenging job demands such as workload.

Regarding the relationship between job crafting and employee well-being, there is meta-analytic evidence that overall job crafting is positively related to engagement and negatively related to job strain (Frederick & VanderWeele, 2020; Rudolph et al., 2017). In terms of Tims et al.'s (2013) four job crafting strategies, increasing structural resources, increasing social resources, and increasing challenging demands are positively related to engagement, whereas decreasing hindering demands is negatively related to engagement. Moreover, increasing structural resources and increasing challenging demands are negatively related to job strain, whereas decreasing hindering demands is positively related to job strain (Rudolph et al., 2017). In line with this, other meta-analyses confirm a positive relationship of promotion-focused job crafting with engagement and a negative relationship with burnout (Boehnlein & Baum, 2020; Lichtenthaler & Fischbach, 2019), as well as a negative relationship of prevention-focused job crafting with engagement and a positive relationship with burnout (Lichtenthaler & Fischbach, 2019).

Recently, more specific crafting strategies at work have been investigated, such as career crafting (Tims & Akkermans, 2020) or network crafting (Huatian Wang et al., 2024). Moreover, job crafting has been applied to other contexts and thus explored beyond the work

domain (Tims et al., 2021). For example, leisure crafting has been introduced as the active pursuit and engagement in leisure activities in line with one's passions (Berg et al., 2010; Petrou & Bakker, 2016). Demerouti et al. (2020) introduced home crafting as a modification of demands and resources in the home, aimed at enhancing the fit between the individual and the home environment. Sturges (2012) further introduced work-life balance crafting as physical, social, and cognitive crafting techniques aimed at improving one's balance between work and private life. There is further evidence of interrelations between different forms of crafting behavior, such as between job and home crafting (Haun et al., 2023) or between job and leisure crafting (Petrou et al., 2017).

However, this concept is under-researched in the higher education context. While initial studies mention the concept of study crafting (e.g., Choi & Shin, 2018; Dormann & Guthier, 2019; Mülder et al., 2022; Park & Lee, 2019), a more systematic investigation within the SD-R framework is lacking. Like employees, students engage in structured activities that are directed toward specific goals (Ouweneel et al., 2011). Consequently, students may also be able to proactively change their study characteristics through study crafting. Therefore, in this dissertation, I transfer the concept of job crafting to the higher education context by introducing study crafting into the SD-R framework. I draw on the conceptualization of Tims and Bakker (2010) because study crafting has been embedded in the SD-R framework and the four crafting strategies seem to be well transferable to students. For example, students can increase their structural resources by developing their own skills. They can increase their social resources by seeking feedback from lecturers or support from fellow students. They can increase their challenging demands by enrolling in additional courses, and decrease their hindering demands by minimizing contact with people whose expectations are unrealistic. Based on the aforementioned findings from the work context on the relationships between job crafting, job resources, and engagement, I propose that the motivational path of the SD-R

framework can be expanded to include study crafting. Thus, I hypothesize a positive relationship between engagement and study crafting (Study 1).

In addition to job crafting, self-undermining has recently been incorporated into the JD-R model. Self-undermining describes behaviors that create barriers and consequently reduce performance (Bakker & Costa, 2014). It includes actions such as poor communication, making mistakes, or creating interpersonal conflicts, all of which represent hindering demands (Huatian Wang et al., 2020). Self-undermining has received less empirical research than job crafting thus far, but initial studies have investigated its role within the JD-R model.

Regarding the relationship between self-undermining and job characteristics, a positive relationship was found between self-undermining and job demands, such as workload or emotional demands (Ratiu & Dobre, 2020). Similarly, a weekly diary study found that job demands are positively related to weekly self-undermining among employees with chronic burnout (Bakker, Xanthopoulou, & Demerouti, 2023). Regarding the relationship between self-undermining and employee well-being, a positive correlation was found between self-undermining and burnout (Bakker & Wang, 2020), and a diary study confirms that weekly burnout predicts weekly self-undermining (Bakker, Xanthopoulou, & Demerouti, 2023).

To the best of my knowledge, self-undermining has not yet been researched in the context of higher education, although behaviors such as making mistakes, creating conflicts or postponing activities are well applicable to students. Therefore, in this dissertation, I transfer the concept of self-undermining to the higher education context by introducing it into the SD-R framework. Based on the aforementioned findings from the work context on the relationships between self-undermining, job demands, and exhaustion, I propose that the health-impairment path of the SD-R framework can be expanded to include self-undermining. Thus, I hypothesize a positive relationship between exhaustion and self-undermining (Study 1).

Processes Within the Study Demands-Resources Framework

The latest version of the JD-R model postulates a gain cycle within the motivational path and a loss cycle within the health-impairment path. Specifically, it posits that employees with high levels of engagement want to stay engaged and therefore craft their jobs. Through job crafting, they create job and personal resources that further increase their engagement (Bakker, Demerouti, & Sanz-Vergel, 2023). This process results in a gain cycle or spiral, characterized by the reciprocal relationships between resources, engagement, and job crafting (Bakker, Demerouti, & Sanz-Vergel, 2023; Hobfoll et al., 2018).

There is empirical evidence to support these assumptions. A meta-analysis examining the longitudinal relationship between job characteristics and well-being confirms that job resources positively predict engagement and that engagement positively predicts job resources over time (Lesener et al., 2019). Furthermore, meta-analytic evidence suggests a positive reciprocal relationship between engagement and promotion-focused job crafting over time (Lichtenthaler & Fischbach, 2019). Another recent meta-analysis exploring job crafting processes confirms that job resources mediate the relationship between job crafting and well-being (Holman et al., 2023).

On the contrary, the JD-R model suggests that when employees feel exhausted by their job, they engage in self-undermining. In doing so, they create additional hindering demands that further increase their exhaustion. This process leads to a loss cycle or spiral with reciprocal relationships between job demands, exhaustion, and self-undermining (Bakker, Demerouti, & Sanz-Vergel, 2023; Hobfoll et al., 2018).

Empirical evidence also supports these assumptions. The meta-analysis of longitudinal JD-R studies confirms that job demands positively predict burnout and that burnout positively predicts job demands over time (Lesener et al., 2019). Further evidence supports a positive relationship between job demands and self-undermining, mediated by burnout (Golu et al., 2022). Consistent with this, a weekly diary study confirms a positive relationship from weekly

job demands to weekly self-undermining via weekly burnout symptoms, with chronic burnout moderating this relationship (Bakker, Xanthopoulou, & Demerouti, 2023).

The gain cycle and loss cycle have not yet been investigated within the SD-R framework, but I assume that the processes from the JD-R model are transferable. Therefore, based on the assumptions described above, I hypothesize that engagement will mediate the relationship between study resources and study crafting, and that exhaustion will mediate the relationship between study demands and self-undermining (Study 1).

In addition, the JD-R model suggests interactions between the health-impairment path and the motivational path. Job and personal resources can mitigate the impact of job demands on burnout, referred to as the buffer hypothesis (Bakker & Demerouti, 2014; Bakker et al., 2005), while job demands can amplify the impact of job resources on engagement, referred to as the boost hypothesis (Bakker & Demerouti, 2014; Bakker et al., 2007). Additionally, although job crafting has been incorporated into the motivational path, this behavior also shows relationships with variables of the health-impairment path. For example, it is negatively related to burnout (Lichtenthaler & Fischbach, 2019) and buffers the negative effects of job demands on burnout (Hakanen et al., 2017).

Exhaustion and Engagement in Higher Education Students

Exhaustion and engagement are the two central indicators of student well-being in the SD-R framework. A recent representative survey of German higher education students in 2023 revealed a worrying trend: the proportion of students experiencing severe exhaustion has increased from 24% in 2015 to 37% in 2023 (Techniker Krankenkasse, 2023). A systematic review including international studies estimated an even higher prevalence of exhaustion among students, at 55.4% (Rosales-Ricardo et al., 2021). While exhaustion has increased among German higher education students in recent years, engagement has, conversely, declined. In a 2017 survey by Grützmacher et al. (2018), half of the students reported a high

level of engagement. However, a more recent survey in 2023 found that only 42.5% of students reported high levels of engagement (Olson et al., 2023).

These findings may be explained in part by the COVID-19 pandemic, which has exacerbated preexisting challenges to student well-being. University closures, the shift to online lectures, and social distancing have significantly changed students' lives (Aristovnik et al., 2020; Benjet, 2020; Kohls et al., 2021). As a result, higher education students reported various negative consequences of the pandemic, including social isolation, loneliness, uncertainty about the future, financial difficulties, and unemployment (Kohls et al., 2021; Werner et al., 2021). Thus, burnout, as well as mental disorders such as anxiety and depression increased, while engagement decreased over the course of the pandemic (Oliveira Carvalho et al., 2021; Salmela-Aro et al., 2022).

Notably, there are also links between burnout and engagement. Olson et al. (2023) found that students with high levels of engagement do not show signs of burnout, while the majority of those with burnout symptoms are only moderately engaged. Furthermore, it has been confirmed that engagement can mitigate the negative effects of burnout on dropout intention, while burnout can suppress the protective effects of engagement on dropout intention and academic performance (Abreu Alves et al., 2022; Marôco et al., 2020). Therefore, engagement is considered a protective factor against burnout (Olson et al., 2023) and contributes to student health (Gusy et al., 2019), but also to academic performance (Schaufeli, Martínez, et al., 2002). In contrast, burnout has far-reaching negative implications for students and society due to its detrimental effects on students' mental and physical health, quality of life, academic performance, and intention to drop out (Madigan & Curran, 2021; Madigan et al., 2024; Marôco et al., 2020; Ribeiro et al., 2018; Turhan et al., 2022). Therefore, students should be supported with programs aimed at both promoting engagement and preventing burnout (e.g., Agarwal et al., 2020; Marôco et al., 2020; Robins et al., 2015).

Interventions Aimed at Improving Student Well-Being

As the demand for support services to improve student health and well-being increases, several interventions have been developed in recent years that target burnout and a diverse array of related issues, including mental disorders, stress management, and psychological well-being (for reviews and meta-analyses, see, e.g., Amanvermez et al., 2020; Barnett et al., 2021; Davies et al., 2014; Farrer et al., 2013; Ferrari et al., 2022; Harrer et al., 2019; Lattie et al., 2019; Madigan et al., 2024; Regehr et al., 2013). However, systematic reviews and meta-analyses report considerable heterogeneity in the effectiveness of available interventions. Overall, they confirm relatively modest intervention effects on burnout (Madigan et al., 2024), mental disorders such as depression and anxiety (Harrer et al., 2019), and psychological well-being (Ferrari et al., 2022). In their meta-analysis, Farrer et al. (2013) report that approximately 30% of the interventions reviewed did not have a significant effect on reducing mental disorders. In addition, significant differences were found between intervention types, with rational emotive behavior therapy, cognitive behavioral therapy, and mindfulness interventions being particularly effective in treating burnout, mental disorders, and stress (Amanvermez et al., 2020; Davies et al., 2014; Madigan et al., 2024; Winzer et al., 2018).

In addition to the considerable variability in the effectiveness of interventions, there are various barriers that prevent students from seeking help. Research has shown that students prefer to deal with problems on their own or with the support of friends and family. They also expressed embarrassment about seeking help because of the stigma associated with mental health problems. Moreover, they reported structural barriers, such as cost or scheduling conflicts, as well as feelings of not needing help, limited awareness of available services, and skepticism about the effectiveness of treatment (D. D. Ebert et al., 2019; Eisenberg et al., 2009; Eisenberg et al., 2007). As a result, there is a particular focus on providing low-

threshold and online support services to overcome these barriers (e.g., Dodd et al., 2021; Tsiouris et al., 2023).

Practical Application of the Study Demands-Resources Framework

Given the numerous methodological criticisms and the limited effectiveness observed in previous interventions, further evidence-based interventions tailored to the specific needs of the student population are imperative to promote their health and well-being (Davies et al., 2014; Ferrari et al., 2022; Mülder et al., 2022). Moreover, to the best of my knowledge, interventions that simultaneously address burnout and engagement are lacking. Reavley and Jorm (2010) recommend adapting and applying interventions originally designed for other populations to the higher education context.

In the work context, the JD-R model has demonstrated its practical applicability and usefulness for improving employee well-being by providing a theoretical basis for the development of interventions (Bakker, 2017; Bakker & Demerouti, 2017; Bakker, Demerouti, & Sanz-Vergel, 2023). Derived from the theoretical assumptions of the JD-R model, optimizing job demands, increasing job resources, and increasing personal resources promise to both promote engagement and reduce burnout (Bakker & Demerouti, 2014; Bakker, Demerouti, & Sanz-Vergel, 2023). Empirical evidence supports the effectiveness of these approaches. For example, personal resources interventions have significantly increased personal resources such as resilience or self-efficacy, as well as engagement (e.g., Bakker & van Wingerden, 2021; van Wingerden, Derks, & Bakker, 2017).

In addition, job crafting interventions in particular have gained attention in recent years. Employees encounter varying levels and types of resources and demands that result from their unique organizational and personal circumstances (Bakker et al., 2014). Job crafting interventions represent tailor-made programs that enable employees to proactively adapt their job characteristics on their own, thereby aligning their job with their individual

skills and strengths (Bakker, Demerouti, & Sanz-Vergel, 2023; Mukherjee & Dhar, 2023; van den Heuvel et al., 2015).

A large body of empirical evidence supports the general effectiveness of job crafting interventions. However, there is also considerable heterogeneity in the effects of interventions. Devotto and Wechsler (2019) reviewed eight job crafting intervention studies, while a more recent review by Mukherjee and Dhar (2023) included 33 job crafting interventions. These reviews confirm mixed effects on job crafting. While some interventions increased all job crafting strategies investigated (e.g., Thomas et al., 2020), others only enhanced specific job crafting strategies (e.g., Dubbelt et al., 2019), and some showed no effect on job crafting at all (e.g., Hulshof et al., 2020; Kuijpers et al., 2020). Inconsistent results were also found regarding engagement, with some studies demonstrating effects on engagement (e.g., van Wingerden, Bakker, & Derks, 2017a) and others not (e.g., Sakuraya et al., 2016). A meta-analysis of job crafting interventions by Oprea et al. (2019), which includes 14 studies, confirms statistically significant effects of job crafting interventions on overall job crafting, the strategies of seeking challenges and reducing demands, and engagement.

In addition, there is initial evidence that job crafting interventions can increase job resources (e.g., opportunities for professional development) and personal resources (e.g., self-efficacy) and reduce exhaustion (e.g., Demerouti et al., 2021; e.g., Gordon et al., 2018; van Wingerden, Bakker, & Derks, 2017b). Moreover, initial studies have confirmed the sustained effectiveness of job crafting interventions, demonstrating long-term effects one month (Sakuraya et al., 2016) and one year after the intervention (van Wingerden, Bakker, & Derks, 2017b).

Jagodics and Szabó (2023) emphasize that interventions for students should support them in both reducing demands and building more resources, while Mülder et al. (2022) highlight that study crafting interventions may be valuable for the student population. Consequently, analogous to the JD-R model, the SD-R framework could serve as a theoretical

basis for interventions. Therefore, in this dissertation, I evaluate three different online interventions based on the SD-R framework, thereby testing a novel intervention approach to promote student well-being. The three interventions target different variables within the SD-R framework. The first intervention is a study crafting intervention (“STUDYCoach”; Study 2), the second aims to adapt demands (“demands-intervention”; Study 3), and the third aims to increase resources (“resources-intervention”; Study 3).

Drawing from the findings on the effects of JD-R-based interventions, I hypothesize that the SD-R-based interventions will have positive effects on the SD-R variables. Specifically, I hypothesize that the STUDYCoach will improve study crafting and well-being (Study 2), while the demands-intervention and the resources-intervention will improve study and personal characteristics, well-being, and self-regulation behavior (Study 3). Based on the findings on the sustainability of job crafting interventions, I further hypothesize that the effects of the SD-R-based interventions will remain stable at follow-up (Studies 2 and 3).

In addition to the intervention effects, in this dissertation, I also explore the underlying mechanisms that mediate the effects of the SD-R-based interventions, as recommended by Mukherjee and Dhar (2023). On the one hand, overall job crafting or specific job crafting strategies have emerged as key mediators in job crafting interventions, mediating the effects of these interventions on different JD-R outcomes (Mukherjee & Dhar, 2023). On the other hand, in personal resources interventions, personal resources have been identified as mediators between the intervention and engagement (Bakker & van Wingerden, 2021).

Thus, given the different target variables of the three SD-R-based interventions, I propose that the interventions primarily influence these variables. Based on the theoretical assumptions and empirical findings on the reciprocal relationships and interrelations within the JD-R model (see Bakker, Demerouti, & Sanz-Vergel, 2023), as well as findings on the mediating processes of job crafting interventions and personal resources interventions (Bakker & van Wingerden, 2021; Mukherjee & Dhar, 2023), I propose that the interventions

subsequently affect the other SD-R variables. Specifically, I hypothesize that study crafting will mediate the effects of the STUDYCoach on well-being (Study 2) and that demands and resources will mediate the effects of the demands-intervention and the resources-intervention on well-being and self-regulation behavior (Study 3). As the intervention studies include three measurement time points, it is possible to separate the variables over time (van Wingerden, Bakker, & Derks, 2017a). Thus, this dissertation also addresses the call by Lesener, Pleiss, et al. (2020) for the longitudinal investigation of causal processes and relationships within the SD-R framework.

Overview of Research Goals and Dissertation Outlook

The overarching aim of this dissertation is to expand the theoretical and methodological foundations and implement practical applications of the SD-R framework.

Within this aim, there are four central research goals:

1. To expand the SD-R framework by integrating (a) personal resources, (b) study crafting, and (c) self-undermining.
2. To examine dynamic fluctuations and relationships between study resources, engagement, and study crafting within the motivational path, and between study demands, exhaustion, and self-undermining within the health-impairment path at the within-person level.
3. To develop three SD-R-based online interventions and evaluate their impact on (a) study demands, study resources, and personal resources; (b) engagement and exhaustion; and (c) study crafting and self-undermining.
4. To investigate the underlying mechanisms that mediate the effects of the SD-R-based interventions on the SD-R outcomes over time, with a focus on the mediating role of (a) demands and resources and (b) study crafting.

To address these research goals, this dissertation consists of three empirical studies, summarized as follows. Study 1 (Chapter 2) addresses research goals 1b, 1c, and 2. This study

aimed to validate an extended SD-R framework that includes study crafting and self-undermining. A within-person research design was adopted by conducting a weekly diary study. I hypothesized a positive relationship between weekly study resources and weekly engagement, and between weekly engagement and weekly study crafting, implying a mediating role of engagement in the relationship between study resources and study crafting. Additionally, I hypothesized a positive relationship between weekly study demands and weekly exhaustion, and between weekly exhaustion and weekly self-undermining, implying a mediating role of exhaustion in the relationship between study demands and self-undermining. A sample of 205 higher education students provided data on their study resources and study demands, engagement, exhaustion, study crafting, and self-undermining over four consecutive weeks. Hypotheses were tested using multilevel structural equation modeling, controlling for autoregressive effects.

Study 2 (Chapter 3) addresses research goals 1b, 3a, 3b, and 4a. This study developed and evaluated the STUDYCoach, a study crafting online intervention, through a randomized controlled trial. I hypothesized that the intervention would increase study crafting and engagement and decrease exhaustion post-intervention in the intervention group, compared to the waiting-list control group, with these effects remaining stable at the 20-week follow up. In addition, I hypothesized that study crafting would mediate the relationship between the intervention and both engagement and exhaustion. Study 2 thus extends Study 1 in three important ways: First, it not only examined study crafting theoretically, but also evaluated its practical application in an intervention. Second, it examined the impact of study crafting on engagement over time in an intervention context, whereas Study 1 examined the weekly effects of engagement on study crafting in everyday study settings. Third, it examined the impact of study crafting on exhaustion over time, thus exploring the relationship of study crafting with variables of both the motivational path and the health-impairment path. A total of 209 higher education students enrolled in the study, with 149 participating in the three-

week intervention and 60 in the waiting-list control group. Hypotheses were tested using repeated measures analyses of variance, with time as the within-person factor and group as the between-person factor. Mediation analyses were also conducted.

Study 3 (Chapter 4) addresses research goals 1a, 1b, 1c, 3a, 3b, 3c, and 4b. This study evaluated a demands-intervention and a resources-intervention through a randomized controlled trial. I hypothesized that both interventions would increase study and personal resources, study crafting, and engagement, as well as decrease study demands, exhaustion, and self-undermining after the intervention in the intervention groups compared to the waiting-list control group, with effects persisting at the 5-week follow-up. I further hypothesized that study demands, study resources, and personal resources would mediate the relationship between the intervention and engagement, exhaustion, study crafting, and self-undermining. In this way, Study 3 extends Study 1 by implementing the extended SD-R framework in two different interventions and by examining how demands and resources practically influence the other variables within the SD-R framework. It also extends Study 2 because the two interventions in Study 3 targeted different SD-R variables. While Study 2 specifically targeted study crafting, the interventions in Study 3 targeted demands and resources, allowing for a comparison of the effectiveness of different SD-R-based interventions. Study 3 also contributes to a more nuanced understanding of the interrelations among SD-R variables by examining additional underlying mediation mechanisms through demands and resources over time. A total of 205 higher education students enrolled in the study, with 64 participating in the demands-intervention, 70 participating in the resources-intervention, and 71 in the waiting-list control group. Hypotheses were tested using repeated measures analyses of variance, with time as the within-person factor and group as the between-person factor. Mediation analyses were also conducted. Figure 2 provides an overview of the aims, methods, and main results of the three studies.

Figure 2*Overview of the Studies that Comprise this Dissertation*

| Study 1 Targets research goals 1b, 1c, 2 | Study 2 Targets research goals 1b, 3a, 3b, 4a | Study 3 Targets research goals 1a, 1b, 1c, 3a, 3b, 3c, 4b |
|---|---|--|
| <p><u>Aim</u> Validation of an extended SD-R framework, which includes the variables study crafting and self-undermining, at a weekly within-person level. Derived from empirical findings on the JD-R model in the work context, it was hypothesized that weekly engagement mediates the relationship between weekly study resources and weekly study crafting. Similarly, it was hypothesized that weekly exhaustion mediates the relationship between weekly study demands and weekly self-undermining.</p> <p><u>Method</u> Participants: 205 higher education students ($N_{\text{Level 1}} = 729$ occasions) Design: Weekly diary study over four consecutive weeks Measures: Study resources, study demands, engagement, exhaustion, study crafting, self-undermining Data analysis: Multilevel structural equation modeling controlling for autoregressive effects of mediators and dependent variables from the previous week</p> <p><u>Main results</u> Study resources positively predicted engagement, and engagement positively predicted study crafting. Consequently, engagement mediated the relationship between study resources and study crafting. Study demands positively predicted exhaustion, and exhaustion positively predicted self-undermining. Consequently, exhaustion mediated the relationship between study demands and self-undermining.</p> | <p><u>Aim</u> Development of an online study crafting intervention (STUDYCoach) and evaluation of its impact on study crafting, engagement, and exhaustion, and the investigation of underlying mediating processes. Derived from empirical findings on job crafting interventions in the work context, it was hypothesized that the intervention increases study crafting and engagement and decreases exhaustion. In addition, it was hypothesized that study crafting mediates the relationship between the intervention and engagement and exhaustion.</p> <p><u>Method</u> Participants: 209 higher education students Design: Randomized controlled trial (RCT) with an intervention group (IG; $n = 149$) and a waiting-list control group (WLC; $n = 60$). The IG used the STUDYCoach for three consecutive weeks. Three measurement time points were conducted (T1: pre-intervention, T2: post-intervention, T3: 20-week follow-up). Measures: Study crafting, engagement, exhaustion Data analysis: Repeated measures (RM) analyses of variance (ANOVA) and mediation analyses</p> <p><u>Main results</u> Overall study crafting, decreasing hindering demands, and engagement significantly increased in the IG, compared to the WLC after the intervention. The effects remained stable at follow-up. Exhaustion significantly decreased in the IG from T1 to T3 and from T2 to T3. Study crafting (T2) mediated the interventions' effects on engagement and exhaustion (T3).</p> | <p><u>Aim</u> Development of two online interventions aimed at adapting demands or increasing resources, respectively, and evaluation of their impact on the SD-R variables, and the investigation of underlying mediating processes. Derived from the theoretical assumptions of the SD-R framework and the JD-R model, it was hypothesized that both interventions increase study and personal resources, engagement, and study crafting, and decrease study demands, exhaustion, and self-undermining. Demands and resources were further expected to mediate the relationship between the interventions and the SD-R variables.</p> <p><u>Method</u> Participants: 205 higher education students Design: RCT with two IGs (demands-intervention: $n = 64$, resources-intervention: $n = 70$) and a WLC ($n = 71$). The IGs used the interventions for two consecutive weeks. Three measurement time points were conducted (T1: pre-intervention, T2: post-intervention, T3: 5-week follow-up). Measures: Study demands, study resources, personal resources, engagement, exhaustion, study crafting, self-undermining Data analysis: RM ANOVA and mediation analyses</p> <p><u>Main results</u> Both interventions had significant positive effects on the personal resource mindfulness, on exhaustion, and on increasing structural resources. The resources-intervention further had significant positive effects on increasing challenging demands and on self-undermining. Mindfulness (T2) mediated the effects on engagement, increasing structural resources, increasing challenging demands, and self-undermining (T3).</p> |

Chapter 2 – Study 1: Study Crafting and Self-Undermining in Higher Education

Students – A Weekly Diary Study on the Antecedents¹

Abstract

The aim of the current study is to validate the adaptation of the job demands-resources theory to the study context. In addition, we introduce the concepts study crafting and self-undermining to the study demands-resources framework by examining the mediating role of engagement and exhaustion in the relationship between study characteristics and study crafting and self-undermining. Over four consecutive weeks, 205 higher education students answered a questionnaire about their weekly study demands and resources, their well-being (i.e., engagement, exhaustion), and their study crafting and self-undermining behaviors. Multilevel structural equation modeling (controlling for autoregressors of mediators and dependent variables from the previous week) demonstrated a positive relationship between study resources and study crafting mediated by engagement, as well as a positive relationship between study demands and self-undermining mediated by exhaustion. Our findings show that even short-term fluctuations in study characteristics affect students' well-being and, in turn, their proactive and dysfunctional behaviors. Accordingly, universities should provide a resource-rich study environment and limit study demands as much as possible. Furthermore, our results demonstrate that students can also actively influence their study environment themselves.

Keywords: study demands-resources framework, study characteristics, student engagement, student burnout, study crafting, self-undermining, higher education students

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Introduction

Students are a growing part of the general population (Wörfel et al., 2016) and of great importance to ensuring the growth of the economy in a country (Auerbach et al., 2018). At the same time, students report a high level of stress and emotional exhaustion (Grütmacher et al., 2018). Robins et al. (2018) followed students from the final year at university through work and found that burnout was higher during study than during work. There is also a high prevalence of common mental disorders such as depression among students (Auerbach et al., 2018). These findings demonstrate the importance of early interventions at universities to decrease student burnout and other stress-related psychological disorders. On the other hand, Grütmacher et al. (2018) showed that approximately 50% of students hold high levels of engagement, which is especially important because evidence shows that student engagement is strongly related to student performance (Schaufeli, Martínez, et al., 2002).

While there is growing interest in studying burnout and engagement among students, the majority of existing studies is instead atheoretical (Robins et al., 2015). The job demands-resources (JD-R) model is a widespread model in the context of work that explains the development of burnout and engagement in employees (Demerouti et al., 2001). Lesener, Pleiss, et al. (2020) recently introduced the study demands-resources (SD-R) framework and thus confirmed the core assumptions of the JD-R model for the higher education context. However, there is a significant gap between the findings on the JD-R model and the SD-R framework, and more research on the SD-R framework is needed (Lesener, Pleiss, et al., 2020). Therefore, the central aim of the present study is to validate an extended version of the SD-R framework by supplementing the behavioral variables study crafting and self-undermining. These student behaviors have not yet been considered in the higher education context. However, we know from research in the work context that employees actively influence their own work, and so we assume the same is true for students. Thus, in the present study, we make a first contribution by introducing study crafting as an outcome in the SD-R

framework and investigating its antecedents. We make a second contribution by introducing self-undermining as an outcome in the SD-R framework and investigating its antecedents.

Furthermore, in our study we focus on intraindividual differences by using a weekly diary approach. This approach can contribute to our understanding of student well-being and can also complement the findings of between-person studies (Ilies et al., 2015). It is often used in the work context, but there is a lack of within-person studies in a higher education context (Bakker et al., 2015). We aim to fill this research gap and make a third contribution by investigating whether the theoretical assumptions of the SD-R framework also hold when adopting a week-level within-person approach. In this way, we examined which transient study characteristics were present when students exhibited high levels of student engagement and emotional exhaustion. These characteristics, in turn, represent important starting points for fostering student engagement and proactive behavior and reducing exhaustion and dysfunctional behavior.

Student Burnout and Engagement

A growing number of students in Germany—almost three million in total during the winter 2020/2021 term (Destatis, 2021)—are encountering a variety of health problems (Grützmacher et al., 2018). In a survey on the stress level of German students, 53% indicated a high level of stress, whereas only 5% indicated a low level of stress (Herbst et al., 2016). Approximately 25% of the students reported high levels of emotional exhaustion (Grützmacher et al., 2018), which is the key component and most obvious manifestation of burnout (Maslach et al., 2001). Student burnout can be defined as a feeling of exhaustion caused by study demands, a detached and cynical attitude toward studying, and a feeling of incompetence as a student (Schaufeli, Martínez, et al., 2002). In our study, we focus on emotional exhaustion as a negative, as well as malleable, indicator of a student's well-being. Emotional exhaustion can be measured on a continuum, and thus does not need to fulfill criteria for a clinical diagnosis. However, we know that emotional exhaustion is positively

related to negative outcomes for the student (such as depression, fatigue, loss of motivation), as well as negative outcomes for the university (such as dropouts and lower performance) (Mokgele & Rothmann, 2014).

Based on a general trend toward positive psychology, which focuses on optimal human functioning rather than on malfunctioning (Seligman & Csikszentimihaly, 2000), there is also a research trend toward the concept of student engagement (Gusy et al., 2019). Student engagement is characterized by a positive, fulfilling mental state that consists of vigor, dedication, and absorption. Vigor describes a high level of energy as well as the ability to invest effort. Dedication means a sense of significance and enthusiasm. Absorption is characterized by a feeling of full concentration and of being carried away. Student engagement is positively associated with performance and even more strongly linked to performance than burnout (Salanova et al., 2009).

Robins et al. (2018) emphasize that it is necessary to use relevant theories in the research of student burnout and engagement to obtain a stronger evidence base on their antecedents and consequences. Contrary to student well-being, employee well-being has been researched for many years, and several theoretical models are available within the work context (Bakker, 2015). One of the most popular models is the JD-R model (Demerouti et al., 2001), which was recently introduced in a higher education context by Lesener, Pleiss, et al. (2020).

The JD-R Theory in a Higher Education Context: The SD-R Framework

Like employees, students are involved in structured activities (e.g., attending lectures) and are aimed at specific goals (e.g., passing exams). Therefore, from a psychological perspective, there is similarity between work and study (Ouweneel et al., 2011). This similarity makes it possible to apply models from the work context, such as the JD-R model, to the higher education context. JD-R theory assumes that all work characteristics can be divided into two categories: job demands and job resources (Bakker & Demerouti, 2017).

Accordingly, in the higher education context, we divide into two categories: study demands and study resources. Study demands refer to those psychological, physical, social, or organizational study aspects that require effort and are associated with mental or physiological costs. Study resources are defined as psychological, physical, social, or organizational study aspects that contribute to goal achievement, reduce study demands, or improve personal development (Demerouti et al., 2001; Lesener, Pleiss, et al., 2020). Furthermore, two psychological paths are specified within JD-R theory: the health-impairment path and the motivational path. In the health-impairment path, job demands require energy and consequently lead to exhaustion (Bakker & Demerouti, 2007; Demerouti et al., 2001). In the motivational path, job resources foster motivation and lead to high levels of work engagement (Bakker & Demerouti, 2007).

The applicability of JD-R theory in higher education settings has been tested in initial studies (Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Mokgele & Rothmann, 2014; Salanova et al., 2009). Mokgele and Rothmann (2014) first introduced the SD-R model and assumed that the paths of the JD-R model would also occur in the higher education context. The results actually showed that study demands and a lack of study resources were associated with student burnout. Conversely, study resources were associated with student engagement. As Mokgele and Rothmann (2014) examined only first-year students, Gusy, Wörfel, and Lohman (2016) tested the paths in a sample of German students from all semesters. They confirmed a health-impairment path from study demands to reduced well-being mediated through exhaustion and a motivational path from study resources to well-being mediated through student engagement. Recently, Lesener, Pleiss, et al. (2020) introduced the SD-R framework by validating the key assumptions of the SD-R model in a large, representative sample of university students.

In the studies mentioned above, different study resources and study demands were examined that confirmed the paths specified in the SD-R framework can be initiated by

different characteristics of the study. Xanthopoulou et al. (2009b) emphasized the importance of focusing on the characteristics that are most relevant for the studied target group in order to capture the specificity of the respective environment. Therefore, in our study, we investigated three study resources and two study demands that, on one hand, represent study characteristics as broadly as possible and, on the other hand, have been shown to be particularly important in previous studies of the SD-R framework (Bakker et al., 2015; Gusy, Wörfel, & Lohman, 2016; Robins et al., 2015). The study resource decision latitude is known from the job demand-control model (Karasek et al., 1998; Theorell et al., 1990) and consists of two sub-dimensions: skill discretion and decision authority. Skill discretion means the extent to which different skills and creativity are required. Decision authority describes the autonomy to make one's own decisions within the study program (Schmidt et al., 2019). This resource captures the domain of study organization. In addition, we chose two resources that cover the interpersonal domain: social support from lecturers and social support from fellow students. Social support from lecturers refers to how attentive lecturers are and to what extent they care about their students and help them in their studies. Social support from fellow students describes interest, helpfulness, and friendliness as well as a good cooperation with fellow students (Schmidt et al., 2019). Derived from the challenge-hindrance framework (LePine et al., 2004), we chose two study demands that we expected to represent a challenging and hindering demand: psychological demands and overload. Psychological demands include workload and time pressure (Schmidt et al., 2019). Overload includes qualification requirements as well as qualitative overload (Gusy, Wörfel, Töpritz, & Abt, 2016). Although an a priori categorization into challenging and hindering demands should be viewed with reservation as the interpretation is highly individual (Baethge et al., 2019; Tadić et al., 2015), there is empirical evidence that psychological demands are more likely to show challenge characteristics whereas overload is more likely to be perceived as a hindrance (LePine et al., 2004; LePine et al., 2005).

The vast majority of previous research on student well-being and its antecedents and outcomes is cross-sectional and uses between-person designs that focus on how students differ from one another under the assumption that the studied concepts are stable. These studies cannot explain why one individual student feels more engaged or exhausted during some weeks than they do during others because those studies ignore intraindividual variation (Bakker et al., 2015). Like Ilies et al. (2015), we believe it necessary to conduct further within-person studies that extend findings from between-person studies, as both approaches complement each other. We aim to fill this gap in higher education research by investigating both paths of the SD-R framework for the first time using a weekly diary approach.

There is evidence from JD-R theory that the paths act at the between-person level but also at the within-person level and that the JD-R variables have both a stable component and a malleable component (Bakker, 2015). Evidence from the work context suggests that engagement and exhaustion fluctuate on a daily or weekly basis depending on existing daily or weekly demands and resources (Bakker, 2011, 2015). Bakker and Bal (2010) found that teachers' weekly job resources were positively related to their weekly work engagement. A study by Bakker et al. (2015) is one of the first to examine intraindividual changes in student well-being using a weekly diary approach. Results showed that weekly study resources predicted weekly student engagement. Focusing on exhaustion, Simbula (2010) showed that on days when teachers experienced higher job demands, they also reported higher daily exhaustion. It is obvious that the study program is also characterized by great variability; students have different courses and projects spread over the semester. They interact with different fellow students and lecturers, which can be rather supportive or even exhausting. In addition, exam periods are often characterized more by time pressure than is the beginning of the semester. Therefore, it is expected that study demands and study resources will fluctuate over different weeks as well. In turn, these study characteristics are expected to be relevant predictors for student engagement and student burnout in the corresponding week. Based on

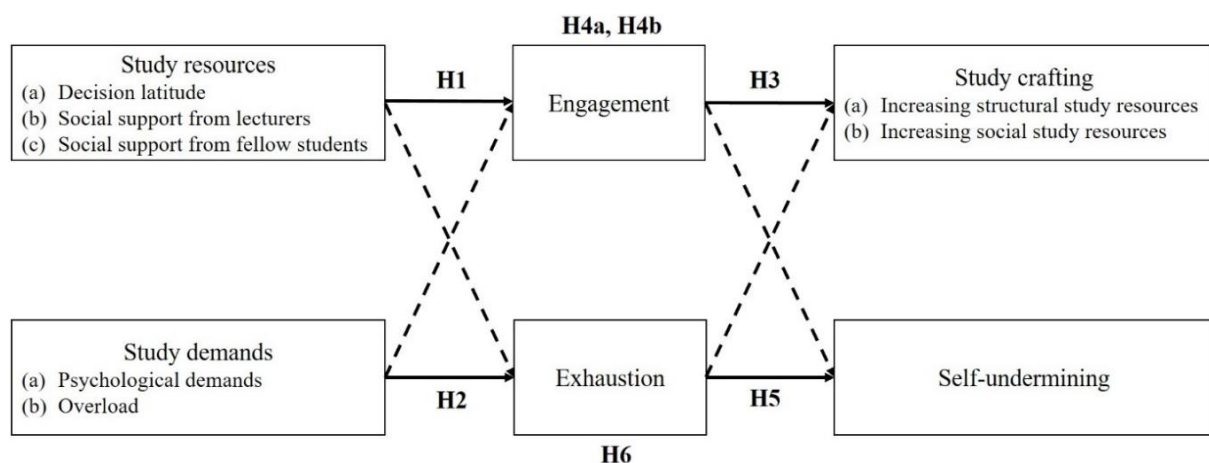
the theoretical and empirical findings on JD-R theory and the SD-R framework, we formulated the following hypotheses (see Figure 3):

Hypothesis 1 (H1). There is a positive relationship between weekly study resources: (a) decision latitude, (b) social support from lecturers, and (c) social support from fellow students and weekly engagement.

Hypothesis 2 (H2). There is a positive relationship between weekly study demands: (a) psychological demands and (b) overload and weekly exhaustion.

Figure 3

The Underlying Research Model for the Weekly Relationships



Study Crafting and Self-Undermining

Within JD-R theory, employees were long seen as passive, reacting to their working conditions. However, employees can also be active in modifying their own work (Tims & Bakker, 2010; Wrzesniewski & Dutton, 2001). Therefore, the JD-R model was extended by the bottom-up approach of job crafting. Job crafting is defined as the proactive changes employees make to their working tasks, relationships, and appraisal of their work (Wrzesniewski & Dutton, 2001), or the proactive changes of employees to their job demands and job resources (Tims & Bakker, 2010). These changes are aimed at better adaption of the

workplace with personal skills, needs, and preferences, as well as a better fit between individual and workplace (Tims et al., 2013). Tims et al. (2013) specify four job crafting strategies: increasing structural resources, increasing social resources, increasing challenging job demands, and decreasing hindering demands. Increasing structural resources means behaviors that influence the job's design such as changing levels of autonomy or variety within the job. Increasing social resources refers to the social aspects of the job such as searching for social support or feedback (Tims et al., 2012). Increasing challenging job demands means behaviors such as taking on new projects. Decreasing hindering demands means, for example, the reduction of cognitive demands (Tims et al., 2013).

JD-R theory assumes that job resources foster engagement. Engaged employees want to stay engaged and therefore exhibit job crafting (Bakker & Demerouti, 2017). This process is consistent with conservation of resources (COR) theory, which states that individuals are motivated to maintain and accumulate their resources (Hobfoll, 2001). A recently published meta-analysis confirmed a reciprocal positive relationship between promotion-focused job crafting (increasing social and structural job resources, increasing challenging job demands) and engagement (Lichtenthaler & Fischbach, 2019). There is evidence that employees also craft their jobs on a daily or weekly basis (Niessen et al., 2016; Petrou et al., 2017; Petrou & Demerouti, 2015).

We investigated the concept of study crafting in the context of higher education for the first time, as this could contribute to a more comprehensive understanding of student well-being. Because we investigated study crafting within the motivational path and therefore focused on resources, we only examined the strategies of increasing social resources and increasing structural resources. Based on the theoretical and empirical findings from the work context regarding job crafting, we made the following hypotheses (see Figure 3):

Hypothesis 3 (H3). There is a positive relationship between weekly engagement and weekly study crafting in the form of (a) increasing structural resources and (b) increasing social resources.

Hypothesis 4a (H4a). Weekly engagement mediates the relationship between weekly study resources and weekly study crafting in the form of increasing structural resources.

Hypothesis 4b (H4b). Weekly engagement mediates the relationship between weekly study resources and weekly study crafting in the form of increasing social resources.

In addition to job crafting, the behavioral component self-undermining was also included in a recent version of JD-R theory (Bakker & Demerouti, 2017). Self-undermining is defined as a “behavior that creates obstacles that may undermine performance” (Bakker & Costa, 2014, p. 115). Examples of self-undermining behavior are poor communication, making mistakes, and creating conflicts (Bakker & Wang, 2020). Within JD-R theory, it is suggested that self-undermining is the initiator of a loss cycle of strain and job demands: Employees with a high level of job demands experience higher levels of strain, which in turn promotes self-undermining (Bakker & de Vries, 2021). Empirical research on this concept is still scarce, but an early study showed that exhaustion positively predicts self-undermining (Ratiu & Dobre, 2020). We introduced the concept to the SD-R framework, as we assumed that behaviors such as making mistakes or creating backlogs are also common among students. Derived from the JD-R theory, we made the following hypotheses (see Figure 3):

Hypothesis 5 (H5). There is a positive relationship between weekly exhaustion and weekly self-undermining.

Hypothesis 6 (H6). Weekly exhaustion mediates the relationship between weekly study demands and weekly self-undermining.

Materials and Methods

Participants and Procedure

Every student at Aalen University ($N = 5573$) was informed about the weekly diary study by e-mail and was given the opportunity to register. In total, 255 students signed up for the study and filled out a short demographic questionnaire upon registration. All registered students then received a web-based diary questionnaire every Friday for four consecutive weeks. Participants who completed all four weekly questionnaires had the potential to win one of five vouchers for local businesses. In addition, EUR 1 per complete diary was donated to charitable institutions. Of the registered students, 32 did not fill out any of the four questionnaires (12.5% non-responders). Participants who completed at least two of the four questionnaires were included in our analyses, resulting in a final sample of 205 participants (80.4%). Of these, 136 participants were female and 69 were male. The average age was 23 years ($SD = 3.20$, $n = 5$ missing). The students studied in the following five faculties: chemistry ($n = 7$), informatics and electronics ($n = 22$), mechanical engineering and materials technology ($n = 27$), optics and mechatronics ($n = 35$), and economics ($n = 114$). Although the number of students from the faculties varied greatly, this is still representative of Aalen University, with chemistry as the smallest faculty and economics as the largest faculty. A majority of participants ($n = 159$) studied at the bachelor's level, and 41 studied at the master's level ($n = 5$ missing).

Measures

Because participation in diary studies requires more effort from participants than filling out a one-time cross-sectional questionnaire, using shortened scales with only a few items is recommended (Ohly et al., 2010). Therefore, for each variable, we selected three items that showed the highest item total correlations in a previous cross-sectional survey as recommended by Ohly et al. (2010).

Study resources were measured with the Questionnaire on Structural Study Conditions (StrukStud; Schmidt et al., 2019), which is based on the job content questionnaire (Karasek et al., 1998). All items were adapted so that they referred to the previous week. *Decision latitude* was measured with three items. An example item is: “This week I had variety in my studies.” Cronbach’s α across the occasions ranged between 0.57 and 0.71. *Social support from lecturers/professors* (e.g., “This week my lecturers/professors helped me in my studies”; Cronbach’s α : 0.83–0.88) and *social support from fellow students* (e.g., “This week my fellow students and I worked well together”; Cronbach’s α : 0.78–0.83) were also measured with three items each. All items were answered on a 4-point Likert-type scale from “does not apply” (1) to “does apply” (4).

We investigated two *study demands*: psychological demands and overload.

Psychological demands were measured with three items of the Questionnaire on Structural Study Conditions (Schmidt et al., 2019) adapted to the week level, for example: “This week, I had to work fast in my studies.” Cronbach’s α varied across the four weeks between 0.82 and 0.90. For measuring *overload*, we selected three week-level adapted items from the scale on study demands of the BARI-S/V08 (Gusy, Wörfel, Töpitz, & Abt, 2016). An example item is, “This week my studies happened to be too difficult.” Cronbach’s α ranged from 0.73 to 0.82. All items were answered on a 4-point Likert-type scale from “does not apply” (1) to “does apply” (4).

Study crafting was measured with a version of the job crafting scale (Tims et al., 2012) that was adapted to the study context (Job Crafting Scale–Student Survey; Gusy, Wörfel, Töpitz, & Abt, 2016). The scale included three items for the sub-dimensions *increasing structural resources* (e.g., “This week I tried to learn new things during in my studies”) and *increasing social resources* (e.g., “This week I asked whether my lecturers are satisfied with my work”) that were adapted to week-level. All items were answered on a 5-point Likert-type scale from “does not apply at all” (1) to “does fully apply” (5). Cronbach’s α

ranged from 0.84 to 0.89 for increasing structural resources and ranged from 0.71 to 0.84 for increasing social resources.

Self-undermining was measured with three items of the self-undermining scale (Bakker & Wang, 2020). The items were adapted to the university context and adjusted so that they referred to the previous week (e.g., “This week I created a backlog in my tasks”). The items were answered on a 7-point Likert-type scale, from “never” (1) to “always” (7). Cronbach’s α ranged between 0.69 and 0.80.

Engagement was measured with a 3-item version (Gusy et al., 2019) of the Utrecht Work Engagement Scale–Student form (UWES-SF; Schaufeli, Martínez, et al., 2002) adapted to the week level. Each item assessed one of the three dimensions: vigor (“This week I felt strong and vigorous when I was studying”), dedication (“This week my study inspired me”), and absorption (“This week I felt happy when I was studying intensely”). The items were rated on a 7-point Likert-type scale from “never” (1) to “always” (7). Cronbach’s α for this scale across the four occasions varied between 0.81 and 0.85.

Emotional exhaustion was measured with the short German version (MBI-SS-KV; Wörfel et al., 2015) of the Maslach Burnout Inventory–Student Survey (MBI-SS; Schaufeli, Martínez, et al., 2002). In line with Demerouti et al. (2001), only emotional exhaustion as the initial symptom of burnout was considered. The three items were adjusted so that they referred to the previous week. An example item is, “This week I felt emotionally drained by my studies.” The items were answered on a 7-point Likert-type scale from “never” (1) to “always” (7). Cronbach’s α ranged between 0.88 and 0.91.

Strategy of Analysis

The weekly study included four repeated measurements (Level 1; $n = 729$ occasions) nested within persons (Level 2; $N = 205$ participants). We therefore analyzed our data using multilevel path analysis in Mplus version 8.5 (Muthén & Muthén, 1998-2007). We employed multilevel structural equation modeling (MSEM) with concurrent models at the within and the

between levels (Preacher et al., 2011). As with the person-centering approach, within effects can be interpreted as controlled for their between-level variation. Furthermore, MSEM is considered to be less prone to estimation bias (Preacher et al., 2010). In our overall model, the three study resources and two study demands were included as independent variables while the two study crafting strategies and self-undermining were included as dependent variables. Engagement and exhaustion were included as potential mediators of the relationships between study characteristics and study crafting/self-undermining. We allowed the mediators to correlate. Although we limited our hypotheses to the theoretically most relevant paths, we also included and tested additional paths in our model (dashed arrows in Figure 3).

As indirect effects typically are non-normally distributed, a distribution-free method should be used for testing mediation effects (Preacher & Hayes, 2008). We therefore analyzed our data using the Bayesian approach (Zyphur & Oswald, 2013). Bayesian analysis provides credibility intervals (CRI) that include a predefined percentage (e.g., 95%) of posterior distribution.

Because repeated measurements data are dependent—previous states can influence current states—we corrected for serial dependency by including lagged variables (Fisher & To, 2012); we included paths from previous engagement (ratings in the previous week; lag-1) on current engagement and from previous exhaustion (ratings in the previous week; lag-1) on current exhaustion to investigate whether our independent variables predicted change in the mediators. Analogously, we included paths from previous study crafting (lag-1) on current study crafting and from previous self-undermining (lag-1) on current self-undermining to test whether our mediators predicted change in the dependent variables. Similarly, for the indirect effects we investigated whether our independent variables predicted change in the mediators (controlling for ratings of the mediator in the previous week), which in turn predicted change in the dependent variables (controlling for ratings of the dependent variables in the previous

week). By including these autoregressive variables, the number of occasions at Level 1 reduced from 729 to 493.

Results

Table 1 shows means, standard deviations, intraclass correlation coefficients (ICC), and within- and between-person correlations among the study variables. The ICCs ranged between .33 and .73, confirming a sufficient within-person variation (between 26.8% for exhaustion and 66.9% for social support from lecturers), thus, justifying multilevel analysis.

Test of Model Fit

We conducted multilevel confirmatory factor analyses (simultaneously at the within- and between-level) to test whether the three study resources and two study demands as well as the two study crafting strategies could be discriminated. Our hypothesized model (Model 1) consisted of ten factors: three study resources (decision latitude, social support from lecturers, social support from fellow students), two study demands (psychological demands, overload), engagement, exhaustion, two study crafting strategies (increasing structural resources, increasing social resources), and self-undermining. This model yielded a good fit to the data. Still, we tested several alternative models. First, we tested Model 2, in which the three study resources were combined into one factor. Next, we tested Model 3, in which the two study demands were combined into one factor. Then we tested Model 4, in which the two study crafting strategies were combined into one factor. Finally, we tested Model 5, where the three study resources, the two study demands, and the two study crafting strategies were combined into one factor each. Table 2 shows the fit indices for the tested models, indicating best model fit for Model 1. Satorra-Bentler scaled χ^2 difference tests (Satorra & Bentler, 2010) also showed superior fit for our hypothesized model compared with Model 2 ($F = 538.04$, $df = 36$, $p < .001$), Model 3 ($F = 425.16$, $df = 19$, $p < .001$), Model 4 ($F = 326.48$, $df = 19$, $p < .001$), and Model 5 ($F = 1424.39$, $df = 62$, $p < .001$). We therefore conclude that our study

variables show sufficient discriminant validity and included them as separate variables in our path analyses.

Test of Direct Effects

Regarding the relationships between the predictors and the mediator within the motivational path, we found that decision latitude ($\gamma = .31$, 95% Credibility interval (CRI) [.20, .42]), social support from lecturers ($\gamma = .17$, 95% CRI [.09, .26]), and social support from fellow students ($\gamma = .12$, 95% CRI [.02, .23]) positively predicted engagement while controlling for previous engagement. Therefore, Hypothesis 1 could be confirmed. Within the health-impairment path, we found that psychological demands ($\gamma = .22$, 95% CRI [.09, .35]) and overload ($\gamma = .45$, 95% CRI [.33, .57]) positively predicted change in exhaustion, confirming Hypothesis 2. Results for the relationships between all predictors and mediators are shown in Table 3a.

Regarding the relationships between the mediator and the dependent variables within the motivational path, we found a positive relationship from engagement to increasing structural resources ($\gamma = .25$, 95% CRI [.19, .31]) and from engagement to increasing social resources ($\gamma = .13$, 95% CRI [.04, .22]), while controlling for previous study crafting. Within the health-impairment path, we found that exhaustion positively predicted change in self-undermining ($\gamma = .16$, 95% CRI [.09, .22]). This provided full support for Hypothesis 3 and Hypothesis 5. Table 3b shows the relationships between the mediators and the outcomes. For complete reporting, the direct effects from the predictors to the outcomes are also reported in Table 3b, although no hypotheses were formulated for those relationships.

Table 1*Means, Standard Deviations, ICCs, and Intercorrelations of all Study Variables*

| Variable | <i>M</i> | <i>SD</i> | ICC | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------------------|----------|-----------|-----|---------|---------|-------|--------|---------|---------|---------|--------|--------|--------|
| 1. Decision latitude | 2.50 | 0.64 | .41 | – | -.30*** | .16** | .09 | -.09* | .31*** | -.16** | .29*** | .19*** | -.10 |
| 2. Support lecturers | 2.68 | 0.74 | .33 | .57*** | – | .12** | .13*** | -.05 | .26*** | -.04 | .22*** | .21*** | .03 |
| 3. Support fellow students | 3.26 | 0.67 | .50 | .21 | -.41*** | – | .14** | .06 | .16*** | -.02 | .13** | .06 | .03 |
| 4. Psychological demands | 3.11 | 0.79 | .56 | -.03 | -.07 | -.06 | – | .28*** | .12* | .20*** | .32*** | .12** | .34*** |
| 5. Overload | 2.52 | 0.78 | .55 | -.18* | -.11 | -.03 | .69*** | – | -.13* | .33*** | .14** | .14** | .40*** |
| 6. Engagement | 3.25 | 1.18 | .62 | .58*** | .28** | -.05 | -.22** | -.41*** | – | -.33*** | .39*** | .17*** | -.05 |
| 7. Exhaustion | 3.98 | 1.72 | .73 | -.32*** | -.20* | -.14 | .72*** | .74*** | -.57*** | – | -.06 | .02 | .32*** |
| 8. Increasing str. resources | 3.77 | 0.84 | .45 | .55*** | .28** | .13 | .25** | .11 | .42*** | -.01 | – | .20*** | .07 |
| 9. Increasing so. resources | 2.21 | 1.07 | .48 | .43*** | .32*** | .01 | .16 | .11 | .28** | .09 | .40*** | – | .04 |
| 10. Self-undermining | 3.60 | 1.38 | .67 | -.14 | -.13 | -.10 | .60*** | .70*** | -.34*** | .70*** | .06 | .10 | – |

Note. $N = 205$. Number of observations = 729. Within-person correlations are above the diagonal and between-person correlations are below the

diagonal. ICC = intraclass correlation coefficients. * $p \leq .05$ ** $p \leq .01$, *** $p \leq .001$.

Table 2*Model Fit Indices for the Tested Models*

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|------------------------|---------------|--|--|--|--|
| | 10 factors | 8 factors (three study resources combined into one factor) | 9 factors (two study demands combined into one factor) | 9 factors (two study crafting strategies combined into one factor) | 6 factors (three study resources, two study demands, two study crafting strategies combined into one factor each) |
| Fit indices | | | | | |
| χ^2 (<i>df</i>) | 1210.75 (721) | 1820.45 (757) | 1611.20 (740) | 1570.01 (740) | 2621.59 (738) |
| AIC | 53140.38 | 53704.36 | 53633.96 | 53473.52 | 54453.31 |
| BIC | 54237.79 | 54636.47 | 54575.25 | 54483.69 | 55266.04 |
| CFI | .94 | .86 | .89 | .89 | .76 |
| TLI | .92 | .84 | .87 | .88 | .74 |
| RMSEA | .03 | .04 | .04 | .04 | .06 |
| SRMR (within) | .05 | .07 | .07 | .08 | .11 |
| SRMR (between) | .07 | .17 | .09 | .12 | .21 |

Note. *df* = degrees of freedom; AIC = Aikaine Information Criterion; BIC = Bayesian

Information Criterion; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA =

Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square

Residual.

Table 3*Within-Person Path Coefficients and Credibility Intervals for the Mediators and the Outcomes*

| <i>(a) Results for the mediators</i> | | | | | | |
|---|---------------------------------|---------------------|-----------------------------|---------------------|------------------|---------------------|
| | Engagement | | Exhaustion | | | |
| | γ | 95% CRI | γ | 95% CRI | | |
| Decision latitude | .31 | [.20, .42] | -.24 | [-.37, -.11] | | |
| Social support from lecturers | .17 | [.09, .26] | .03 | [-.08, .13] | | |
| Social support from fellow students | .12 | [.02, .23] | -.07 | [-.19, .06] | | |
| Psychological demands | .13 | [.02, .23] | .22 | [.09, .35] | | |
| Overload | -.17 | [-.27, -.07] | .45 | [.33, .57] | | |
| Engagement (lag-1) | -.21 | [-.30, -.12] | | | | |
| Exhaustion (lag-1) | | | -.24 | [-.33, -.16] | | |
| <i>(b) Results for the outcomes</i> | | | | | | |
| | Increasing structural resources | | Increasing social resources | | Self-undermining | |
| | γ | 95% CRI | γ | 95% CRI | γ | 95% CRI |
| Engagement | .25 | [.19, .31] | .13 | [.04, .22] | .04 | [-.04, .12] |
| Exhaustion | -.01 | [-.06, .04] | .03 | [-.04, .10] | .16 | [.09, .22] |
| Decision latitude | .19 | [.10, .28] | .17 | [.05, .30] | -.12 | [-.23, -.01] |
| Social support from lecturers | .06 | [-.01, .12] | .18 | [.08, .28] | .06 | [-.03, .15] |
| Social support from fellow students | .01 | [-.08, .09] | -.02 | [-.14, .10] | -.00 | [-.11, .11] |
| Psychological demands | .25 | [.16, .33] | .04 | [-.07, .16] | .28 | [.17, .39] |
| Overload | .14 | [.06, .22] | .21 | [.09, .32] | .39 | [.29, .50] |
| Increasing structural resources (lag-1) | -.15 | [-.23, -.06] | | | | |
| Increasing social resources (lag-1) | | | -.13 | [-.22, -.04] | | |
| Self-undermining (lag-1) | | | | | -.22 | [-.31, -.13] |

Note. γ = unstandardized path coefficient. CRI = Credibility interval. Credibility intervals that do not contain 0 are in bold style.

Test of Indirect Effects

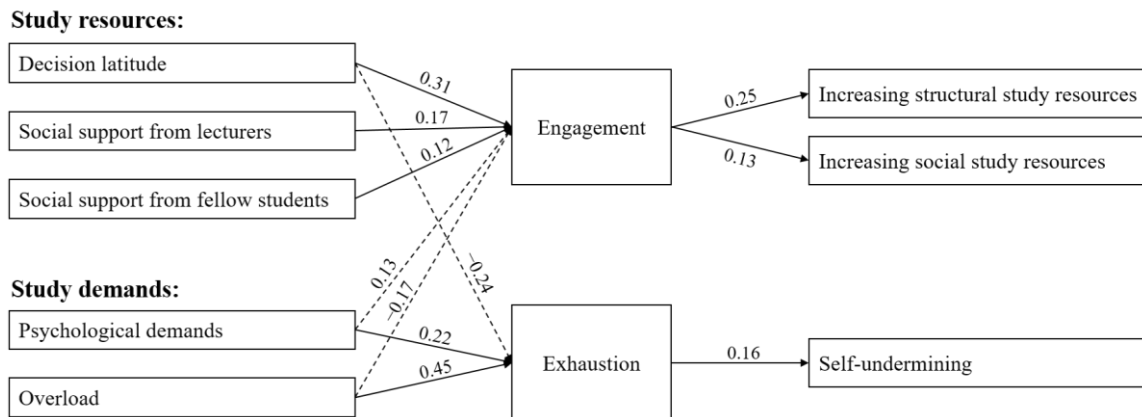
The indirect effects for all paths are shown in Table 4. Engagement mediated the relationship between decision latitude, social support from lecturers, as well as social support from fellow students and increasing structural resources. Engagement also mediated the relationship between decision latitude, social support from lecturers, as well as social support from fellow students and increasing social resources. Therefore, Hypothesis 4a and Hypothesis 4b were supported. Regarding the indirect effect within the health-impairment path, we found that exhaustion mediated the relationship between overload and self-undermining as well as the relationship between psychological demands and self-undermining. Therefore, Hypothesis 6 was also supported. For testing the robustness and uniqueness of our proposed indirect effects, we compared the hypothesized indirect effects with the indirect effects via the other mediator. Results showed that the indirect path from decision latitude ($p < .001$), social support from lecturers ($p < .001$), and social support from fellow students ($p < .05$) to increasing structural resources via engagement was significantly greater than via exhaustion. For increasing social resources, the indirect path from decision latitude ($p < .01$), social support from lecturers ($p < .01$), and social support from fellow students ($p < .05$) via engagement was also significantly greater than via exhaustion. On the other hand, the indirect path from psychological demands ($p < .05$) and overload ($p < .001$) to self-undermining was significantly greater via exhaustion than via engagement. This provides further support for our assumed model. Figure 4 shows the final model.

Table 4*Within-Person Path Coefficients and Credibility Intervals for the Indirect Effects*

| Predictor | Mediator | Outcome | γ | 95% CRI |
|--------------------------------------|------------|---------------------------------|-------------|----------------------|
| <i>Hypothesized indirect effects</i> | | | | |
| Decision latitude | Engagement | Increasing structural resources | .08 | [.05, .11] |
| Social support lecturers | Engagement | Increasing structural resources | .04 | [.02, .07] |
| Social support fellow students | Engagement | Increasing structural resources | .03 | [.00, .06] |
| Decision latitude | Engagement | Increasing social resources | .04 | [.01, .08] |
| Social support lecturers | Engagement | Increasing social resources | .02 | [.01, .05] |
| Social support fellow students | Engagement | Increasing social resources | .01 | [.00, .04] |
| Psychological demands | Exhaustion | Self-undermining | .03 | [.01, .06] |
| Overload | Exhaustion | Self-undermining | .07 | [.04, .11] |
| <i>Additional indirect effects</i> | | | | |
| Psychological demands | Engagement | Increasing structural resources | .03 | [.01, .06] |
| Overload | Engagement | Increasing structural resources | -.04 | [-.07, -.02] |
| Psychological demands | Engagement | Increasing social resources | .02 | [.00, .04] |
| Overload | Engagement | Increasing social resources | -.02 | [-.05, -.01] |
| Decision latitude | Engagement | Self-undermining | .01 | [-.01, .04] |
| Social support lecturers | Engagement | Self-undermining | .01 | [-.01, .02] |
| Social support fellow students | Engagement | Self-undermining | .00 | [-.01, .02] |
| Psychological demands | Engagement | Self-undermining | .00 | [-.01, .02] |
| Overload | Engagement | Self-undermining | -.01 | [-.02, .01] |
| Decision latitude | Exhaustion | Increasing structural resources | .00 | [-.01, .02] |
| Social support lecturers | Exhaustion | Increasing structural resources | .00 | [-.00, .00] |
| Social support fellow students | Exhaustion | Increasing structural resources | .00 | [-.00, .01] |
| Psychological demands | Exhaustion | Increasing structural resources | -.00 | [-.01, .01] |
| Overload | Exhaustion | Increasing structural resources | -.00 | [-.03, .02] |
| Decision latitude | Exhaustion | Increasing social resources | -.01 | [-.03, .01] |
| Social support lecturers | Exhaustion | Increasing social resources | .00 | [-.00, .01] |
| Social support fellow students | Exhaustion | Increasing social resources | -.00 | [-.01, .01] |
| Psychological demands | Exhaustion | Increasing social resources | .01 | [-.01, .02] |
| Overload | Exhaustion | Increasing social resources | .01 | [-.02, .05] |
| Decision latitude | Exhaustion | Self-undermining | -.04 | [-.07, -.01] |
| Social support lecturers | Exhaustion | Self-undermining | .00 | [-.01, .02] |
| Social support fellow students | Exhaustion | Self-undermining | -.01 | [-.03, .01] |

Note. γ = unstandardized path coefficient. CRI = Credibility interval. Credibility intervals that

do not contain 0 are in bold style.

Figure 4*Within-Person Path Coefficients*

Note. For ease of representation, direct effects from the predictors to the outcomes are not shown.

Discussion

The central aim of this study was to investigate the recently introduced SD-R framework (Lesener, Pleiss, et al., 2020) supplemented by the behavioral variables study crafting and self-undermining. More specifically, we examined whether these behaviors are also common among students and whether the underlying antecedents and processes known from the JD-R model apply in the higher education context. Hypotheses were tested using a multilevel structural equation modeling focusing on within-person effects in a weekly diary design. As expected in our hypotheses, our results showed that there was a positive relationship from study resources to study crafting, mediated by engagement within the motivational path. Within the health-impairment path, there was a positive relationship between study demands and self-undermining, mediated by exhaustion. Our study confirms that study characteristics fluctuate over time and that these variations affect student well-being as well as their proactive and dysfunctional behavior.

Previous cross-sectional research has found positive relationships between study resources and engagement and between study demands and exhaustion at the between-person

level (Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Mokgele & Rothmann, 2014). Our results indicate that, regardless of the general availability of study resources, even a weekly (and therefore short-term) experience of decision latitude or social support is relevant for fostering engagement. On the other hand, short-term experience of overload or psychological demands increases exhaustion, regardless of the general level of these study demands. Thus, we extend previous findings by confirming both paths of the SD-R framework at the within-person level for the first time. The results of our study correspond with findings from other studies from the work context, where positive relationships from job resources to engagement and from job demands to exhaustion were already found on a daily basis (Kühnel et al., 2012; Simbula, 2010; Xanthopoulou et al., 2009b) and a weekly basis (Bakker & Bal, 2010).

Looking at study crafting, we found that engagement positively predicted increasing structural and social resources. Furthermore, engagement mediated the relationships between all investigated study resources and the two study crafting strategies. Within the health-impairment path, we found that exhaustion positively predicted self-undermining and mediated the relationships between all investigated study demands and self-undermining. Previous studies on the SD-R framework examined the mediating role of engagement and exhaustion in the relationship between study characteristics and other outcomes such as health (Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020), satisfaction with life (Mokgele & Rothmann, 2014), and performance (Salanova et al., 2009). Our findings on the outcomes study crafting and self-undermining are unique in the higher education context as, to the best of our knowledge, this is the first time these variables have been studied. Consequently, no comparisons of our study with research in this context is possible. However, our findings are in line with the theoretical assumptions of JD-R theory that suggest that, within the motivational path, job resources foster engagement and engaged employees, in turn, show job crafting behavior (Bakker & Demerouti, 2017). Within the health-impairment path, it is

assumed that job demands are positively related to self-undermining through strain (Bakker & de Vries, 2021). Consistent with our findings, there is also empirical evidence from the work context that engagement positively predicts job crafting (Hakanen et al., 2008; Lu et al., 2014; Tims et al., 2015b; Zeijen et al., 2018) and that exhaustion positively predicts self-undermining (Ratiu & Dobre, 2020).

Our additional analyses further revealed that in addition to the indirect effects, there were also direct effects from study resources on study crafting. This corresponds with conservation of resources (COR) theory, which states that people try to conserve but also accumulate their resources (Hobfoll, 2001). There were also direct effects from study demands to study crafting. Again, this is consistent with COR theory, as it is assumed that resource gain cycles are most likely to occur in highly stressful situations (Hobfoll, 2002). Consequently, people should strive to increase their resources (e.g., through study crafting) when there are many demands. There is also empirical evidence for this assumption from a daily diary study in the work context. Petrou et al. (2012) showed that employees engaged in higher levels of seeking resources on days that they experienced high job resources and high job demands.

Regarding the individual study characteristics, the strongest effect on engagement and the strongest indirect effect on study crafting through engagement were found for decision latitude. There is evidence that this study resource is associated with other positive outcomes such as study satisfaction (Cotton et al., 2002; Schmidt et al., 2019; Sieverding et al., 2013) or well-being (Lutz-Kopp et al., 2019), which underscores the importance of this resource. Our additional analyses further revealed a significant negative relationship from decision latitude to exhaustion, which is also in line with previous findings that confirmed a negative effect from study resources on burnout (Lesener, Pleiss, et al., 2020).

Within the health-impairment path, the direct effect on exhaustion and the indirect effect on self-undermining through exhaustion was stronger for overload than for

psychological demands. Additional analyses further revealed a significant positive relationship from psychological demands to engagement and a significant negative relationship from overload to engagement. This can be explained using the challenge-hindrane framework (LePine et al., 2004). This framework builds on the transactional stress model, which assumes that people evaluate stressors as hindrances or challenges depending on their personal coping strategies (Cavanaugh et al., 2000; Lazarus & Folkman, 1984). Studies from the higher education context confirm that hindrance stress has a negative effect on motivation to learn whereas challenge stress has a positive effect on motivation to learn; however, both forms show a positive relationship with exhaustion (LePine et al., 2004). As assumed, based on our results, we conclude that overload is interpreted as a hindrance stressor, whereas most of the participants in our study interpreted psychological demands as a challenge stressor.

Theoretical Contributions

Our study adds to the SD-R framework (Lesener, Pleiss, et al., 2020) in three ways. First, we were able to show that the motivational path can be extended to include the variable study crafting. We define study crafting—in analogy to job crafting—as the proactive changes that students make in their study demands and study resources, and therefore the active influence of the student on his or her study environment (Tims & Bakker, 2010; Wrzesniewski & Dutton, 2001). This change is aimed at a better adaption of the study environment with personal skills, needs, and preferences and therefore a better fit between student and study (Tims et al., 2013). With our findings, we also contribute to the job crafting literature, as this concept is already researched in a variety of domains such as leisure crafting (Berg et al., 2010; Petrou & Bakker, 2016), home crafting (Demerouti et al., 2020), and work-life balance crafting (Gravador & Teng-Calleja, 2018). We confirm that higher education is also a context in which crafting behavior is exhibited. Second, regarding the health-impairment path, we were able to show that it can be extended to include self-undermining.

Derived from the work context, we define self-undermining in the study context as a behavior creating obstacles that may in turn lower academic performance (Bakker & Costa, 2014; Bakker & Wang, 2020). Finally, the present study makes a third contribution by providing insights into the dynamic processes of the SD-R framework through the application of a person-centered approach. We extend findings from previous cross-sectional studies on the SD-R framework by confirming that the paths not only act at a general level, but also at a weekly within-person level. Considering the concepts as transient states enlarges our understanding of how student well-being is affected over short periods of time.

Limitations and Suggestions for Future Research

Our study is not without limitations, but it also offers many starting points for future research. First, all data were collected using self-report measures, which raises concerns about common-method bias (Podsakoff et al., 2003). However, Spector (2006) states that these concerns are often overstated. Because diary research focuses on within-person variation, the influence of response tendencies, such as self-serving bias between persons, is removed. Nevertheless, future studies could combine self-rated measures with other-rated measures (e.g., fellow students, lecturers) and integrate objective measures such as performance (GPA).

Investigating intraindividual effects represents a strength of our study, as we were able to show that the examined paths act at a weekly level. Because we included autoregressors, we can further confirm the robustness of our results. Thus, within-person research seems promising also in the context of higher education. At the same time, we could not ultimately test the directionality of our hypothesized paths with our study. Longitudinal studies could examine causal relationships. As JD-R theory assumes that the variables are dynamically interrelated and continuously influence each other in the form of a gain cycle and a loss cycle, it should be investigated whether these reciprocal relationships also occur within the SD-R framework (Bakker & Demerouti, 2017).

Regarding our sample, another limitation is the relatively small number of study participants. However, this is typical for diary studies because participation here requires a comparatively high effort (Ohly et al., 2010). Furthermore, all students voluntarily participated in our study, which may have caused a self-selection bias. Further studies are warranted to replicate and refine the presented empirical results.

Although we already examined a variety of study resources and study demands, further research could benefit from testing additional resources and demands to obtain a more comprehensive understanding of which short-time study characteristics are most important for student well-being and proactive behavior. In addition, a further step could be to examine personal resources and personal demands because initial studies show that these can also influence student engagement (Bakker et al., 2015).

As we investigated study crafting and self-undermining in the higher education context for the first time, validation of the scales for assessing these constructs is still pending. Bindl et al. (2019) recently introduced a new framework to assess job crafting that distinguishes eight job crafting strategies. It would be worth examining which of these strategies are relevant for students in future studies to obtain a better understanding of crafting in the context of higher education.

A final limitation is that data collection took place during the COVID-19 pandemic and thus during a time that was predominantly characterized by online lectures. This limits the ability to generalize the results to a certain extent, which is why further investigations are necessary when face-to-face study begins again.

Practical Implications

A significant number of students suffer from stress, exhaustion, and mental disorders (Auerbach et al., 2018; Grützmacher et al., 2018). At the same time, many students hold high levels of engagement, which is positively associated with, for example, performance, satisfaction with life, and health (Gusy, Wörfel, & Lohman, 2016; Mokgele & Rothmann,

2014; Schaufeli, Martínez, et al., 2002). The results of our study demonstrate the crucial role of study characteristics in fostering engagement on one hand and preventing exhaustion on the other, especially because variation in engagement and exhaustion influences proactive and dysfunctional student behavior. Therefore, a practical implication of our study for universities is to take care to provide or encourage a resourceful study environment. Academic staff, professors, and lecturers should take care to design study programs in such a way that students have sufficient decision latitude, and they should support students in the best possible way. Social support among students should also be encouraged; for example, by forming learning groups in courses. On the other hand, care should be taken to limit study demands as much as possible, in particular those that the majority of students consider to be hindrances, such as unclear expectations or stalled learning progression (LePine et al., 2004). Although challenging demands may foster engagement, we do not conclude that they are beneficial, *per se*, as they also show a strong relation with exhaustion. Furthermore, there is evidence from the work context that engagement benefits from day-specific challenging demands only on days when a high level of job resources is available (Kühnel et al., 2012). Because our study showed that study characteristics fluctuate on a weekly basis and thus in the short term, attention should be paid to sufficient resources especially during stressful periods; for example, during examination phases. This may help counteract exhaustion and self-undermining and, in contrast, to promote engagement and study crafting.

We assume that there is no optimal level of study resources and study demands that fits all students. In our study, we were able to show that students—just like employees—are not just passive recipients in their studies, but can become active and adapt their study environment themselves via study crafting. For this reason, we see a second practical implication in relying on bottom-up approaches aimed at optimizing the study environment at the individual level (Bakker & Demerouti, 2014). In the work context, a recent review confirms the beneficial effects of job crafting interventions on motivation, well-being,

performance, and strain reduction (Devotto & Wechsler, 2019). Therefore, the next step should be to establish study crafting interventions in which students learn to self-adjust their study demands and study resources and therefore optimize the fit between study and student. Because we assume that behaviors established during studies persist into working life, these interventions can also function as a primary intervention with regard to health in the work context.

Conclusions

As student well-being is of growing interest, a theoretical basis for examining the underlying processes is of great importance. The SD-R framework provides an initial foundation in this regard. Our study adds to existing knowledge of this framework by replicating the findings from between-person studies at the within-person level. Thus, it becomes clear that the theoretical assumptions of the SD-R framework also hold at the weekly level and that dynamic processes should also be included. Furthermore, we expanded the motivational path and the health-impairment path by introducing the concepts of study crafting and self-undermining in the higher education context for the first time. In line with our hypotheses, we confirm that there is a positive relationship between study resources and engagement and between engagement and study crafting and that engagement mediates the relationship between study resources and study crafting within the motivational path. Within the health-impairment path, we confirm that there is a positive relationship between study demands and exhaustion and between exhaustion and self-undermining and that exhaustion mediates the relationship between study demands and self-undermining. Our study hereby helps to narrow the knowledge gap between the widely researched JD-R model and the little-researched SD-R framework. As we are still at the very beginning of research on study crafting and self-undermining in the higher education context, we hope that our study will encourage further research in this area.

Chapter 3 – Study 2: Fostering Study Crafting to Increase Engagement and Reduce Exhaustion among Higher Education Students: A Randomized Controlled Trial of the STUDYCoach Online Intervention²

Abstract

The study demands-resources framework states that study demands increase exhaustion and study resources increase engagement. Study crafting describes a student's proactive adaptation to demands and resources. To date, no intervention in the higher education context has aimed to foster study crafting. Accordingly, this study developed and evaluated the STUDYCoach online intervention, which aimed to increase engagement and reduce exhaustion by promoting study crafting. The study was a randomized controlled trial with a waiting-list control group. All participants ($N = 209$) completed a questionnaire before (T1) and after (T2) the intervention and at a 20-week follow-up (T3). Participants in the intervention group ($n = 149$) used the STUDYCoach over three consecutive weeks. Results showed that overall study crafting, decreasing hindering demands, and engagement significantly increased in the intervention group compared to the control group after the intervention. All effects remained stable at follow-up. Notably, exhaustion decreased significantly in the intervention group from T1 to T3 and T2 to T3. Study crafting mediated the intervention's effect on engagement and exhaustion. Our study extends the study demands-resources framework and the literature on job crafting by confirming that study crafting interventions can be effective in higher education.

² This chapter has been published as a research article in *Applied Psychology: Health and Well-Being*:

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Keywords: engagement, exhaustion, higher education, online intervention, study crafting

Introduction

The Ottawa Charter identifies higher education institutions as an important area for health promotion (World Health Organization, 1986). Because many students will hold influential positions in organizations in the future, it is beneficial for them to gain experience in the field of health promotion during their studies to enable them to apply these skills in their professional lives to improve their health and the health of their employees (Dietz et al., 2020; Wörfel et al., 2016).

The study demands-resources (SD-R) framework (Lesener, Pleiss, et al., 2020)—derived from the job demands-resources (JD-R) model (Demerouti et al., 2001)—states that demands are positively associated with burnout, whereas resources are positively associated with engagement and negatively associated with burnout (Lesener, Pleiss, et al., 2020). However, students, like employees, are not passively exposed to demands and resources, meaning they can actively change them through crafting (i.e., “self-initiated change behaviors that employees engage in with the aim to align their jobs with their own preferences, motives, and passions,” Tims et al., 2012, p. 173). Given the positive effects of job crafting, interventions to foster this behavior have been developed for the work context. Meta-analytic evidence indicates that job crafting interventions can significantly increase job crafting behavior and engagement (Oprea et al., 2019). The concept of job crafting has recently been incorporated into the SD-R framework as study crafting (cf. Choi & Shin, 2018; Dormann & Guthier, 2019; Mülder et al., 2022), but no interventions to increase study crafting behavior exist, despite the possibility that such interventions could positively impact higher education students as well (Körner et al., 2021).

The present study intends to close this gap by evaluating the STUDYCoach online intervention, an adaption of the EngAGE-Coach intervention developed for the work context (Janneck et al., 2018), that aims to foster study crafting. In doing so, we make three contributions to the literature. First, we developed the first intervention based on the SD-R

framework that uses the bottom-up work design concept of study crafting for higher education students and investigated whether this STUDYCoach intervention can increase study crafting in the short and long term. Second, we contribute to research on student well-being by testing whether the STUDYCoach intervention can increase engagement and decrease exhaustion in the short and long term. Third, we examined whether the effects of the intervention on engagement and exhaustion are mediated by study crafting. This approach contributes to further validation of the SD-R framework by examining whether an intervention can actively influence the paths postulated in that framework. Finally, this research should add to the often inconsistent research on job crafting interventions in general.

The Study Demands-Resources Framework

The SD-R framework (Lesener, Pleiss, et al., 2020) enables the investigation of health-promoting and health-impairing processes in the higher education context (Lesener, Pleiss, et al., 2020). The SD-R framework distinguishes two types of study characteristics: study demands and study resources.

Study demands are found at social, physical, organizational, and mental levels and are associated with physical or psychological costs because they require a high level of effort to manage (Lesener, Pleiss, et al., 2020). Students are exposed to numerous study demands, including time pressure, overload, personal expectations, job search anticipation, and constant accessibility (Gusy, Wörfel, & Lohman, 2016; Herbst et al., 2016). Furthermore, the life phase of studying can produce demands by separating students from family and friends (Lesener, Pleiss, et al., 2020). The COVID-19 pandemic has created further study-related demands via the shift to online classes, concerns about delayed graduation, increases to student workload, and social isolation (Koob et al., 2021; Werner et al., 2021). Additionally, students have experienced major uncertainties and concerns about their health and the health of family members and friends as well as financial worries due to unemployment (X. Wang et al., 2020).

Study resources are also present at social, physical, organizational, or mental levels and help students achieve goals, minimize study demands, and develop personally (Lesener, Pleiss, et al., 2020). Important study resources include social support from lecturers or fellow students, autonomy, and opportunities for personal development (Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020). However, the COVID-19 pandemic has depleted resources such as social contacts due to online teaching. Additionally, extracurricular or social events have been canceled or postponed (Lederer et al., 2021).

Exhaustion and Engagement in Higher Education Students

According to Schaufeli, Martínez, et al. (2002), *burnout* describes a sense of exhaustion, an attitude of cynicism and detachment toward one's studies, and a sense of incompetence as a student. The exhaustion component is characterized by the feeling of being overwhelmed and represents the core dimension of burnout (Maslach et al., 2001). In an international review, Rosales-Ricardo et al. (2021) observed a 55% prevalence of exhaustion among higher education students. Given this high prevalence and following Demerouti et al. (2001), this study focuses on this core dimension of burnout.

Engagement is defined as a sustained positive motivational sense of fulfillment characterized by vigor, dedication, and absorption. Engagement is strongly related to academic performance and negatively associated with burnout (Salanova et al., 2009). Notably, engagement is significantly lower during online classes compared to face-to-face classes (Salta et al., 2022).

In response to the call for intervention programs aimed at reducing demands and increasing resources for higher education students (Jagodics & Szabó, 2023), the introduction of the STUDYCoach aims to empower higher education students to decrease their study-related demands and increase their available resources. By enabling students to perform study crafting behavior, we expect to reduce exhaustion and increase engagement.

Job Crafting and its Applicability to the Higher Education Context

Employees have long been considered passive performers of management-designed jobs, promoting job design based on top-down approaches (Tims & Bakker, 2010). However, these top-down measures cannot optimize the individual fit between employee and job, suggesting the need for measures initiated by the employee (Devotto & Wechsler, 2019). Accordingly, recent approaches have adopted a bottom-up perspective in response to insights demonstrating that employees can actively influence their workplace as job crafters (Tims & Bakker, 2010; Wrzesniewski & Dutton, 2001).

Job crafting was originally defined as the physical and cognitive changes employees make to their tasks or relationships at work to better align their work with their needs and abilities (Wrzesniewski & Dutton, 2001). Tims and Bakker (2010) embedded the concept of job crafting into the JD-R model and defined job crafting as changing one's job demands and job resources.

Tims et al. (2012) distinguished four job crafting strategies: increasing structural resources, increasing social resources, increasing challenging demands, and reducing hindering demands. Increasing structural resources refers to the design of the job and includes behaviors such as seeking development opportunities (Tims et al., 2012). Increasing social resources includes, for example, increasing the amount of feedback in the workplace (Tims et al., 2013). Increasing challenging demands includes taking on new tasks when employees feel as though their job does not utilize all of their existing skills (Tims & Bakker, 2010; Tims et al., 2013). Finally, reducing hindering demands involves employees relinquishing tasks or reducing demanding contacts when they feel overwhelmed (Tims & Bakker, 2010).

Meta-analytic evidence also suggests that job crafting relates positively to engagement and negatively to job strain and burnout (Lichtenthaler & Fischbach, 2019; Rudolph et al., 2017). Furthermore, JD-R theory recognizes job crafting as the mechanism by which employees achieve higher engagement (Bakker & Demerouti, 2017). Empirical findings

confirm this theoretical assumption. A three-wave study by Vogt et al. (2016) confirmed that job crafting predicts engagement over time, research by Tims et al. (2013) demonstrated that job crafting helps build resources, which leads to a reduction in burnout and an increase in engagement. Oprea et al. (2019) confirmed in their meta-analysis that job crafting increases engagement.

The concept of job crafting has recently been incorporated into the SD-R framework with *study crafting* describing the student's proactive modification of the study environment (i.e., study demands and study resources). This behavior also aims to improve the fit between the study environment and the student's preferences, needs, and abilities (Körner et al., 2021).

Job Crafting Interventions

Given the positive effects of job crafting, interventions to promote job crafting behavior have been developed for the work context. Previous job crafting interventions have significantly increased both overall job crafting (e.g., van Wingerden et al., 2016, 2017a) and the four strategies of increasing structural resources (e.g., van Wingerden, Derks, & Bakker, 2017), increasing social resources (e.g., van Wingerden, Derks, & Bakker, 2017), increasing challenging demands (e.g., van Wingerden, Bakker, & Derks, 2017a), and reducing hindering demands (e.g., Gordon et al., 2018). Although most studies have examined effects immediately after the intervention, one study also examined the long-term effects of a job crafting intervention (van Wingerden, Bakker, & Derks, 2017b). Here, job crafting was found to increase immediately after the intervention and at follow-up 1 year after the intervention, suggesting that job crafting interventions may also have long-term effects. In the reported studies, the effect sizes for the significant time effect in the intervention group for the different job crafting strategies ranged from $\eta_p^2 = .04$ to $\eta_p^2 = .17$ (van Wingerden, Bakker, & Derks, 2017a, 2017b). Gordon et al. (2018) reported effect sizes between $\eta_p^2 = .04$ and $\eta_p^2 = .08$ for the significant interaction effect on reducing hindering demands. Several recent reviews and meta-analyses have been conducted due to the growing number of job crafting

interventions. For instance, Devotto and Wechsler (2019) considered eight job crafting intervention studies in their review and found that each intervention significantly increased the implementation of at least one job crafting strategy. Elsewhere, Oprea et al. (2019) recently published a meta-analysis that considered 13 job crafting interventions. They confirmed statistically significant effects of the interventions on overall job crafting, increasing challenges, and reducing demands.

Concerning employee well-being, many intervention studies have observed increased engagement following job crafting interventions (e.g., Gordon et al., 2018; van Wingerden, Bakker, & Derks, 2017a). This has been confirmed via meta-analysis (Oprea et al., 2019). For engagement, van Wingerden, Bakker, and Derks (2017a) reported an effect size of $\eta_p^2 = .03$ for the significant time effect in the intervention group and Gordon et al. (2018) reported effect sizes between $\eta_p^2 = .07$ and $\eta_p^2 = .22$ for the significant interaction effect of time and group. Meanwhile, other studies have indicated that job crafting interventions can also reduce psychological distress (e.g., Sakuraya et al., 2016). Notably, all the studies mentioned thus far involved face-to-face interventions. However, more recently, Verelst et al. (2021) tested an electronic job crafting intervention and concluded that it represents an effective alternative to traditional interventions based on the observation of significant increases in job crafting following the tested intervention. Elsewhere, testing an online intervention as part of the EngAGE-Coach program, Uglanova and Dettmers (2023) recorded a significant reduction in irritation among participants of the intervention group.

Health Promotion in Higher Education

Given the high rates of common mental health disorders among higher education students (Auerbach et al., 2018), various interventions target the mental health of this population. However, there are mixed results regarding effectiveness of these interventions. Reviews have predominantly revealed small effect sizes for interventions designed to prevent depression or anxiety (Amanvermez et al., 2020; Reavley & Jorm, 2010). In their review,

Winzer et al. (2018) confirmed small but partially sustained effects of preventive interventions and interventions aimed at positive mental health.

Dietz et al. (2020) presented the criticism that most interventions are directed exclusively at certain students (i.e., from certain fields of study) who tend to be particularly at risk of health impairments. Indeed, students do not seek professional help for various reasons, including skepticism about treatment and preferring to solve problems alone or with the help of friends and family (D. D. Ebert et al., 2019; Eisenberg et al., 2007).

Notably, online interventions demonstrate several advantages over face-to-face interventions and can lower the threshold for student participation. For example, there is no waiting time for treatment, access is available regardless of time or location, and such interventions are cost-effective and counter stigma by ensuring anonymity (D. D. Ebert et al., 2013; Lutz-Kopp et al., 2019). However, although online interventions represent a valuable alternative—especially during the COVID-19 pandemic, with students largely off-campus (Benjet, 2020)—reviews of internet interventions to improve the mental health of higher education students have observed relatively small effects (Farrer et al., 2013; Harrer et al., 2019).

Recognizing the often limited effectiveness of previous interventions in the higher education context, Jagodics and Szabó (2023) recommended using interventions designed for other populations. Following this recommendation, this study adapts a job crafting intervention from the work context to the higher education context. We used an online intervention to reach many students and investigated long-term effects by conducting a follow-up measurement after 20 weeks.

The similarity between study and work (Ouweneel et al., 2011) and the theoretical and empirical findings from the work context concerning the impact of job crafting interventions on job crafting and employee well-being, as well as the mediation effects, led to the following hypotheses (see Figure 5):

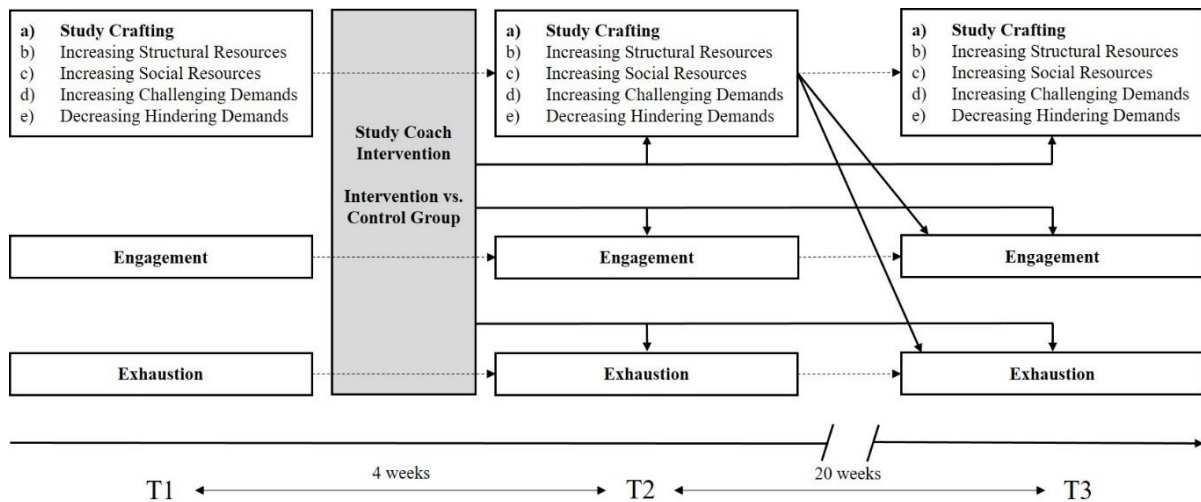
Hypothesis 1. The intervention group (IG), as compared to the waiting-list control group (WCG), will show significantly higher levels of (a) overall study crafting, (b) increasing structural resources, (c) increasing social resources, (d) increasing challenging demands, and (e) decreasing hindering demands after the intervention (T2 and T3) compared with pre-intervention (T1) levels.

Hypothesis 2. The IG, as compared with the WCG, will show (a) significant increases in engagement and (b) significant decreases in exhaustion after the intervention (T2 and T3) compared with the pre-intervention (T1) levels.

Hypothesis 3. Study crafting after the intervention (T2) mediates the relationship between the intervention and (a) engagement and (b) exhaustion at follow-up (T3).

Figure 5

Overview of the Study Design and Hypotheses



Note. T1, pre-intervention; T2, post-intervention; T3, follow-up.

Method

Participants and Procedure

To estimate the required sample size, we conducted an a priori power analysis for a repeated measures analysis of variance in a 3×2 factorial design. Based on the results of prior job crafting intervention evaluations, we conducted our analysis assuming a small effect of $f = .1$ and a power of 80%. This indicated a sample of 164 participants. Therefore, we aimed to obtain full participation from at least 170 students. In accordance with meta-analytic evidence, we assumed an attrition rate of approximately 30% (cf. Farris et al., 2020) for the intervention and the control group (cf. Crutzen et al., 2013). This was taken into account accordingly during recruitment. The study population included all students at German higher education institutions. Student advisors and student councils at all German universities were contacted and asked to forward an email with information about the study to their students. To participate in our study, participants had to be enrolled at a German university and be at least 18 years old. Students could register for the study via email. In accordance with the ethical guidelines of the American Psychological Association, participation was voluntary, no financial compensation was provided, and informed consent was obtained before the study began (American Psychological Association, 2017). Psychology students could receive credits. Additionally, students who completed the study could access the STUDYCoach platform for three additional months. Approval for the study was obtained from the local ethics committee.

The study was a randomized controlled trial with a WCG. After students registered, they were randomly assigned (in turn) to one of three IGs or the WCG, with participants distributed equally among the four groups. The three IGs only differed in the sequence of presentation of the intervention modules, and they were combined into a single IG for further analyses. Participant information informed participants about the randomized group allocation and the fact that there would be two start dates for the intervention. The information about

which group the participants were assigned to was sent to them by email before the intervention started. No blinding was used in our study. At the beginning of the study, all students received an email with their STUDYCoach login link, which allowed them to create their personal account. Students then completed the pre-intervention questionnaire (T1) on the STUDYCoach platform. The intervention comprised of three modules, with each module completed over 1 week. After completing the STUDYCoach intervention, participants completed the post-intervention questionnaire (T2). Twenty weeks after T2, participants completed the follow-up questionnaire (T3). After completing the follow-up questionnaire, the WCG was granted access to the STUDYCoach platform. Figure 5 illustrates the study design.

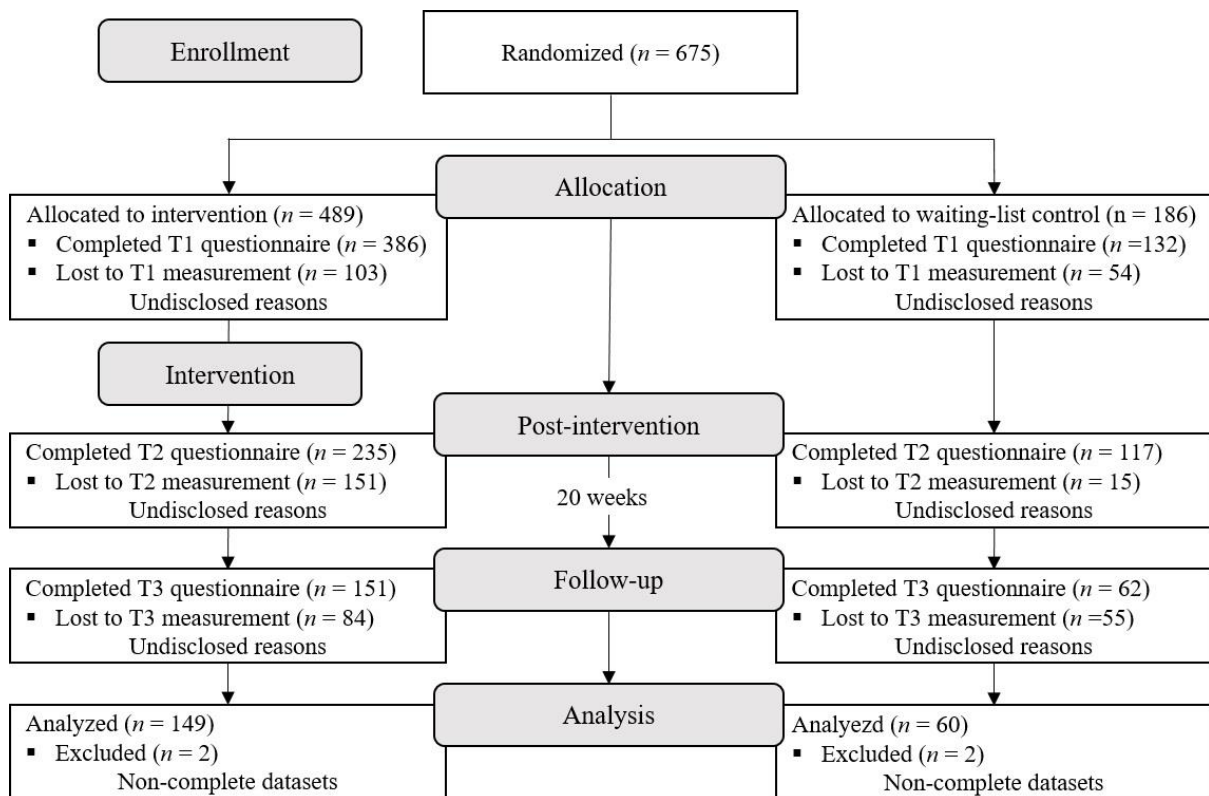
A total of 675 higher education students registered for the study. Of these, 518 completed the questionnaire at T1 (23.3% non-responders). The T2 questionnaire was completed by 352 participants (32.1% dropout from T1 to T2), and the follow-up questionnaire (T3) was completed by 213 participants (39.5% dropout from T2 to T3). Our final sample for data analysis included 209 participants who answered the questionnaire at all three measurement time points. A visualization of randomization and sample size over the course of the study is provided by the CONSORT flow diagram (Figure 6).

Of the 209 participants who completed the three questionnaires, 165 were women, 37 were men, and 4 were diverse (not specified: $n = 3$). Participants were, on average, 24.05 years old ($SD = 5.35$). Most participants (83.3%) were in a bachelor's degree program, 12.4% were in a master's degree program, and 0.5% were in a doctoral degree program (other: 3.8%). On average, participants were in their fourth semester of higher education ($M = 4.22$, $SD = 2.77$). Almost half of the participants indicated that they already had work experience ($n = 86$, 41.1%). Of the 209 participants, 149 were allocated to an IG (IG1: $n = 53$, IG2: $n = 52$, and IG3: $n = 44$). These participants were, on average, 24.01 years old ($SD = 5.32$), and 118 were female, 27 were male, and 2 were diverse, (not specified: $n = 2$).

The 60 participants in the WCG were, on average, 24.13 years old ($SD = 5.47$), and 47 were female, 10 were male, and 2 were diverse (not specified: $n = 1$).

Figure 6

CONSORT Flowchart Showing Participant Flow



Note. T1, pre-intervention; T2, post-intervention; T3, follow-up.

The STUDYCoach

The STUDYCoach intervention was adapted from the EngAGE-Coach intervention (Janneck et al., 2018) for the target group of higher education students by shortening some content and relating it to the study context and adding the Study Crafting module. The STUDYCoach intervention comprises three online modules, each of which participants complete independently over 1 week: My Study, My Study Environment, and Study Crafting. Each module features three submodules. All modules involve theoretical input and practical exercises supplemented by video and audio inputs. In the Study Crafting module, a fictional

person is used to guide participants. The duration of each module is between 60 and 120 min.

Table 5 provides an overview of the STUDYCoach intervention.

Table 5

The STUDYCoach Modules and Submodules With Their Respective Contents

| <i>Modules</i> | <i>Submodules</i> | <i>Topics</i> |
|----------------------|--------------------------|--|
| My Study | Study organization | Setting priorities according to the Eisenhower method for efficient and structured study; Analysis of own interruptions and strategies for reduction |
| | Self-motivation | Dealing with unpleasant tasks by implementing rewards |
| My Study Environment | Ergonomics | Analysis and ergonomic optimization of the workplace; Analysis and ergonomic optimization of mobile workplaces; Ergonomic exercises for in between, for example, back exercises |
| | Accessibility | Analysis of one's accessibility; Definition of limits of one's accessibility for the creation of free spaces |
| | Social resources | Analysis and resolution of social conflicts; Search for social support; Dealing with difficult fellow students |
| Study Crafting | Networking | Analysis of the current network and strategies to increase/reduce contact; Analysis of communication with the four-sided model (Schulz von Thun, 2014) |
| | Person and task analysis | Identification of one's tasks in the study; Identification of one's values, needs, and strengths; Increasing the fit between tasks and personal values, needs, and strengths (Berg et al., 2008) |
| | My study crafting | Reflection on one's study crafting behavior; Getting to know the different study crafting strategies |
| | SMART goals | Setting two study crafting goals for the following two weeks using the SMART method (Doran, 1981) |

Measures

The questionnaires were identical across the three measurement time points (T1, T2, and T3), with the T1 questionnaire collecting the following demographic variables in addition to the outcome variables: age, gender, study degree, semester of higher education, and work experience. Cronbach's alphas appear in Table 6.

Study crafting was measured using a version of the German Job Crafting Scale (Lichtenthaler & Fischbach, 2016) adapted to the study context and shortened to 16 items. The subdimensions of *increasing structural resources* (e.g., "I try to develop myself further"), *increasing social resources* (e.g., "I ask my fellow students for advice"), *increasing challenging demands* (e.g., "I look for challenges in my activities"), and *reducing hindering demands* (e.g., "I make sure that my studies are less mentally demanding") were each surveyed via four items. Response to all items were collected using a 5-point Likert-type scale (1 = *not at all true*, 5 = *completely true*).

Engagement was measured using the Utrecht Work Engagement Scale-Student Form (Schaufeli, Martínez, et al., 2002), which includes three dimensions: vigor (e.g., "When I study, I feel like I am bursting with energy"), dedication (e.g., "I am enthusiastic about my studies"), and absorption (e.g., "I feel happy when I am studying intensely"). Each dimension includes three items answered on a 7-point Likert-type scale (1 = *never*, 7 = *always*).

Exhaustion was measured using the German version of the Maslach Burnout Inventory-Student Survey (Schaufeli, Martínez, et al., 2002). The scale comprises three items, for example, "I feel tired when I get up in the morning and I have to face another day at university". The items were answered on a 7-point Likert-type scale (1 = *never*, 7 = *always*).

Strategy of Analysis

Data were analyzed using IBM SPSS version 26. First, we tested for sociodemographic differences between the IG and the WCG using chi-square tests and *t*-tests. Then, we used multivariate analysis of variance (ANOVA) to test whether there were

significant differences between the two groups at T1 for all research variables. To test Hypotheses 1 and 2, we conducted 3×2 repeated measures (RM) ANOVAs for all study variables with time (T1, T2, and T3) as the within-subject factor and group (IG and WCG) as the between-subject factor. Prior to analysis, the prerequisites of RM ANOVA were checked. Normal distribution testing was unnecessary given the sample size ($N > 25$). We tested for homogeneity of error variances using the Levene test. Sphericity was tested using the Mauchly test (Salkind, 2010). When the sphericity assumption was violated, the Greenhouse-Geisser epsilon (ϵ) was considered. For $\epsilon < .75$, the Greenhouse-Geisser correction was selected. For $\epsilon > .75$, the Huynh-Feldt correction was selected (Girden, 1992). In the event of a significant interaction effect, the main effect for time was examined separately for both groups. Additionally, in the event of a significant main effect of time, differences between two measurement time points (T1–T2, T1–T3, and T2–T3) were investigated via additional RM ANOVAs. Partial eta squared (η_p^2) is reported as effect size and interpreted as follows: $\eta_p^2 > .01$ = small effect; $\eta_p^2 > .06$ = medium effect; and $\eta_p^2 > .14$ = large effect. In addition we also report Cohen's d as an alternative effect size, indicating small ($d = .2$), medium ($d = .5$), and large ($d = .8$) effects according to Cohen (1988). Hypothesis 3 was tested using mediation analyses. Model 4 of the Hayes Process macro for SPSS was used (Hayes, 2017). Group membership (IG and WCG) was included as the X variable. Study crafting at T2 was included as the mediator, and engagement or exhaustion at T3 was included as the Y variable. Study crafting at T1 and the value of the investigated Y variable at T1 were included as control variables. For indirect effects, 95% confidence intervals were calculated using 5000 bootstrap samples.

Results

Means, standard deviations, reliabilities, and correlations between all study variables at the three measurement time points appear in Table 6.

Table 6*Correlation Matrix and Descriptive Statistics*

| Variable | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--|----------|-----------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------|--------|--------|
| 1. Engagement T1 | 4.21 | 1.11 | (.93) | | | | | | | | | | | |
| 2. Exhaustion T1 | 3.36 | 1.30 | -.51** | (.86) | | | | | | | | | | |
| 3. Study Crafting T1 | 3.08 | 0.44 | .52** | -.23** | (.68) | | | | | | | | | |
| 4. Increasing structural resources T1 | 4.02 | 0.54 | .52** | -.28** | .54** | (.65) | | | | | | | | |
| 5. Increasing social resources T1 | 2.60 | 0.75 | .31** | -.11 | .62** | .18** | (.61) | | | | | | | |
| 6. Increasing challenging demands T1 | 3.01 | 0.88 | .29** | -.07 | .69** | .20** | .27** | (.73) | | | | | | |
| 7. Decreasing structural hindering demands T1 | 2.78 | 0.92 | .07 | -.21* | .31** | .06 | -.01 | -.05 | (.68) | | | | | |
| 8. Decreasing social hindering demands T1 | 2.59 | 1.08 | .22** | -.04 | .47** | .14* | .04 | .10 | .21** | (.73) | | | | |
| 9. Engagement T2 | 4.32 | 1.15 | .81** | -.43** | .41** | .44** | .24** | .23** | .05 | .16* | (.95) | | | |
| 10. Exhaustion T2 | 3.28 | 1.16 | -.48** | .77** | -.18** | -.21** | -.09 | -.12 | -.07 | .01 | -.55** | (.85) | | |
| 11. Study Crafting T2 | 3.20 | 0.49 | .43** | -.17* | .64** | .36** | .40** | .52** | .06 | .29** | .50** | -.28 | (.77) | |
| 12. Increasing structural resources T2 | 3.92 | 0.59 | .46** | -.22** | .42** | .59** | .19** | .27** | -.06 | .12 | .52** | -.31** | .63** | (.68) |
| 13. Increasing social resources T2 | 2.69 | 0.74 | .22** | -.06 | .38** | .08 | .55** | .24** | -.06 | .05 | .29** | -.17* | .64** | .20** |
| 14. Increasing challenging demands T2 | 3.03 | 0.88 | .30** | -.06 | .56** | .24** | .27** | .74** | -.13 | .12 | .33** | -.15* | .73** | .40** |
| 15. Decreasing structural hindering demands T2 | 3.20 | 0.89 | .11 | -.15* | .22** | .08 | .03 | .00 | .45** | .22** | .14* | -.15* | .43** | .16* |
| 16. Decreasing social hindering demands T2 | 3.17 | 1.10 | .18* | -.05 | .28** | .12 | .04 | .05 | .21** | .47** | .21* | -.08 | .54** | .16* |
| 17. Engagement T3 | 4.31 | 1.16 | .75** | -.38** | .37** | .39** | .21** | .25** | -.01 | .12 | .83** | -.49** | .45** | .46** |
| 18. Exhaustion T3 | 3.14 | 1.21 | -.44** | .64** | -.19** | -.24** | -.08 | -.12 | -.10 | .00 | -.46** | .70** | -.25** | -.28** |
| 19. Study Crafting T3 | 3.22 | 0.54 | .41** | -.21** | .55** | .30** | .32** | .48** | .07 | .23** | .44** | -.33** | .73** | .49** |
| 20. Increasing structural resources T3 | 3.99 | 0.58 | .42** | -.18** | .39** | .47** | .13 | .31** | -.04 | .17* | .46** | -.29** | .54** | .68** |
| 21. Increasing social resources T3 | 2.65 | 0.82 | .28** | -.22** | .34** | .07 | .48** | .22** | -.03 | .04 | .34** | -.34** | .48** | .25** |
| 22. Increasing challenging demands T3 | 3.07 | 0.90 | .24** | -.08 | .51** | .21** | .22** | .69** | -.06 | .08 | .23** | -.15** | .56** | .27** |
| 23. Decreasing structural hindering demands T3 | 3.12 | 0.94 | .22** | -.13 | .19** | .09 | -.04 | .01 | .43** | .20** | .23** | -.16* | .32** | .23** |
| 24. Decreasing social hindering demands T3 | 3.24 | 1.05 | .20** | -.08 | .30** | .18* | .09 | .11 | .11 | .38** | .21** | -.10 | .42** | .23** |

Note. $N = 209$. Cronbach's alphas are presented in parentheses in the diagonal. T1 = pre-intervention, T2 = post-intervention, T3 = follow-up.

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

Table 6 (continued)*Correlation Matrix and Descriptive Statistics*

| Variable | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|--|-------|-------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|
| 13. Increasing social resources T2 | (.66) | | | | | | | | | | | |
| 14. Increasing challenging demands T2 | .36** | (.72) | | | | | | | | | | |
| 15. Decreasing structural hindering demands T2 | .01 | .02 | (.80) | | | | | | | | | |
| 16. Decreasing social hindering demands T2 | .15* | .10 | .51** | (.87) | | | | | | | | |
| 17. Engagement T3 | .27** | .30** | .14* | .18** | (.94) | | | | | | | |
| 18. Exhaustion T3 | -.17* | -.11 | -.15* | -.08 | -.55** | (.86) | | | | | | |
| 19. Study Crafting T3 | .50** | .53** | .26** | .37** | .50** | -.38** | (.82) | | | | | |
| 20. Increasing structural resources T3 | .24** | .35** | .16* | .21** | .57** | -.37** | .71** | (.70) | | | | |
| 21. Increasing social resources T3 | .63** | .30** | .04 | .12 | .34** | -.35** | .73** | .36** | (.72) | | | |
| 22. Increasing challenging demands T3 | .36** | .69** | .05 | .10 | .31** | -.17* | .73** | .43** | .41** | (.77) | | |
| 23. Decreasing structural hindering demands T3 | .04 | .05 | .49** | .36** | .23** | -.18* | .47** | .28** | .17* | .06 | (.79) | |
| 24. Decreasing social hindering demands T3 | .16* | .10 | .33** | .61** | .19** | -.17* | .54** | .29** | .20** | .15* | .37** | (.86) |

Note. $N = 209$. Cronbach's alphas are presented in parentheses in the diagonal. T1 = pre-intervention, T2 = post-intervention,

T3 = follow-up. * $p < .05$, ** $p < .01$.

Test of Model Fit

We conducted confirmatory factor analyses using Mplus version 8.5 to test our hypothesized factor structure. A one factor model for engagement fitted the data satisfactorily, though indicating potential item redundancy ($\chi^2 = 496.38$, $df = 27$, $CFI = .85$, $RMSEA = .18$). The three items to measure exhaustion, constraining the factor variance on 1, showed a good fit to a one-factor model ($\chi^2 = 4.32$, $df = 1$, $CFI = 1.00$, $RMSEA = .08$). For study crafting, a five factor model with two separate factors for the strategy decreasing hindering demands resulted in a significant better fit ($\chi^2 = 292.59$, $df = 94$, $CFI = .91$, $RMSEA = .06$) as compared with the hypothesized four factor model ($\chi^2 = 496.11$, $df = 98$, $CFI = .81$, $RMSEA = .09$). Based on the items, we therefore separated the factor decreasing hindering demands in decreasing structural hindering demands and decreasing social hindering demands and conducted our analyses separately for both factors.

Dropout Analysis

We conducted dropout analyses to examine whether participants who did not complete the questionnaire at T2 or T3 differed from participants who completed all stages of the study. Participants who dropped out of the study at T2 and participants who completed the three questionnaires did not differ in terms of gender, semester of higher education, study degree, and work experience. Multivariate ANOVA showed no significant differences in the study variables at T1 between participants who dropped out at T2 and participants who completed the three questionnaires, $F(7, 370) = .85$, $p = .55$, Wilk's $\Lambda = .98$. Although, participants who dropped out at T3 and participants who completed the three questionnaires did not differ in terms of gender, study degree, and work experience, participants who dropped out at T3 were, on average, in a later semester of their studies than participants who completed the three questionnaires, $t(254.34) = -2.54$, $p < .05$. Nonetheless, multivariate ANOVA based on differences in our study variables at T1 and T2 revealed no significant differences between the two groups, $F(14, 328) = .89$, $p = .58$, Wilk's $\Lambda = .96$.

Test of Hypotheses

There were no significant differences between the IG and the WCG in terms of gender, $\chi^2(3) = .97, p = .81$, age, $t(204) = -.15, p = .88$, study degree, $\chi^2(3) = 3.98, p = .26$, work experience, $\chi^2(1) = .05, p = .83$, or semester of higher education, $t(207) = .29, p = .77$, or regarding our study variables at T1, $F(7, 200) = 1.15, p = .336$, Wilk's $\Lambda = .96$.

Study crafting

For overall study crafting (H1a), we found a statistically significant time \times group interaction effect, $F(1.90, 393.72) = 5.55, p < .01, \eta^2 = .03$. We found a significant main effect of time for the IG, $F(1.85, 274.36) = 17.61, p < .001, \eta^2 = .11$. Within the IG, study crafting was significantly higher at T2 compared with T1, $F(1, 148) = 21.39, p < .001, \eta^2 = .13$, and significantly higher at T3 compared with T1, $F(1, 148) = 24.63, p < .001, \eta^2 = .14$. We found no significant main effect of time for the WCG, $F(2, 118) = .59, p = .56$. These findings confirm H1a.

Concerning the study crafting strategy increasing structural resources (H1b), we found no statistically significant time \times group interaction effect, $F(1.90, 394.10) = .01, p = .99$. We observed a significant main effect of time for the overall group, $F(1.90, 394.10) = 3.28, p < .05, \eta^2 = .02$. In the overall group, increasing structural resources was significantly lower at T2 compared with T1, $F(1, 208) = 7.69, p < .01$. We also found a significant main effect of group, $F(1, 207) = 5.59, p < .05, \eta^2 = .03$. Increasing structural resources was higher on average in the IG than in the WCG. Hence, H1b was rejected.

Concerning the study crafting strategy increasing social resources (H1c), we found no statistically significant time \times group interaction effect, $F(1.94, 400.90) = 2.27, p = .11$. We found no significant main effect of time, $F(1.94, 400.90) = 1.55, p = .22$, but a significant main effect of group, $F(1, 207) = 4.46, p < .05, \eta^2 = .02$, indicating that increasing social resources was, on average, higher in the IG than in the WCG. Thus, H1c was rejected.

Concerning the study crafting strategy increasing challenging demands (H1d), we found no statistically significant time \times group interaction effect, $F(2, 414) = .91, p = .40$. We found no significant main effect of time, $F(2, 414) = .19, p = .83$, and no significant main effect of group, $F(1, 207) = 2.85, p = .09$. Thus, H1d was rejected.

Concerning the study crafting strategy decreasing hindering demands (H1e), we found a statistically significant time \times group interaction effect for decreasing structural hindering demands, $F(2, 414) = 6.18, p < .01, \eta_p^2 = .03$. There was a significant main effect of time for the IG, $F(2, 296) = 24.28, p < .001, \eta_p^2 = .14$. Within the IG, decreasing structural hindering demands was significantly higher at T2 compared with T1, $F(1, 148) = 34.85, p < .001, \eta_p^2 = .19$, and significantly higher at T3 compared with T1, $F(1, 148) = 34.09, p < .001, \eta_p^2 = .19$. We found no significant main effect of time for the WCG, $F(2, 118) = 2.90, p = .06$. We also found a statistically significant time \times group interaction effect for decreasing social hindering demands, $F(1.93, 399.25) = 10.31, p < .001, \eta_p^2 = .05$. There was a significant main effect of time for the IG, $F(1.91, 282.60) = 52.13, p < .001, \eta_p^2 = .26$. Within the IG, decreasing social hindering demands was significantly higher at T2 compared with T1, $F(1, 148) = 71.35, p < .001, \eta_p^2 = .33$, and significantly higher at T3 compared with T1, $F(1, 148) = 68.75, p < .001, \eta_p^2 = .32$. We found no significant main effect of time for the WCG, $F(2, 118) = 2.22, p = .11$. These findings confirm H1e.

Engagement

For engagement (H2a), we found a statistically significant time \times group interaction effect, $F(1.93, 404.78) = 3.48, p < .05, \eta_p^2 = .02$. We found a significant main effect of time for the IG, $F(1.87, 277.85) = 5.33, p < .01, \eta_p^2 = .04$. Within the IG, engagement was significantly higher at T2 compared with T1, $F(1, 149) = 10.76, p < .01, \eta_p^2 = .07$, and significantly higher at T3 compared with T1, $F(1, 149) = 5.44, p < .05, \eta_p^2 = .04$. We found no significant main effect of time for the WCG, $F(1.88, 114.46) = .57, p = .56$. These findings confirm H2a.

Exhaustion

For exhaustion (H2b), we found no statistically significant time \times group interaction effect, $F(1.89, 393.88) = 2.35, p = .10$. However, we found a significant main effect of time within the IG, $F(1.81, 268.25) = 8.39, p < .001, \eta_p^2 = .05$. Within the IG, exhaustion was significantly lower at T3 compared with T1, $F(1, 148) = 12.44, p < .001, \eta_p^2 = .08$, and significantly lower at T3 compared with T2, $F(1, 148) = 6.47, p < .05, \eta_p^2 = .04$. We found no significant main effect of time for the WCG, $F(2, 120) = .08, p = .92$. These findings partially confirm H2b. Table 7 shows the means and standard deviations of the study variables at each measurement time point for each group. Figure 7 represents the significant effects graphically.

Mediation

The intervention significantly predicted the mediator study crafting, $b = .14, SE = .06, p < .05$. Study crafting at T2 significantly predicted engagement at T3, $b = -.56, SE = .14, p < .001$. The indirect effect of the STUDYCoach intervention on engagement (T3) via study crafting (T2) was also significant, $b = .08, SE = .04, 95\% CI [.02, .17]$. These findings confirm H3a.

Study crafting at T2 significantly predicted exhaustion at T3, $b = -.43, SE = .17, p < .05$. The indirect effect of the STUDYCoach intervention on exhaustion (T3) via study crafting (T2) was also significant, $b = -.06, SE = .04, 95\% CI [-.14, -.01]$. These findings confirm H3b.

Table 7

Means and Standard Deviations of the Study Variables for the Intervention Group and Control Group, and Effect Sizes for Significant Effects

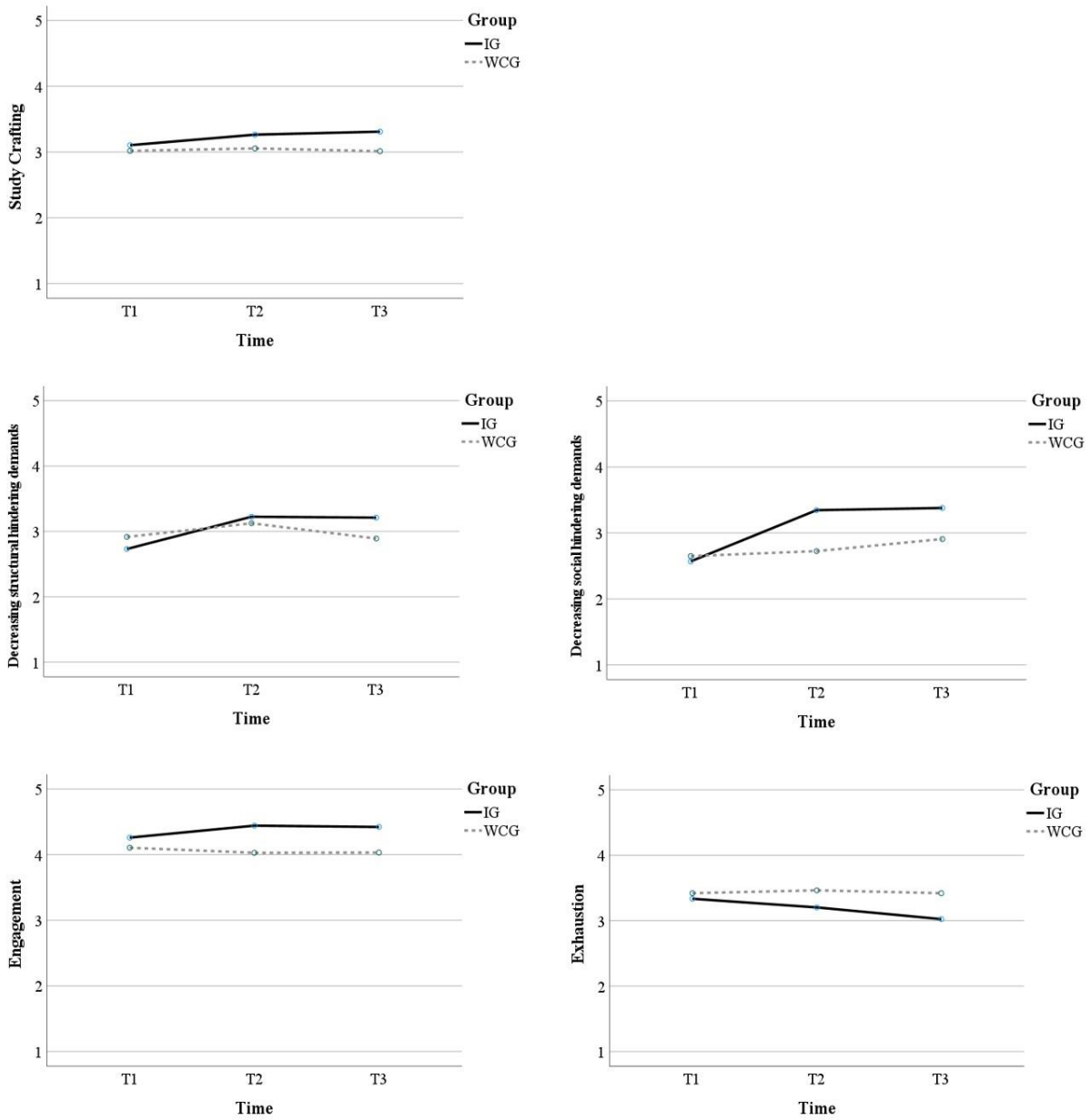
| | Intervention group | | | | | | | | | | Control group | | | | | | | |
|---|--------------------|------|-------|------|-------------|-----|--------|------|-------------|---------|---------------|------|------|------|------|------|---------------------|-----|
| | T1 | | T2 | | Time-effect | | T3 | | Time-effect | | T1 | | T2 | | T3 | | Time x Group Effect | |
| | M | SD | M | SD | η_p^2 | d | M | SD | η_p^2 | d | M | SD | M | SD | M | SD | η_p^2 | d |
| Study crafting | 3.10 | .44 | 3.26a | .49 | .13 | .77 | 3.31c | .53 | .14 | .81 | 3.02 | .44 | 3.06 | .47 | 3.01 | .51 | .03 | .35 |
| Increasing structural resources | 4.07 | .56 | 3.97 | .60 | | | 4.04 | .59 | | | 3.89 | .50 | 3.80 | .55 | 3.88 | .52 | | |
| Increasing social resources | 2.64 | .77 | 2.73 | .72 | | | 2.75 | .79 | | | 2.50 | .70 | 2.59 | .78 | 2.41 | .85 | | |
| Increasing challenging demands | 3.06 | .89 | 3.07a | .89 | | | 3.15c | .87 | | | 2.89 | .87 | 2.91 | .85 | 2.87 | .93 | | |
| Decreasing structural hindering demands | 2.73 | .91 | 3.22a | .86 | .19 | .97 | 3.21c | .92 | .33 | 1.40 | 2.92 | .93 | 3.13 | .96 | 2.89 | .95 | .03 | .35 |
| Decreasing social hindering demands | 2.57 | 1.08 | 3.35a | 1.11 | .19 | .97 | 3.38c | 1.06 | .32 | 1.37 | 2.65 | 1.06 | 2.72 | .95 | 2.91 | .95 | .05 | .46 |
| Engagement | 4.26 | 1.11 | 4.44a | 1.13 | .07 | .55 | 4.42c | 1.13 | .04 | .41 | 4.11 | 1.10 | 4.03 | 1.12 | 4.03 | 1.16 | .02 | .29 |
| Exhaustion | 3.34 | 1.31 | 3.20 | 1.11 | | | 3.02bc | 1.19 | .04/.08 | .41/.59 | 3.42 | 1.26 | 3.46 | 1.23 | 3.42 | 1.20 | | |

Note. a = significant change from T1 to T2, b = significant change from T2 to T3, c = significant change from T1 to T3. T1 = pre-intervention,

T2 = post-intervention, T3 = follow-up.

Figure 7

Intervention Effects on Study Crafting, Decreasing Hinderling Demands, Engagement, and Exhaustion



Note. IG, intervention group; T1, pre-intervention; T2, post-intervention; T3, follow-up;

WCG, waiting-list control group.

Discussion

Higher education students face many demands during the course of their studies, and they have lost some resources due to the COVID-19 pandemic (Herbst et al., 2016; Lederer et al., 2021). The SD-R framework proposes that high demands can promote exhaustion, whereas resources foster engagement (Lesener, Pleiss, et al., 2020). Thus, optimizing demands and resources via study crafting should foster engagement and reduce exhaustion. However, because the optimal balance between demands and resources is highly individualized (van Wingerden, Bakker, & Derks, 2017a), this study has developed and evaluated the STUDYCoach, an online intervention that includes a module on study crafting. Building on the JD-R model and SD-R framework, we hypothesized that our intervention would increase study crafting and improve student well-being. RM ANOVA results demonstrated that overall study crafting, decreasing hindering demands, and engagement significantly increased in the IG compared to the WCG after the intervention. These effects were maintained at the 20-week follow-up. Exhaustion significantly decreased in the IG at follow-up compared to the measurements before and after the intervention. Additionally, study crafting after the intervention mediated the relationship between the intervention and engagement and exhaustion at follow-up.

To the best of our knowledge, this is the first intervention built on the SD-R framework and employing the concept of study crafting, meaning no comparison with previous interventions of this type is possible. However, our finding that a study crafting intervention increased overall study crafting is consistent with findings from the work context that suggest that overall job crafting increases following job crafting interventions (e.g., van Wingerden et al., 2016). Meta-analytic and systematic review evidence also supports this finding (Devotto & Wechsler, 2019; Oprea et al., 2019). In line with the intervention study by van Wingerden, Bakker, and Derks (2017b), confirming that the effects on job crafting remained stable at the 1-year follow-up, we also found that the effects on study crafting

remained present at the 20-week follow-up. This demonstrates that our intervention can sustainably increase study crafting behavior, even over a semester.

Regarding the different study crafting strategies, only the strategy decreasing hindering demands significantly increased following the intervention. This is also consistent with findings from the work context (e.g., Demerouti et al., 2017; Gordon et al., 2018). A review by Oprea et al. (2019) confirmed this finding. In contrast to van Wingerden, Bakker, and Derks (2017b), where this strategy was lower at the 1-year follow-up, the effect remained stable at the 20-week follow-up in our study. van Wingerden, Bakker, and Derks (2017b) offered the following explanation for this result: By conducting a task analysis as part of the intervention, employees became aware of the many demands they were facing, making them want to reduce those demands; after 1 year, they might have succeeded doing so sufficiently or stopped trying. We assumed the same to be true for higher education students: As part of the intervention, they performed a task analysis that likely made them aware of their many demands. This is unsurprising given the intervention took place shortly before the exam period, one of the biggest stressors for higher education students (Herbst et al., 2016). Additionally, data collection took place during the COVID-19 pandemic, which further increased demands on higher education students (Lederer et al., 2021). Demerouti (2014) described the strategy of decreasing hindering demands as a “health-protecting coping mechanism when demands are excessively high” (p. 239). Tims et al. (2016) confirmed that when job demands overwhelm employees, demands can be proactively reduced to restore the balance between job demands and individual capabilities. Thus, reducing hindering demands seems to be an effective strategy for higher education students during such demanding times.

We observed no significant effects of the intervention on increasing social resources or structural resources. These findings are consistent with some job crafting intervention studies (e.g., Gordon et al., 2018; van Wingerden, Bakker, & Derks, 2017a) and the meta-analysis by Oprea et al. (2019). This suggests that the strategies to increase resources are only partially

affected by job crafting interventions. The lack of effect on increasing social resources in our study may be due to data collection taking place during the COVID-19 pandemic—and thus, during periods of social distancing and online lectures—which may have reduced opportunities for social interaction (Benjet, 2020). However, the results do show that the mean scores increased slightly from T1 to T3 in the IG and decreased slightly from T1 to T3 in the WCG. This enables us to conclude that there was a tendency to increase social resources in the IG, but insufficient opportunities were available due to the COVID-19 pandemic. Regarding the strategy of increasing structural resources, van Wingerden, Bakker, and Derks (2017a) explained that the successful application of this strategy often requires a longer period because opportunities for personal development must first be present. In their longitudinal study, van Wingerden, Bakker, and Derks (2017b) observed an increase in this strategy at the 1-year follow-up, empirically confirming their assumption. Due to the COVID-19 pandemic, many events that contribute to personal development were canceled (Lederer et al., 2021), likely resulting in insufficient opportunities for increasing structural resources for our participants.

We observed no effect on increasing challenging demands, which is consistent with some job crafting intervention studies (van Wingerden, Derks, & Bakker, 2017). This result is unsurprising given that seeking challenges includes, for example, taking on new tasks (Tims et al., 2013). The finding that our participants primarily chose the strategy of reducing hindering demands suggests that students were not able to face additional challenges at the time of the intervention due to the already high level of demands.

Our intervention successfully increased engagement, which is consistent with job crafting intervention studies (e.g., van Wingerden, Bakker, & Derks, 2017a) and meta-analyses and reviews (Devotto & Wechsler, 2019; Oprea et al., 2019) that confirm this finding for the work context. According to the JD-R theory, the optimal balance of job demands and resources results in engagement (Bakker & Demerouti, 2014). We conclude that our

intervention successfully optimized the balance between demands and resources, increasing vigor, dedication, and absorption among our participants.

We observed no significant interaction effect regarding exhaustion. However, exhaustion significantly decreased from T1 to T3 and from T2 to T3 in the IG, whereas no time effect was found for the WCG. Although, to the best of our knowledge, no job crafting intervention study has examined the impact on exhaustion, one study did examine the effect of job crafting on psychological distress. In that study, psychological distress significantly decreased at the 1-month follow-up, but the authors did not use a control group for comparison (Sakuraya et al., 2016). Our finding that exhaustion was significantly lower in the IG at T3 than at T1 and T2 suggests that this variable can be influenced by a study crafting intervention, but it seemingly takes time, as the effect was not apparent until follow-up.

The mediation analyses show that study crafting was the mechanism by which our STUDYCoach intervention contributed to higher levels of engagement and lower levels of exhaustion. This is consistent with the theoretical assumptions of JD-R theory, which assumes that job crafting helps employees foster engagement and prevent burnout (Bakker & Demerouti, 2014), and the empirical findings that job crafting positively predicts engagement (Tims et al., 2013; Vogt et al., 2016) and negatively predicts burnout (Tims et al., 2013) over time.

Theoretical Contributions

Our study contributes to the literature in three ways. First, to the best of our knowledge, this is the first intervention study for higher education students that builds on the theoretical assumptions of the SD-R framework and aims to increase study crafting behavior. We have confirmed that the STUDYCoach intervention increases overall study crafting and decreasing hindering demands and that the effects are sustained over a semester. These findings extend the job crafting literature because our results show that such interventions can be successful for not only employees but also higher education students. In particular, with

regard to the strategy of decreasing hindering demands, our study makes a theoretical contribution, as we were able to show for the first time that this strategy can be divided into two factors in the higher education context, namely decreasing structural hindering demands and decreasing social hindering demands. This is in accordance with a study from the work context, which also confirms a separation into the strategies decreasing social job demands and decreasing hindering job demands for blue collar workers (Nielsen & Abildgaard, 2012). In the work context, the strategy of decreasing hindering demands is often viewed with skepticism because it is negatively related with engagement (Lichtenthaler & Fischbach, 2019; Rudolph et al., 2017). However, engagement increased after our study's intervention. Another criticism of this strategy in the work context is that reducing hindering demands can add to the workload of other employees, potentially causing conflict (Tims et al., 2015a). However, this does not apply to the higher education context. Our study responds to the call from Gordon et al. (2018) to investigate the effects of this strategy on different populations to determine when it is useful. Students in higher education apparently represent a population for which reducing hindering demands seems to be helpful.

Second, we contribute to the literature on student well-being by demonstrating that engagement increased significantly following the intervention and that exhaustion decreased significantly in the IG. Thus, our intervention, based on the SD-R framework, can contribute to both promoting positive states and mitigating negative states among higher education students.

Third, we contribute to the SD-R framework by demonstrating that an intervention can actively influence the postulated processes. Optimizing the study environment via study crafting in the form of adjusting one's resources and demands leads to an increase in student well-being (i.e., more engagement, less exhaustion). Thus, we contribute to the further validation of the SD-R framework.

Practical Implications

A practical implication of our study is that universities should be aware of the potential of study crafting interventions to increase study crafting behavior and, in turn, increase engagement and reduce exhaustion. This is of particular importance because engagement is associated with academic performance (Schaufeli, Martínez, et al., 2002), and burnout is associated with common mental disorders and high dropout (Mokgele & Rothmann, 2014). Given the optimal level of demands and resources is highly individualized, a bottom-up approach such as study crafting seems to be useful to optimize the study environment at the individual level. Additionally, study characteristics can change rapidly over the course of a degree program—or even over a semester—due to external factors, such as the COVID-19 pandemic, which made new demands of students. Study crafting can help students flexibly adapt to changing conditions and thereby stay healthy and motivated.

However, because higher education students cannot be expected to adopt study crafting on their own, universities should provide interventions, such as the STUDYCoach, to introduce students to these behaviors. Given online interventions have many advantages over face-to-face interventions, this type of intervention should continue to be offered after the pandemic or online courses are over. Notably, the impact of our intervention was sustained, lasting more than a semester, suggesting the value of universities investing in interventions of this kind. We further assume that the behaviors learned in the study will be used later in the professional context. Students who learn and apply the concept of study crafting during their studies might be more likely to use job crafting later in their professional lives.

A practical implication for lecturers and university staff is that they can support the successful application of study crafting strategies. Lecturers can help higher education students increase their social resources by providing more feedback and encouraging social interaction among higher education students. In addition, universities should create

opportunities to increase structural resources and challenges. Such opportunities might include extracurricular activities, language courses, and study-abroad programs.

Limitations and Suggestions for Further Research

Several limitations of our study should be mentioned. First, we experienced a high dropout between the post-measurement and the follow-up measurement. However, this is unsurprising given the follow-up measurement took place one semester after the pre- and post-measurements. Therefore, it is likely that some higher education students graduated, dropped out, took a semester abroad, or completed an internship. Nonetheless, having the third measurement time point at 20 weeks post-intervention was a strength of our study because it allowed us to examine the long-term effects of the intervention. Thus, we address the criticism that most intervention studies have not collected follow-up data and, in particular, lacked follow-up periods of more than 3 months (Winzer et al., 2018). Furthermore, despite the high dropout, our final sample size of 205 participants was larger than the required sample size calculated in the a priori power analysis, enabling us to achieve sufficiently high power. Nonetheless, further intervention studies could test additional time frames.

Second, female students were overrepresented in our study, limiting generalizability. However, representative surveys show that female students report significantly more exhaustion and significantly less engagement than male students (Grützmacher et al., 2018), suggesting that female students have a greater need for interventions such as the STUDYCoach. In addition, a strength of our study was that our intervention targeted all higher education students, rather than only those at particular health risk, the approach adopted by most previous studies (Dietz et al., 2020). Future research could examine whether differential effects of the intervention exist concerning sociodemographic variables (e.g., gender or semester of study) and whether certain groups consequently benefit more from the

intervention than others. To increase the generalizability of our findings, the intervention could be studied in other populations, such as other cultural contexts, in the future.

Third, our study used only self-assessments, potentially resulting in common method bias (Podsakoff et al., 2012). Although the constructs examined in our study are best captured by the self-assessment approach, also including assessments from lecturers or fellow students could provide a more complete picture. This could be considered in future studies. Similarly, objective data, such as performance, could be collected as shown in the work context that job crafting interventions can also improve performance (van Wingerden, Bakker, & Derks, 2017b).

Fourth, our intervention comprised three modules, and we cannot determine which components of the STUDYCoach produced the effects we found. In the future, additional post-module questionnaires or qualitative interviews could provide insights into which modules and submodules participants found most helpful. Qualitative interviews could also clarify barriers encountered in implementing the three study crafting strategies for which no intervention effects were observed.

Fifth, we cannot rule out the possibility of contamination of study participants. Although this seems rather unlikely, as participants were informed exclusively by email, future studies could use a cluster-random design.

Finally, our study only examined the effect of the intervention on study crafting and well-being. Future studies should, on the one hand, examine the concept of study crafting in more detail, especially because we found that the strategy decreasing hindering demands can be separated into two factors. On the other hand, it would be interesting to investigate the effect of the intervention on study demands and resources. In addition, recent studies confirm that personal resources (Robins et al., 2015) and personal demands (Zeijen et al., 2021) also play an important role in the SD-R framework, suggesting that future intervention studies could also investigate the influence on these variables.

Conclusion

We can conclude that the STUDYCoach intervention represents a valuable tool that can help higher education students adapt their study environment to create an individually optimized balance between study demands and resources, thereby increasing engagement and reducing exhaustion. Given this represents the first research considering a study crafting intervention, further research is needed to more comprehensively understand the effects of study crafting interventions, especially in comparison to findings in the work context.

Chapter 4 – Study 3: Evaluation of two Study Demands-Resources-Based Interventions: A Randomized Controlled Trial³

Abstract

Higher education students experience significant levels of exhaustion in their studies, yet there are limited evidence-based support programs available. Therefore, this study evaluated a novel intervention approach by testing the effectiveness of two online interventions based on the study demands-resources framework. These interventions aimed to balance demands and resources. Derived from the theoretical assumptions of the framework, we hypothesized that the interventions would increase study and personal resources, engagement, and study crafting, and decrease study demands, exhaustion, and self-undermining. Additionally, we hypothesized that demands and resources would mediate the effects of the intervention on engagement, exhaustion, study crafting, and self-undermining. Conducted as a randomized controlled trial with a waitlist control group ($n = 71$), the study involved participants in two intervention groups who engaged with the interventions for two weeks. Intervention group 1 ($n = 64$) focused on adapting demands, while intervention group 2 ($n = 70$) focused on increasing resources. The design allowed for a comparison of the effectiveness of these different approaches. Participants completed questionnaires before and after the intervention, and at a 5-week follow-up. Results of the analyses of variance with repeated measures revealed that the interventions had significant positive effects on the personal resource mindfulness, two study crafting strategies, self-undermining, and exhaustion. Notably, intervention group 2 exhibited more positive outcomes. The hypothesized mediation effects through mindfulness were partially supported. The study demonstrates the considerable

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potential of interventions based on the study demands-resources framework for higher education institutions in supporting student well-being.

Keywords: study demands-resources framework, online intervention, mindfulness, study crafting, self-undermining, exhaustion, randomized controlled trial

Introduction

In a representative survey among German higher education students, more than half reported experiencing high levels of stress (Herbst et al., 2016). Stress levels in students significantly rise throughout the semester, peaking in (pre-)exam weeks (Pitt et al., 2018). Moreover, an international review indicated that 55% of students suffer from emotional exhaustion, the primary symptom of burnout (Rosales-Ricardo et al., 2021). Meta-analytic studies indicate that burnout negatively impacts academic performance (Madigan & Curran, 2021). Burnout is further a negative predictor of dropout intention (Marôco et al., 2020). Beyond academic implications, stress and burnout can also have detrimental effects on physical health and may contribute to the development and persistence of mental disorders (Pascoe et al., 2020). The COVID-19 pandemic has further exacerbated stress levels of students by reducing their resources such as social interaction and support, and increasing their demands such as workload and self-study issues (Hoss et al., 2021; Tsiouris et al., 2023).

Thus, there is an urgent need to develop and evaluate interventions aimed at reducing stress and exhaustion among students, while enhancing their coping skills (e.g., Madigan & Curran, 2021; Pascoe et al., 2020). Interventions that focus on reducing demands and enhancing resources have been considered as particularly effective in this regard (Jagodics & Szabó, 2023). The study demands-resources (SD-R) framework, an adaption of the job demands-resources (JD-R) model from the work context, explains the interplay between demands and resources and their impact on student exhaustion and engagement, as well as their proactive (i.e., study crafting) and dysfunctional (i.e., self-undermining) behavior (Bakker & Demerouti, 2014; Körner et al., 2021; Lesener, Pleiss, et al., 2020). The JD-R model has been successfully applied in the work context by serving as a theoretical basis for interventions designed to enhance employee well-being (Bakker & Demerouti, 2014, 2017). However, there is a gap in the application of the SD-R framework. Interventions based on this

framework, aimed at balancing demands and resources to enhance student well-being are lacking.

The end of the semester, characterized by an accumulation of stressors, is an especially critical time to implement such interventions to prevent negative stress-related outcomes (Pitt et al., 2018). In a qualitative study, students further expressed interest in compact interventions, which can be more easily integrated into their daily study routines, particularly before high-stress periods like exams (Seidl et al., 2018). Furthermore, students prefer online interventions due to their anonymity, accessibility, and time and location flexibility (Lutz-Kopp et al., 2019).

Thus, the aim of this study is to evaluate the efficacy of two brief online SD-R-based interventions aimed at improving student well-being. We conducted a randomized controlled trial with a waitlist control group and a follow-up assessment during the pre-exam period. This was to evaluate the sustainability of intervention effects and determine if the interventions could prevent negative outcomes typically occurring during the exam phase. Our study thereby aims to make three key contributions: First, we evaluated the efficacy of two SD-R-based online interventions aimed at balancing demands and resources. We examined the impact of these interventions on study resources and demands, engagement, and exhaustion, as well as the underlying mediation processes. Second, we also investigated the impact of the SD-R-based interventions on personal resources, study crafting, and self-undermining. Since these variables have been relatively underexplored in research on the SD-R framework, our study expands the framework, drawing parallels to the JD-R model where these aspects have received more extensive research attention (e.g., Bakker, Demerouti, & Sanz-Vergel, 2023; Bakker & Wang, 2020; Tims et al., 2013; Xanthopoulou et al., 2007). Third, our study addresses the critical need for evidence-based student support programs, as highlighted by recent research (e.g., Mülder et al., 2022). By evaluating a novel theoretical approach—the SD-R framework—through brief online interventions, we provide new

perspectives on effective strategies to improve student well-being. Additionally, incorporating a follow-up measurement enabled us to assess the sustainable impact of these interventions. Taken together, our research contributes to the practical validation of the SD-R framework by testing how SD-R-based interventions can actively influence the key processes specified in the framework.

Theoretical Background

Demands and Resources in the Study Demands-Resources Framework

The SD-R framework, derived from the well-established JD-R model in the work context (Bakker et al., 2014; Demerouti et al., 2001), includes two central paths. The health-impairment path posits that study demands are positively related to burnout, while the motivational path posits that study resources are positively related to engagement and negatively related to burnout (Lesener, Pleiss, et al., 2020). The validity of these two paths is supported by broad empirical evidence from cross-sectional (e.g., Gusy, Wörfel, & Lohman, 2016), longitudinal (e.g., Gusy et al., 2021), and diary studies (e.g., Körner et al., 2021).

Study demands occur at an organizational, physical, social, or psychological level. They require high levels of physical or mental effort, and are therefore associated with physiological or psychological costs (Lesener, Pleiss, et al., 2020). Overload and time pressure are among the most common study demands and key predictors of burnout within the SD-R framework (e.g., Gusy et al., 2021; Lesener, Pleiss, et al., 2020). Consequently, our study examined the *psychological demands* of studying. This study demand encompasses aspects such as time pressure, haste, or competing tasks (Schmidt et al., 2019).

Study resources also occur at organizational, physical, social, or psychological levels and can help achieve goals, promote personal development, and reduce study demands (Lesener, Pleiss, et al., 2020). An important study resource, and a strong predictor of engagement within the SD-R framework even during the COVID-19 pandemic, is *social support from lecturers* (Salmela-Aro et al., 2022). In line, Reichel et al. (2023) assume that

social support from lecturers plays an especially important role in times of numerous stressors, such as during a pandemic. We therefore examined this study resource in our study. Social support from lecturers includes the extent to which lecturers/professors take an interest, help students in their studies and support them through good organization.

The JD-R model has been extended to incorporate personal resources alongside job resources (Bakker & Demerouti, 2017). Personal resources are self-aspects associated with resilience and a sense of being able to successfully control and influence the environment, even in difficult situations (Hobfoll et al., 2003). These resources help to achieve goals, grow personally, and protect against threats (Xanthopoulou et al., 2009a). A key personal resource receiving increased attention in recent years is mindfulness, defined as the “enhanced attention to and awareness of current experience or present reality” (Brown & Ryan, 2003, p. 822). Grover et al. (2017) integrated mindfulness into the JD-R model, highlighting its relevance as a personal resource within this model. In the academic context, a positive relationship between mindfulness and engagement as well as a negative relationship between mindfulness and burnout was found (Robins et al., 2015), demonstrating its impact similar to that of study resources within the SD-R framework. Consequently, our study examined the personal resource of *mindfulness*.

According to the SD-R framework, engagement is fostered by high levels of study and personal resources (Lesener, Pleiss, et al., 2020; Ouweneel et al., 2011). Engagement is a fulfilling, positive state that encompasses the three dimensions of vigor, dedication, and absorption. Vigor includes high levels of energy and perseverance and a willingness to try hard even when difficulties arise. Dedication includes feelings of enthusiasm, inspiration, and pride. Absorption is a state of concentration and flow (Schaufeli, Salanova, et al., 2002). In the academic context, engagement is of great importance due to its positive relationship with academic performance (Salanova et al., 2009) and life satisfaction (Lesener, Pleiss, et al., 2020).

Conversely, the SD-R framework posits that burnout results from high study demands and a lack of study resources (Lesener, Pleiss, et al., 2020). Burnout encompasses the three dimensions of exhaustion, cynicism, and professional inefficacy. Exhaustion describes a feeling of fatigue due to high study demands and represents the core dimension of burnout. Cynicism refers to a detached attitude toward one's studies, and professional inefficacy refers to a feeling of incompetence as a student (Schaufeli, Martínez, et al., 2002).

Study Crafting and Self-Undermining in the Study Demands-Resources Framework

The JD-R model has been further expanded to incorporate two behavioral variables: job crafting within the motivational path (Tims & Bakker, 2010) and self-undermining within the health-impairment path (Bakker & Wang, 2020). Recently, the concept of job crafting has been adapted to the academic context as *study crafting* and incorporated into the SD-R framework (Körner et al., 2021). Study crafting refers to the proactive adjustments students make to their study environment, aligning their studies with their personal skills and preferences (Körner et al., 2021). This concept draws from the job crafting strategies distinguished by Tims et al. (2013), and includes four analogous study crafting strategies: increasing structural resources, increasing social resources, increasing challenging demands, and decreasing hindering demands. Increasing structural resources involves activities that contribute to personal growth, such as skill development. Increasing social resources includes behaviors such as seeking feedback or advice. Increasing challenging demands involves activities such as taking on additional projects or attending extra lectures. Decreasing hindering demands involves, for example, trying to make study less demanding (Körner et al., 2021; Tims et al., 2012).

On the other hand, the concept of self-undermining, defined as “behavior that creates obstacles that may undermine performance” (Bakker & Costa, 2014, p. 115), has been included in the JD-R model. Self-undermining involves behaviors such as making mistakes or provoking conflicts (Bakker & Wang, 2020). This concept has received little attention within

the academic context so far. However, an initial study investigated self-undermining within the SD-R framework and confirmed that the health-impairment path can be extended to include this concept (Körner et al., 2021).

Gain Cycles and Loss Cycles

Recent versions of the JD-R model specify a gain cycle within the motivational path and a loss cycle within the health-impairment path, further clarifying the interplay among JD-R variables (Bakker, Demerouti, & Sanz-Vergel, 2023). The model assumes that engaged employees want to maintain their engagement and therefore attempt to build new resources through job crafting. The resources built through job crafting, in turn, foster engagement, resulting in a gain cycle with reciprocal relationships between resources, engagement, and job crafting (Bakker, Demerouti, & Sanz-Vergel, 2023). Empirical evidence supports this assumption. Systematic reviews and meta-analyses in the work context have affirmed positive relationships between job crafting and various job resources (e.g., autonomy, social support), between job crafting and engagement, as well as between job resources and engagement (Lesener et al., 2019; Lichtenthaler & Fischbach, 2019; Rudolph et al., 2017; Zhang & Parker, 2019). In the academic context, similar positive correlations have been observed between study and personal resources and engagement (Lesener, Pleiss, et al., 2020; Ouweneel et al., 2011). Furthermore, a weekly diary study found a positive relationship between study resources and study crafting, mediated by engagement (Körner et al., 2021).

Conversely, the JD-R model suggests that exhausted employees tend to engage in self-undermining. Through self-undermining, they create new demands and obstacles, which further increase exhaustion, resulting in a loss cycle (Bakker, Demerouti, & Sanz-Vergel, 2023). This assumption is empirically supported by research indicating a positive reciprocal relationship between job demands and burnout and a positive relationship between exhaustion and self-undermining as well as between job demands and self-undermining (Bakker, Xanthopoulou, & Demerouti, 2023; Lesener et al., 2019; Ratiu & Dobre, 2020). Within the

academic context, the concept of self-undermining is relatively underexplored. However, preliminary research indicated a positive relationship between study demands and self-undermining via exhaustion at the weekly within-person level (Körner et al., 2021).

Interventions Based on the Job Demands-Resources Model and the Study Demands-Resources Framework

In the work context, the JD-R model has been effectively utilized as a theoretical foundation for interventions aimed at enhancing employee well-being (Bakker & Demerouti, 2017; Bakker, Demerouti, & Sanz-Vergel, 2023). This model provides various starting points for such interventions, including optimizing job demands, increasing job and personal resources, and promoting job crafting (Bakker & Demerouti, 2014; Bakker, Demerouti, & Sanz-Vergel, 2023; Demerouti & Peeters, 2018). Research has validated the effectiveness of these interventions, demonstrating significant increases in personal resources, engagement, and job crafting, as well as reductions in exhaustion (Bakker, 2017; Bakker & van Wingerden, 2021; Gordon et al., 2018; van Wingerden, Derks, & Bakker, 2017). To our knowledge, only one intervention has employed the SD-R framework as a theoretical foundation for an intervention within the academic context so far. This intervention, a study crafting intervention, was adapted from job crafting interventions in the work context. It successfully increased study crafting while concurrently fostering engagement and reducing exhaustion (Körner et al., 2022).

Our present study expands this research by again utilizing the SD-R framework for developing interventions, but with different starting points within the SD-R framework compared to the previous study crafting intervention. Whereas the study crafting intervention primarily focused on enhancing study crafting, our current interventions aim to balance demands and resources. Besides the impact on demands and resources, we also investigate the influence of the interventions on the other variables of the SD-R framework. Drawing from the theoretical assumptions and empirical findings from both the JD-R model and the SD-R

framework, and building on results from job crafting and study crafting interventions, we hypothesize:

Hypothesis 1 (H1): In the intervention groups (IGs), there will be a significant increase in the levels of (a) the study resource social support from lecturers and (b) the personal resource mindfulness, and a significant decrease in the level of (c) the study demand psychological demands after the intervention (T2 and T3), compared to the levels before the intervention (T1) and compared to the waitlist control group (WLC).

Hypothesis 2 (H2): In the IGs, there will be a significant increase in the level of (a) engagement, and a significant decrease in the level of (b) exhaustion after the intervention (T2 and T3), compared to the levels before the intervention (T1) and compared to the WLC.

Hypothesis 3 (H3): In the IGs, there will be a significant increase in the level of (a) study crafting, and a significant decrease in the level of (b) self-undermining after the intervention (T2 and T3), compared to the levels before the intervention (T1) and compared to the WLC.

We also explore the underlying mechanisms that influence the outcomes of our intervention. Research into these mediating processes of interventions based on the JD-R model or the SD-R framework remains relatively scarce. However, in the work context, there is evidence suggesting that job crafting serves as a mediator in the relationship between job crafting interventions and JD-R outcomes like engagement (Mukherjee & Dhar, 2023). Similarly, an initial study in the academic context has found comparable results, with study crafting acting as a mediator in the effects of a study crafting intervention on engagement and exhaustion (Körner et al., 2022). Our SD-R-based interventions are targeted at balancing demands and resources. Therefore, we assume that the interventions will primarily influence

these variables, which in turn, will affect other variables within the SD-R framework. Thus, we hypothesize:

Hypothesis 4 (H4): Study and personal resources will mediate the relationship between the intervention and (a) engagement, (b) exhaustion, (c) study crafting, and (d) self-undermining.

Hypothesis 5 (H5): Study demands will mediate the relationship between the intervention and (a) engagement, (b) exhaustion, (c) study crafting, and (d) self-undermining.

Method

Participants and Procedure

The study was conducted at Aalen University. All students received an email invitation to participate in the study, we presented the study in selected lectures, promoted it at a trade fair, and through social media. Inclusion criteria were a minimum age of 18 years and enrollment at Aalen University. The exclusion criterion was a diagnosed mental disorder. After registration, students received detailed participant information. The study was conducted in accordance with the ethical guidelines of the American Psychological Association: Participation was voluntary and could be terminated at any time without giving a reason. There was no monetary compensation, but students received credit for their participation and got access to all modules of the online intervention upon completion of the study. Informed consent was obtained from all participants before the study began.

The study was a randomized controlled trial with two IGs and one WLC. Students were randomly assigned to one of the three groups after enrollment. In the week prior to the start of the intervention, students received information about their group assignment, access information to the online platform, and the link to the T1 questionnaire by e-mail. In the first intervention week, the Introductory Module and Module 1 (“Understanding Stress”) were unlocked for both IGs. In the second intervention week, IG1 received access to Module 2

We conducted an a priori power analysis for a repeated measures analysis of variance in a 3x3 factorial design to estimate the required sample size. We assumed a small effect size of $f = .1$, based on findings of previous job crafting interventions, and targeted a power of .80. This resulted in a sample size of 204. A total of 253 students enrolled in the study of whom 242 completed the T1 questionnaire (95.7% response rate), 220 completed the T2 questionnaire (9.1% dropout from T1 to T2), and 208 completed the T3 questionnaire (5.5% dropout from T2 to T3). The overall dropout rate was 18.7%, which is relatively low compared to other online interventions, which report adherence rates of about 50% (Kelders et al., 2012) and attrition rates of 40–50% (Bennett & Glasgow, 2009; Kuster et al., 2017). Previous studies have pinpointed various factors contributing to dropout in online interventions, such as dwindling interest over time (Bennett & Glasgow, 2009), the burden of high time demands, and uncertainties related to the intervention's content and instructions (Fasthoff et al., 2023). Given that our intervention took place just before the Christmas period and exam season, it is plausible to suggest that the observed dropout could especially be linked to heightened demands and the resultant time constraints.

Our final sample consisted of 205 students, distributed across the two IGs and the WLC, who completed the three questionnaires. Of these, 141 were female, 62 were male, 1 was diverse, and 1 did not provide gender information. The participants studied in five faculties (chemistry: $n = 12$, electronics and informatics: $n = 12$, mechanical and materials engineering: $n = 19$, optics and mechatronics: $n = 30$, economics: $n = 132$). They were on average 21.82 years old ($SD = 3.08$) and the majority of participants ($n = 199$) were in a bachelor's degree program (master's degree program: $n = 6$). On average, the students were in their third study semester ($M = 3.25$, $SD = 2.61$). IG1 consisted of 64 students. Of these, 44 were female and 20 were male with a mean age of 21.94 years ($SD = 3.57$). IG2 consisted of 70 students. Of these, 47 were female and 21 male (diverse: $n = 1$, not specified: $n = 1$) with a mean age of 21.50 years ($SD = 2.60$). The WLC consisted of 71 students. Of these, 50 were

female and 21 were male with a mean age of 22.04 years ($SD = 3.07$). Figure 9 shows the study procedure.

The Interventions

Our study utilized two interventions based on the “Einfach weniger Stress [Simply less stress]” (EWS) concept (Paulsen & Kortsch, 2020), which has been tested and certified by the Zentrale Prüfstelle Prävention [Central Examination Office for Prevention] (ZPP; www.zentrale-pruefstelle-praevention.de)⁴. The concept has already been successfully applied in the work context (Fasthoff et al., 2023). Initially designed as a face-to-face training, EWS was adapted into an online format to enhance accessibility and increase its reach. The web-based version of the intervention was implemented as a standalone Wordpress-based solution. The EWS intervention includes five modules: 1) Understanding Stress, 2) Recognizing Stressors, 3) Awakening Resources, 4) Planning Implementation, 5) Acting calmly. The modules build on each other but are carefully crafted to be self-sufficient, offering a complete package of content. Every module starts with clearly defined learning objectives and concludes with a comprehensive review, coupled with an observation task designed to integrate the learned content into daily life. In each module, exercises address at least one Behaviour Change Technique, as outlined by Michie et al. (2015) from one of four main categories: goals and planning (main category 1), observing behaviour and giving feedback (main category 2), building knowledge (main category 4) or repeating and generalizing (main category 8). This thoughtful design ensures that even standalone modules can deliver significant intervention effects.

To address students’ preference for concise interventions that seamlessly fit into their academic routines, we have deliberately chosen to limit the selection to two modules per group, as supported by the findings of Seidl et al. (2018). Our selection prioritized modules 1-

⁴ The ZPP is a cooperative association of statutory health insurance funds in Germany, which reviews and certifies preventive health programs based on the “Leitfaden Prävention” [Prevention Guideline] in accordance with uniform qualitative standards.

3, which are fundamentally based on the SD-R framework. This choice was made to ensure that our interventions are in line with the aims of SD-R-based strategies, following the guidance provided by research on JD-R-based interventions (Bakker et al., 2014; Bakker, Demerouti, & Sanz-Vergel, 2023).

Module 1 provides an in-depth explanation of the SD-R framework, highlighting the interplay between demands and resources. Module 2 encourages participants to identify and reflect on their demands, while Module 3 focuses on recognizing, enhancing, and activating their resources. Both IGs completed Module 1, providing all participants with foundational knowledge about the SD-R framework. IG1 then primarily focused on adapting demands, while IG2 then emphasized increasing resources. This design enabled us to compare the effectiveness of these two intervention approaches.

Each module consisted of theoretical input, exercises, reflection activities, and transfer tasks. Participants could download and print worksheets or complete them digitally. Two fictional characters guided participants through the online course. An additional third fictional student character was created especially for this study. Participants were allocated one week to complete each module, with the option to stop at any time and continue later. The completion time of module 1 was approximately 90 minutes, and that of module 2 and 3 were approximately 110 minutes each. Table 8 provides an overview of the intervention modules.

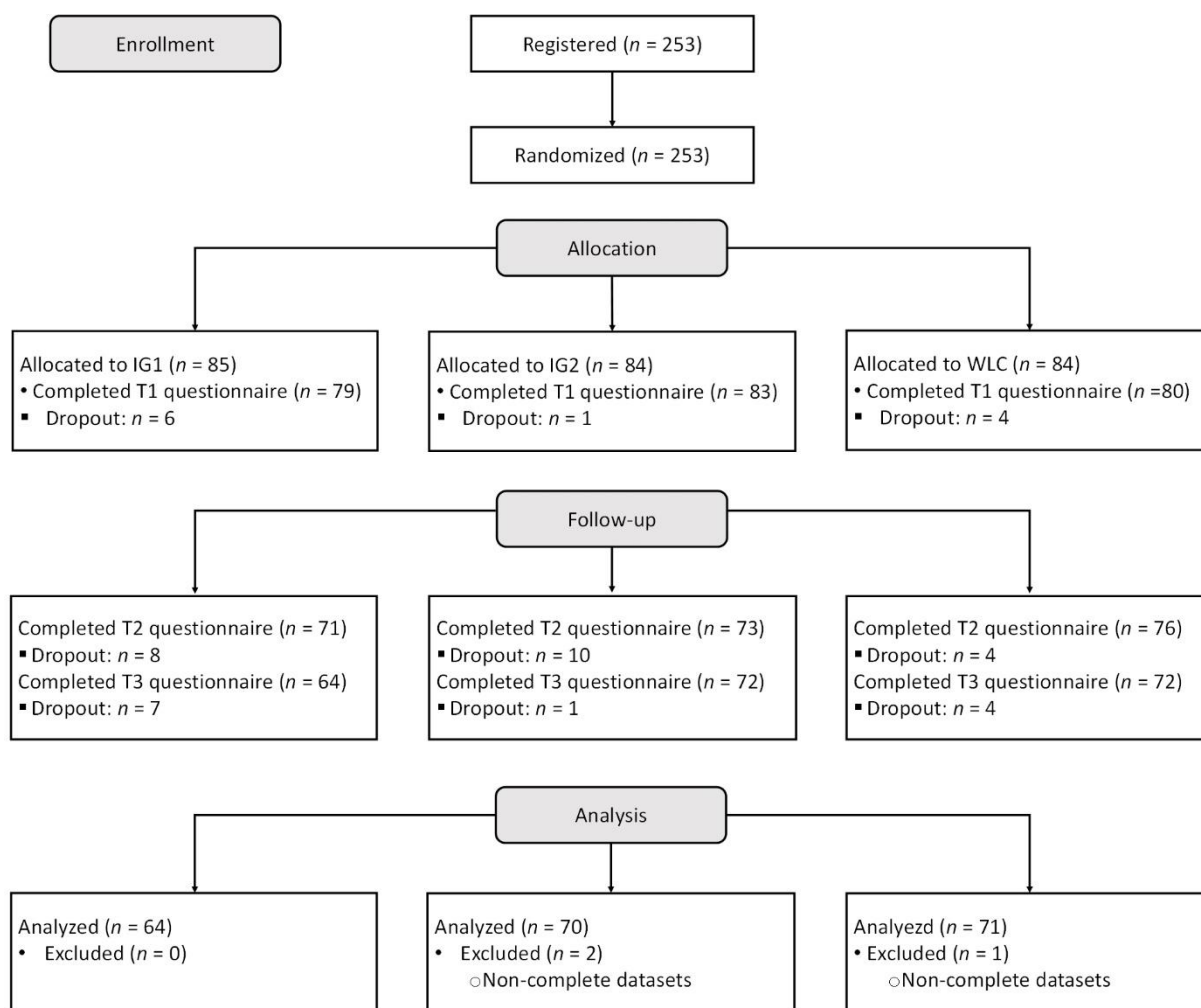
Figure 9*CONSORT Flowchart of Participants*

Table 8*The Three EWS Intervention Modules*

| Module | Goals | Theory | Practice |
|------------------------------|--|--|--|
| Under- standing Stress | <ul style="list-style-type: none"> ▪ Understanding stress and stress reactions ▪ Understanding the transactional stress model ▪ Reflecting on one's own stress experiences and recognizing the consequences of stress ▪ Understanding the interplay of demands and resources ▪ Recognizing the personal boundary between study and private life | <ul style="list-style-type: none"> ▪ Stress (eustress / distress), stress reactions (Selye, 1956) ▪ Transactional stress model (Lazarus & Folkman, 1984, 1987) ▪ Coping strategies (Lazarus, 1991) ▪ JD-R model (Demerouti et al., 2001) | <ul style="list-style-type: none"> ▪ Reflection on the stress level of the last days ▪ Reflection on different stress situations and one's own reaction to them ▪ Identification of demands and resources based on the JD-R model ▪ Reflection on constant accessibility |
| Recognizing Stressors | <ul style="list-style-type: none"> ▪ Understanding stressors and their classification ▪ Understanding inner drivers and their role in the development of stress ▪ Developing more advantageous thoughts for selected stressors | <ul style="list-style-type: none"> ▪ Definition of stressors ▪ Typical stressors ▪ Personality traits (inner drivers) as potential stress amplifiers | <ul style="list-style-type: none"> ▪ Reflection of a stress situation of the last days ▪ Stressor radar to identify own stressors ▪ Classification of own stressors (frequency / importance) ▪ Identification of own inner drivers ▪ Re-interpretation of stress situations / inner drivers |
| Awakening Resources | <ul style="list-style-type: none"> ▪ Understanding resources and their classification ▪ Identifying available resources and how to activate them ▪ Identifying previously unconscious resources ▪ Creating an inner strength picture | <ul style="list-style-type: none"> ▪ Definition of resources ▪ Typical resources ▪ Resource activation techniques | <ul style="list-style-type: none"> ▪ Reflection of a stress situation of the last days ▪ Dream journey to enable metaphorical access to one's own resources ▪ Resource radar to identify own resources ▪ Inner strength picture ▪ Identification of techniques to activate resources |

Measures

The questionnaires were identical at the three measurement time points. In the T1 questionnaire, we also collected sociodemographic data.

Social support from lecturers was measured with five items (e.g., “My lecturers / professors support me through good organization.”) and *psychological demands* were measured with seven items (e.g., “My studies are hectic.”) of the questionnaire on Structural Study Conditions (Schmidt et al., 2019). Items were rated on a 4-point Likert-type scale (1 = *does not apply*, 4 = *does apply*).

Mindfulness was measured using the short version of the Freiburg Mindfulness Questionnaire (Walach et al., 2004). The questionnaire contains 14 items (e.g., “I am in touch with my experiences, here and now.”), which were rated on a 4-point Likert-type scale (1 = *almost never*, 4 = *almost always*).

Study crafting was measured with a shortened version of the German Job Crafting Scale (Lichtenthaler & Fischbach, 2016) adapted to the academic context. The sub dimensions increasing structural resources (e.g., “I try to develop my capabilities.”), increasing social resources (e.g., “I ask others for feedback on my performance in my studies.”), increasing challenging demands (e.g., “When there is not much to do in my studies, I see it as a chance to start new projects.”), and decreasing hindering demands (e.g., “I make sure that my studies are mentally less intense.”) were measured with four items each. Items were rated on a 5-point Likert-type scale (1 = *not at all true*, 5 = *completely true*).

Self-undermining was measured using the self-undermining scale (Bakker & Wang, 2020). We adapted the six items (e.g., “I make mistakes.”) to the academic context and participants rated them on a 7-point Likert-type scale (1 = *never*, 7 = *always*).

Engagement was measured using the Utrecht Work Engagement Scale–Student Form, which includes three items each for vigor, dedication, and absorption (Schaufeli, Salanova, et

al., 2002). Items (e.g., “I am immersed in my studies.”) were rated on a 7-point Likert-type scale (1 = *never*, 7 = *always*).

Exhaustion was measured using the short German Maslach Burnout Inventory–Student Survey (Wörfel et al., 2015). The scale consists of three items (e.g., “I feel drained by my studies.”) which were rated on a 7-point Likert-type scale (1 = *never*, 7 = *always*).

Strategy of Analysis

Data were analyzed using IBM SPSS 28 and R 4.1.0 with package *welchADF* (Villacorta, 2017). First, we used chi-square tests and *t*-tests to test for sociodemographic differences among the three groups and multivariate analysis of variance (ANOVA) to test for significant T1 differences in all research variables. We tested hypotheses 1-4 with 3x3 repeated measures (RM) ANOVA. Measurement time (T1, T2, T3) was the within-subject factor and group (IG1, IG2, WLC) was the between-subject factor. The requirements for RM ANOVA are homogeneity of error variances (tested with Levene’s test) and sphericity (tested with Mauchly’s test). If the sphericity assumption was violated, the Greenhouse-Geisser correction (for $\epsilon < .75$) or the Huynh-Feldt correction (for $\epsilon > .75$) was used. If there was a significant time x group interaction effect, the time effect was examined separately for each group. If there was a significant time effect, the differences between each of the two measurement time points (T1-T2, T1-T3, T2-T3) were further examined. If there was no significant time x group interaction effect, the main time effect (also separately for the three groups) was examined. Hypotheses 5 and 6 were tested using Model 4 of the Hayes Process macro for SPSS (Hayes, 2017). Group membership was included as the independent variable. Demands and resources at T2 were each included as the mediator. Engagement, exhaustion, study crafting, or self-undermining at T3 were each included as the dependent variable. T1 scores of the mediator and dependent variable were included as control variables. Bootstrapping with 5000 samples was used to calculate 95% confidence intervals.

Results

Testing for T1 differences in the study variables between the three groups revealed no significant group effect, $F(24, 384) = .76, p = .78$. Similarly, there were no significant differences between the three groups on the sociodemographic variables of gender, $\chi^2(6) = 3.95, p = .68$, age, $F(2) = .61, p = .55$, study degree, $\chi^2(2) = .98, p = .61$, work experience, $\chi^2(2) = 44, p = .80$, and study semester, $F(2) = 1.30, p = .29$. Table 9 shows the means, standard deviations, reliabilities, and correlations between the study variables at T1, T2, and T3.

Table 9

Means, Standard Deviations, Correlations, and Reliabilities for all Study Variables at the Three Measurement Time Points

| Variable | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-----------------------------------|----------|-----------|--------|-------|--------|--------|--------|-------|-------|--------|--------|--------|--------|-------|--------|--------|
| 1. Social support T1 | 3.17 | 0.48 | (.80) | | | | | | | | | | | | | |
| 2. Psychological demands T1 | 2.74 | 0.51 | .04 | (.81) | | | | | | | | | | | | |
| 3. Mindfulness T1 | 2.61 | 0.43 | .08 | -.03 | (.81) | | | | | | | | | | | |
| 4. Incr. structural resources T1 | 3.92 | 0.50 | .19** | .11 | .36** | (.69) | | | | | | | | | | |
| 5. Incr. social resources T1 | 2.59 | 0.72 | .10 | .06 | .16* | .16* | (.64) | | | | | | | | | |
| 6. Incr. challenging demands T1 | 2.92 | 0.77 | .01 | .19** | .20** | .33** | .32** | (.61) | | | | | | | | |
| 7. Decr. hindering demands T1 | 2.75 | 0.83 | .07 | .02 | .05 | -.03 | .16* | .13 | (.69) | | | | | | | |
| 8. Self-undermining T1 | 3.10 | 0.81 | -.20** | .24** | -.21** | -.13 | -.03 | .03 | -.13 | (.74) | | | | | | |
| 9. Engagement T1 | 4.37 | 1.00 | .34** | .02 | .25** | .41** | .35** | .31** | .04 | -.19** | (.91) | | | | | |
| 10. Exhaustion T1 | 3.12 | 1.05 | -.15* | .34** | -.22** | -.13 | -.24** | -.11 | -.02 | .27** | -.43** | (.80) | | | | |
| 11. Social support T2 | 3.08 | 0.50 | .72** | -.10 | .16* | .22** | .12 | .03 | .02 | -.23** | .29** | -.16* | (.83) | | | |
| 12. Psychological demands T2 | 2.81 | 0.46 | -.05 | .71** | -.03 | .13 | .08 | .19** | .02 | .21** | .07 | .26** | -.09 | (.78) | | |
| 13. Mindfulness T2 | 2.68 | 0.43 | .17* | .08 | .71** | .34** | .22** | .26** | .19** | .17* | .30** | -.17* | .26** | -.02 | (.85) | |
| 14. Incr. structural resources T2 | 3.87 | 0.51 | .31** | .07 | .23** | .53** | .17* | .27** | .01 | -.09 | .44** | -.19** | .32** | .03 | .40** | (.65) |
| 15. Incr. social resources T2 | 2.61 | 0.75 | .03 | .10 | .08 | .03 | .67** | .22** | .11 | .11 | .25** | -.10 | .05 | .08 | .20** | .15* |
| 16. Incr. challenging demands T2 | 2.94 | 0.76 | .02 | .14* | .22** | .27** | .27** | .65** | .13 | .01 | .31** | -.14* | .09 | .12 | .38** | .38** |
| 17. Decr. hindering demands T2 | 2.95 | 0.77 | .04 | .07 | .11 | .12 | .10 | .22** | .51** | -.06 | .08 | -.06 | -.03 | .02 | .27** | .20** |
| 18. Self-undermining T2 | 3.19 | 0.81 | -.17* | .20** | -.12 | -.08 | -.04 | .02 | -.14* | .69** | -.22** | .27** | -.16* | .24** | -.20** | -.17* |
| 19. Engagement T2 | 4.34 | 1.06 | .34** | .02 | .27** | .39** | .28** | .24** | -.02 | -.16* | .72** | -.40** | .38** | .02 | .42** | .52** |
| 20. Exhaustion T2 | 3.15 | 1.10 | -.12 | .32** | .19** | -.16* | -.20** | -.13 | -.02 | .30** | -.41** | .70** | -.21** | .37** | -.24** | -.30** |
| 21. Social support T3 | 3.06 | 0.55 | .69** | -.02 | .16* | .16* | .14 | .03 | .07 | -.16* | .33** | -.12 | .74** | -.08 | .25** | .37** |
| 22. Psychological demands T3 | 2.84 | 0.50 | .03 | .67** | -.06 | .11 | .12 | .18** | .05 | .21** | .06 | .28** | -.07 | .74** | .01 | .06 |
| 23. Mindfulness T3 | 2.68 | 0.45 | .20** | .03 | .68** | .37** | .27** | .26** | .21** | -.14* | .31** | -.21** | .27** | -.08 | .78** | .39** |
| 24. Incr. structural resources T3 | 3.88 | 0.57 | .24** | .08 | .24** | .54** | .18** | .23** | .09 | -.08 | .34** | -.07 | .27** | -.03 | .36** | .59** |
| 25. Incr. social resources T3 | 2.67 | 0.82 | .17* | .03 | .10 | .16* | .69** | .25** | .11 | .09 | .30** | -.21** | .17* | .05 | .21** | .21** |
| 26. Incr. challenging demands T3 | 3.03 | 0.77 | .08 | .15* | .17* | .31** | .34** | .63** | .13 | .04 | .37** | -.18* | .07 | .07 | .35** | .40** |
| 27. Decr. hindering demands T3 | 3.03 | 0.79 | .19** | -.01 | .08 | .12 | .15* | .15* | .48** | .04 | .12 | -.13 | .15* | -.05 | .22** | .29** |
| 28. Self-undermining T3 | 3.19 | 0.80 | -.23** | .21** | -.18* | -.18** | -.08 | .00 | -.09 | .66** | -.29** | .24** | -.25** | .23** | -.27** | -.28** |
| 29. Engagement T3 | 4.36 | 1.11 | .31** | -.02 | .21** | .35** | .34** | .28** | -.02 | -.04 | .73** | -.34** | .33** | -.01 | .34** | .44** |
| 30. Exhaustion T3 | 3.29 | 1.14 | -.14* | .32** | -.15* | -.12 | -.20** | -.08 | .04 | .16* | -.34** | .56** | -.21** | .34** | -.21** | -.24** |

Note. Cronbach's alphas are reported in parentheses. Incr. = Increasing, Decr. = Decreasing. * $p < .05$, ** $p < .01$.

Table 9 (continued)*Means, Standard Deviations, Correlations, and Reliabilities for all Study Variables at the Three Measurement Time Points*

| Variable | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|-----------------------------------|-------|-------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|-------|
| 15. Incr. social resources T2 | (.70) | | | | | | | | | | | | | | | |
| 16. Incr. challenging demands T2 | .36** | (.63) | | | | | | | | | | | | | | |
| 17. Decr. hindering demands T2 | .25** | .36** | (.67) | | | | | | | | | | | | | |
| 18. Self-undermining T2 | .08 | -.08 | -.19** | (.73) | | | | | | | | | | | | |
| 19. Engagement T2 | .31** | .42** | .11 | -.24** | (.92) | | | | | | | | | | | |
| 20. Exhaustion T2 | -.10 | -.16* | -.05 | .38** | -.47** | (.81) | | | | | | | | | | |
| 21. Social support T3 | .18* | .08 | .03 | -.16* | .40** | -.17* | (.85) | | | | | | | | | |
| 22. Psychological demands T3 | .07 | .14* | .05 | .25** | .07 | .37** | -.05 | (.81) | | | | | | | | |
| 23. Mindfulness T3 | .19** | .30** | .17* | -.10 | .38** | -.28** | .32** | -.05 | (.87) | | | | | | | |
| 24. Incr. structural resources T3 | .17* | .34** | .16* | -.08 | .45** | -.20** | .36** | .07 | .54** | (.75) | | | | | | |
| 25. Incr. social resources T3 | .74** | .30** | .20** | .09 | .37** | -.17* | .29** | .06 | .28** | .28** | (.77) | | | | | |
| 26. Incr. challenging demands T3 | .40** | .74** | .30** | -.02 | .47** | -.26** | .20** | .13 | .45** | .49** | .49** | (.68) | | | | |
| 27. Decr. hindering demands T3 | .19** | .21** | .64** | -.08 | .21** | -.19** | .28** | -.02 | .33** | .40** | .31** | .35** | (.71) | | | |
| 28. Self-undermining T3 | -.08 | -.14 | -.19** | .66** | -.29** | .37** | -.31** | .28** | -.24** | -.27** | -.07 | -.10* | -.15* | (.72) | | |
| 29. Engagement T3 | .34** | .40** | .06 | -.14* | .80** | -.41** | .42** | .00 | .41** | .51** | .46** | .52** | .27** | -.25** | (.93) | |
| 30. Exhaustion T3 | -.18* | -.15* | -.06 | .29** | -.37** | .66** | -.30** | .42** | -.27** | -.27** | -.26** | -.22** | -.26** | .40** | -.47** | (.85) |

Note. Cronbach's alphas are reported in parentheses. Incr. = Increasing, Decr. = Decreasing. * $p < .05$, ** $p < .01$.

Test of Hypotheses

Study and Personal Resources and Study Demands

Social support from lecturers significantly decreased from T1 to T2, from T1 to T3, and from T2 to T3 in the WLC, but not in the IGs, which provides partial support for H1a, even though the time x group interaction effect was not significant.

For mindfulness, we found a statistically significant time x group interaction effect. The main time effects show that in both IGs, mindfulness was higher at T2 and T3 compared to T1, whereas in the WLC, we did not observe a significant change in mindfulness across time points. These results fully support H1b.

Psychological demands significantly increased in the WLC from T1 to T2 and from T1 to T3, but not in the IGs, which provides partial support for H1c, even though the time x group interaction effect was not significant.

Engagement and Exhaustion

For engagement, Levene's test was significant ($p < .01$ for T1 and T2), so we performed a Welch-Test as a robust alternative. We found no statistically significant time x group interaction effect and no significant main time effect, so we reject H2a.

For exhaustion, we found a statistically significant time x group interaction effect. The main time effects show that in the WLC, exhaustion was higher at T2 and T3 compared to T1, whereas in both IGs, we did not observe a significant change in exhaustion across time points. Therefore, the significant intervention effect did not result from the hypothesized reduction in exhaustion within the IGs, but rather from the increase observed in the WLC, which was counteracted by the intervention. Thus, we partially confirm H2b.

Study Crafting and Self-undermining

For increasing structural resources, we found a statistically significant time x group interaction effect. The main time effects show that in the WLC, increasing structural resources was lower at T3 compared to T1, whereas in both IGs, we did not observe a significant

change in this study crafting strategy across time points. For increasing social resources, we found no statistically significant time x group interaction effect and no significant main time effect. For increasing challenging demands, we found a statistically significant time x group interaction effect. The main time effects show that in IG2, increasing challenging demands was higher at T3 compared to T1 and T2, whereas in IG1 and the WLC, we did not observe a significant change in this study crafting strategy across time points. For decreasing hindering demands, we found no statistically significant time x group interaction effect, but a significant main time effect. In IG1, decreasing hindering demands increased from T1 to T2 and from T1 to T3 and in the WLC, decreasing hindering demands increased from T1 to T3, whereas in IG2, we did not observe a significant change in this study crafting strategy. These results partially support H3a.

For self-undermining, we found a statistically significant time x group interaction effect. The main time effects show that in IG2, self-undermining decreased from T2 to T3 and in the WLC, self-undermining increased from T1 to T3 and from T2 to T3. In IG1, we did not observe a significant change in self-undermining across time points. Thus, we partially confirm H3b.

Tables 10 and 11 show the means and standard deviations of the study variables for the three groups and the results of the RM ANOVA (interaction effects and main time effects). Table A1 (supplementary material) shows the time effects for each of the two measurement time points for the three groups. Figure A1 (supplementary material) shows the results for variables with significant interaction effects and/or main time effects graphically.

Table 10

Means and Standard Deviations for all Study Variables at the Three Measurement Time Points for the Three Groups

| Variable | IG1 | | | IG2 | | | WLC | | |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> |
| Social support | 3.18 (0.50) | 3.11 (0.50) | 3.16 (0.57) | 3.17 (0.46) | 3.08 (0.50) | 3.09 (0.53) | 3.15 (0.48) | 3.05 (0.49) | 2.95 (0.52) |
| Mindfulness | 2.60 (0.48) | 2.73 (0.43) | 2.75 (0.43) | 2.61 (0.38) | 2.74 (0.42) | 2.73 (0.41) | 2.61 (0.44) | 2.58 (0.44) | 2.57 (0.49) |
| Psychological demands | 2.73 (0.52) | 2.77 (0.45) | 2.80 (0.49) | 2.75 (0.50) | 2.78 (0.42) | 2.83 (0.46) | 2.74 (0.53) | 2.87 (0.52) | 2.88 (0.55) |
| Engagement | 4.47 (1.06) | 4.41 (1.16) | 4.49 (1.22) | 4.35 (0.79) | 4.46 (0.80) | 4.39 (1.02) | 4.30 (1.13) | 4.15 (1.18) | 4.21 (1.09) |
| Exhaustion | 3.03 (1.03) | 2.98 (1.13) | 3.02 (1.22) | 3.25 (1.02) | 3.13 (0.91) | 3.26 (0.98) | 3.07 (1.11) | 3.33 (1.23) | 3.56 (1.17) |
| Increasing structural resources | 3.90 (0.47) | 3.92 (0.46) | 3.95 (0.46) | 3.93 (0.51) | 3.89 (0.51) | 3.96 (0.55) | 3.93 (0.54) | 3.81 (0.55) | 3.74 (0.65) |
| Increasing social resources | 2.67 (0.81) | 2.71 (0.76) | 2.83 (0.87) | 2.53 (0.65) | 2.60 (0.77) | 2.63 (0.84) | 2.58 (0.70) | 2.52 (0.71) | 2.58 (0.73) |
| Increasing challenging demands | 3.00 (0.74) | 2.98 (0.78) | 3.11 (0.78) | 2.83 (0.77) | 2.95 (0.78) | 3.11 (0.71) | 2.94 (0.79) | 2.89 (0.71) | 2.89 (0.80) |
| Decreasing hindering demands | 2.75 (0.94) | 3.07 (0.82) | 3.12 (0.74) | 2.79 (0.72) | 2.94 (0.74) | 3.01 (0.85) | 2.72 (0.82) | 2.86 (0.76) | 2.96 (0.78) |
| Self-undermining | 3.07 (0.72) | 3.09 (0.73) | 3.14 (0.76) | 2.98 (0.84) | 3.15 (0.88) | 2.95 (0.69) | 3.25 (0.86) | 3.32 (0.79) | 3.47 (0.85) |

Table 11*Results of the RM ANOVA*

| Variable | RM-ANOVA | | | |
|---------------------------------|--------------------------------------|------------|--------------------------------------|------------|
| | Time x group interaction effect | | Main time effect | |
| | <i>F</i> -value | η_p^2 | <i>F</i> -value | η_p^2 |
| Social support | $F(4, 404) = 2.24, p = .06$ | | $F(2, 404) = 8.49, p < .001$ | .04 |
| Mindfulness | $F(3.95, 398.52) = 4.70, p < .01$ | .04 | | |
| Psychological demands | $F(3.94, 397.95) = .75, p = .56$ | | $F(1.97, 397.95) = 6.80, p < .01$ | .03 |
| Engagement | Welch's $F(4, 316.5) = .61, p = .66$ | | Welch's $F(2, 404.8) = .24, p = .79$ | |
| Exhaustion | $F(3.88, 392.20) = 3.63, p < .01$ | .04 | | |
| Increasing structural resources | $F(4, 404) = 2.58, p < .05$ | .03 | | |
| Increasing social resources | $F(4, 404) = .88, p = .48$ | | $F(2, 404) = 2.32, p = .10$ | |
| Increasing challenging demands | $F(3.91, 394.78) = 2.69, p < .05$ | .03 | | |
| Decreasing hindering demands | $F(3.85, 389.18) = .67, p = .61$ | | $F(1.93, 389.18) = 14.59, p < .001$ | .07 |
| Self-undermining | $F(4, 404) = 3.02, p < .05$ | .03 | | |

Mediation

We found no significant indirect effects through the study resource social support from lecturers and the study demand psychological demands. Thus, we reject H5. However, the intervention significantly predicted the personal resource mindfulness (T2) as a mediator, $b = .17, p < .001$. Mindfulness, in turn, significantly predicted engagement (T3), $b = .53, p < .01$, increasing structural resources (T3), $b = .32, p < .01$, increasing challenging demands (T3), $b = .52, p < .001$, and self-undermining (T3), $b = -.41, p < .01$, but not exhaustion, $b = -.34, p = .12$. Thus, we partially confirm H4a, H4c, and H4d and reject H4b. The significant indirect effects are shown in Table 12.

Table 12

Overview of the Indirect Effects

| Variable | Engagement | | Increasing structural resources | | Increasing challenging demands | | Self-undermining | |
|-------------|--------------|------------|---------------------------------|------------|--------------------------------|------------|------------------|--------------|
| | <i>B(SE)</i> | 95% CI | <i>B(SE)</i> | 95% CI | <i>B(SE)</i> | 95% CI | <i>B(SE)</i> | 95% CI |
| Mindfulness | .09(.04) | .019, .178 | .05(.02) | .014, .106 | .09(.03) | .031, .159 | -.07(.03) | -.137, -.016 |

Discussion

Given the increase in burnout and the temporary decrease in engagement during the COVID-19 pandemic (e.g., Herbst et al., 2016; Salmela-Aro et al., 2022), there is an urgent need for evidence-based support programs for students. Our study therefore tested a novel intervention approach by evaluating two online interventions based on the SD-R framework, aimed at balancing resources and demands. Consistent with our hypotheses, the interventions positively influenced the personal resource mindfulness, two study crafting strategies, self-undermining, and exhaustion. The hypothesized mediation effects through the personal resource mindfulness were partially confirmed.

While we observed no significant interaction effects for the study resource and study demand, there were significant time effects within the WLC. Social support from lecturers decreased over time, while psychological demands increased. Since lectures switched from face-to-face (T1) to online (T2 and T3) during the course of our study, these results align with research suggesting that social support decreased and workload increased during the COVID-19 pandemic, especially with the shift to online lectures (Hoss et al., 2021). The results also align with literature indicating workload intensification throughout the semester (Pitt et al., 2018). Contrary to our hypotheses, social support did not increase and psychological demands did not decrease in the IGs, but remained stable. This at least suggests that our interventions may help counteract the loss of resources and the increase in demands typically associated with online lectures and semester progression. A job crafting intervention study also found no effect on job resources and demands after the intervention, but increased job resources at the 1-year follow-up (van Wingerden, Bakker, & Derks, 2017b). Accordingly, changes in the study environment may take time to become measurable.

The personal resource mindfulness significantly increased in both IGs after the intervention and compared to the WLC, with effects persisting at follow-up. This supports the notion that actively engaging with one's own demands and resources can sustainably enhance mindfulness. Given its positive correlation with life satisfaction, optimism, and self-esteem and its negative correlation with negative affect (Brown & Ryan, 2003), this is a promising result. Consistent with our findings, job crafting interventions also increased personal resources such as self-efficacy (van Wingerden, Bakker, & Derks, 2017b) or psychological capital (van Wingerden et al., 2016).

Unexpectedly, we did not observe an intervention effect on engagement, which is in contrast to an earlier study on a study crafting intervention (Körner et al., 2022). However, job crafting interventions also appear to have heterogeneous effects on work engagement (Devotto & Wechsler, 2019). A meta-analysis concludes that the resource gain appears to be a

key condition for increasing engagement through interventions (Devotto & Wechsler, 2019). The COVID-19 pandemic and the change to online lectures after the intervention eliminated some resources (Lederer et al., 2021). Salta et al. (2022) also noted lower engagement in online lectures versus face-to-face lectures. Thus, our result may be explained by a lack of sufficient resource building of the participants as well as the switch to online lectures.

A significant intervention effect was observed on exhaustion. Exhaustion significantly increased in the WLC, which is consistent with studies confirming that stressors accumulate and negative stress-related outcomes occur particularly at the end of the semester (Pitt et al., 2018). In addition, Salmela-Aro et al. (2022) confirmed that exhaustion increased steadily over the course of the COVID-19 pandemic. In contrast, exhaustion remained stable in both IGs, suggesting that our interventions might help counteract increasing exhaustion as the semester progresses. A study crafting intervention study found a significant decrease of exhaustion at the 5-month follow-up in the IG (Körner et al., 2022). This suggests that it may take longer for exhaustion to decrease measurably as a result of an intervention.

Regarding study crafting, significant intervention effects were found for increasing structural resources and increasing challenging demands. In the WLC, increasing structural resources significantly decreased, while there were no significant changes in both IGs. As stressors accumulate over the course of the semester (Pitt et al., 2018), students may feel too stressed to increase structural resources. Our intervention may have helped encourage students to engage in this behavior even during stressful times. Van Wingerden, Bakker, and Derks (2017a) posited that increasing structural resources requires ample opportunities and time for successful implementation. The COVID-19 pandemic has eliminated some structural resources that can contribute to personal development such as a semester abroad (Lederer et al., 2021). This may also explain why this study crafting strategy did not increase in the IGs. Increasing challenging demands significantly increased in IG2, possibly due to the

focus on resources in this group, which may have strengthened participants to seek new challenges.

No intervention effect was found on increasing social resources, aligning with a job crafting intervention review (Devotto & Wechsler, 2019), which also reported no effect on this strategy. Students reported a decrease in interaction, communication, and support due to the COVID-19 pandemic (Hoss et al., 2021). This might have limited students' opportunities to increase their social resources during online lectures at T2 and T3.

Decreasing hindering demands significantly increased in IG1, consistent with the results of a study crafting and some job crafting interventions (Körner et al., 2022; van Wingerden, Bakker, & Derks, 2017a). However, as this strategy also increased in the WLC, it seems partly intuitive, particularly during stressful periods like the shift to online lectures and exam preparation. Studies from the work context confirm that decreasing hindering demands is an effective strategy especially during stressful times (Demerouti et al., 2017). Interestingly, in IG2, this behavior remained stable, possibly due to an increased capacity to cope with stressors due to their focus on resources.

For self-undermining, an increase was observed in the WLC, while it decreased in IG2 from T2 to T3 and remained stable in IG1. As this behavior has not yet been investigated in intervention contexts, our results provide novel insights, suggesting that SD-R-based interventions can mitigate dysfunctional behaviors that typically increase over the course of a semester.

Our mediation analyses indicated that mindfulness mediated the effect of the interventions on several SD-R outcomes. This is in line with the assumptions of a gain cycle between resources, engagement, and job crafting, as well as the buffer hypothesis postulating that resources can also impact variables of the health-impairment path (Bakker & Demerouti, 2014, 2017). Our study confirms that mindfulness can help promoting engagement and study crafting, while countering self-undermining. This further confirms the suitability of

integrating it within the SD-R framework, given its influence on both the health-impairment path and the motivational path.

Theoretical Contributions

Our study contributes to the literature in three significant ways: First, it extends the literature on the SD-R framework by demonstrating that SD-R-based interventions can actively influence the postulated paths. Since we confirmed intervention effects on mindfulness, study crafting, and self-undermining in addition to exhaustion, our study also contributes to the validation of an extended SD-R framework. Additionally, our mediation analyses underscore the importance of personal resources within the SD-R framework, highlighting their role in influencing both behavioral (i.e., study crafting, self-undermining) and well-being outcomes (i.e., engagement).

Second, our study contributes to the literature on interventions in higher education settings. While existing reviews indicate heterogeneous effects of online stress management or mindfulness interventions (e.g., Dawson et al., 2020; Harrer et al., 2019), our findings indicate that the SD-R framework represents a novel effective intervention approach. Thereby, our study also addresses the critical need for further evidence-based support programs for students (Mülder et al., 2022).

Third, our research adds to the understanding of proactive and dysfunctional student behavior. A study crafting intervention only increased the study crafting strategy of decreasing hindering demands (Körner et al., 2022), while our intervention had an impact on a broader range of study crafting strategies (i.e., increasing structural resources and increasing challenging demands). This suggests that the intervention focus on balancing resources and demands can achieve different effects than a study crafting intervention. Moreover, our study is pioneering in demonstrating that interventions can positively affect self-undermining, which, to our knowledge, has not been previously investigated in an intervention in either the academic context or work context.

Limitations and Suggestions for Further Research

Although our study was carefully planned and conducted, it has some limitations that should be considered in future research: First, we focused on a limited set of study demands, study resources, and personal resources, with some showing no significant intervention effects. Future studies could explore the impact of SD-R-based interventions on a broader range of study resources (e.g., qualification potential) and study demands (e.g., incompatibility of study and private life) (Gusy, Wörfel, & Lohman, 2016). Similarly, the impact of these interventions on other outcome variables that have already been examined in cross-sectional studies in the context of the SD-R framework such as life satisfaction or performance could be examined (Lesener, Pleiss, et al., 2020; Schaufeli, Martínez, et al., 2002).

Second, currently there are no validated scales for assessing study crafting and self-undermining among students. Therefore, scales developed and validated for the work context were adapted to the higher education context. Although most scales exhibited satisfactory reliability, the results concerning study crafting and self-undermining should be interpreted with caution. Therefore, future research should prioritize the development and validation of such measurement instruments.

Third, the changing study conditions during the course of our study (online vs. face-to-face lectures, exam phase at follow-up) may also have influenced our results, as discussed earlier. Future research should consider varying time points and examine the longer-term impact of SD-R-based interventions (i.e., one semester later) as some effects may only emerge over time, as evidenced in a job crafting intervention study in the work context (van Wingerden, Bakker, & Derks, 2017b).

Fourth, our study's generalizability is limited by the specific demographic composition of the sample. The sample consisted predominantly of women and bachelor's students at a single university of applied sciences. At the same time, Herbst et al. (2016)

emphasize that women show higher stress levels compared to men, students at universities of applied sciences compared to students at universities, and bachelor's students compared to master's students. Thus, our intervention targeted a particularly vulnerable population, which has a high practical value for this target group, but further limits its transferability of the results. Future studies could address these points and also investigate whether sociodemographic variables or personality traits (e.g., regulatory focus) influence how students respond to the resources-intervention compared to the demands-intervention.

Last, self-report data, while appropriate for capturing subjective well-being and personal perceptions regarding the own study environment, is susceptible to common method bias (Podsakoff et al., 2003). Future studies might incorporate peer or lecturer ratings for a more comprehensive assessment of certain variables.

Practical Implications and Conclusion

Our study demonstrated that SD-R-based interventions are effective in enhancing mindfulness and study crafting behavior, and mitigating self-undermining and exhaustion among students. Notably, our study underscores that brief interventions, requiring only 3-4 hours over two weeks, can yield positive outcomes, which also meets students' preference for compact stress management solutions and online interventions (Harrer et al., 2019; Seidl et al., 2018). Therefore, a key practical implication of our study is the great potential of our interventions for higher education institutions as a cost-effective, and time- and resource-efficient way to support students. A notable observation is that the intervention group focusing on resources (IG2) exhibited more positive intervention effects. This suggests that interventions emphasizing resource enhancement are particularly impactful.

However, beyond implementing targeted interventions, it is crucial for higher education institutions to create a study environment that facilitates the adjustment of resources and demands. This involves creating opportunities for personal growth and autonomy, such as diverse extracurricular activities or flexible course choices. In addition, lecturers should pay

attention to fostering social resources such as communication, support, feedback, and interaction. To counteract accumulation of demands and associated stress, higher education institutions should also ensure a distribution of academic demands across the semester, for example, by staggering exam schedules and assignment deadlines.

In conclusion, it should be noted that demands and resources can fluctuate greatly over the course of a semester, and study conditions can change rapidly due to external circumstances such as the COVID-19 pandemic (Körner et al., 2021). The SD-R framework provides an adaptable and responsive basis for interventions that can help customize demands and resources to respond flexibly to changing circumstances. While our intervention warrants further refinement and testing, we conclude that SD-R-based interventions offer a promising measure for improving student well-being by creating an optimal balance of demands and resources.

Chapter 5: General Discussion

The overarching aim of this dissertation was to enhance the theoretical and methodological foundations of the SD-R framework and to explore its practical applicability. The three empirical studies conducted within this dissertation aimed to narrow the research gaps between the JD-R model and the SD-R framework by incorporating additional variables (i.e., personal resources, study crafting, self-undermining), validating the framework at the within-person level, and evaluating three different SD-R-based interventions.

In this chapter, I will summarize the three studies and integrate their findings with the four research goals outlined in the General Introduction. Subsequently, I will highlight the theoretical implications of this dissertation by contextualizing the findings within previous research on the JD-R model and the SD-R framework. Next, I will discuss the strengths and limitations of the studies, provide suggestions for future research, and outline practical implications. Finally, I will present a central conclusion.

Summary and Integration of Findings

Study 1 examined an extended SD-R framework that included the variables study crafting and self-undermining in a weekly diary design. It was hypothesized that study resources would predict engagement, which would predict study crafting, and that study demands would predict exhaustion, which would predict self-undermining. Weekly data were collected over a four-week period during the semester. Multilevel analyses controlling for autoregressors supported the hypotheses by confirming the mediating role of engagement between study resources and study crafting, as well as the mediating role of exhaustion between study demands and self-undermining at the weekly within-person level.

Study 2 evaluated an online study crafting intervention through a randomized controlled trial with a 20-week follow-up. It was hypothesized that the intervention would increase study crafting and engagement while decreasing exhaustion. Study crafting was also expected to mediate the effects of the intervention on engagement and exhaustion. Repeated

measures analyses of variance indicated that overall study crafting, the study crafting strategy of decreasing hindering demands, and engagement increased significantly in the intervention group compared to the waiting-list control group, both immediately after the intervention and at the 20-week follow-up. In addition, exhaustion was significantly reduced in the intervention group at follow-up compared to pre- and post-intervention measures. Mediation analyses further confirmed that post-intervention study crafting mediated the effects of the intervention on engagement and exhaustion at follow-up.

Study 3 evaluated two SD-R-based online interventions, one focused on adapting demands and the other on increasing resources, through a randomized controlled trial with a 5-week follow-up. The interventions were hypothesized to increase study and personal resources, engagement, and study crafting, while decreasing study demands, exhaustion, and self-undermining. It was further hypothesized that demands and resources would mediate the effects of the interventions on the other SD-R variables. Repeated measures analyses of variance indicated significant positive intervention effects on the personal resource mindfulness, on exhaustion, on the study crafting strategies of increasing structural resources and increasing challenging demands, and on self-undermining. The resources-intervention showed more positive intervention effects than the demands-intervention. In addition, post-intervention mindfulness mediated the effects of the interventions on engagement, increasing structural resources, increasing challenging demands, and self-undermining at follow-up.

The combined findings of the three empirical studies contribute to the four research goals of this dissertation in the following ways. The first research goal aimed to expand the SD-R framework by integrating personal resources, study crafting, and self-undermining derived from the latest version of the JD-R model (Bakker, Demerouti, & Sanz-Vergel, 2023). Taken together, the three studies provide evidence that personal resources (see Study 3), study crafting (see Studies 1-3), and self-undermining (see Studies 1 and 3) show significant relationships with the core variables of the SD-R framework—study demands, study

resources, engagement, and exhaustion—as well as with each other (see Study 3). Therefore, the findings of the three studies support the inclusion of personal resources, study crafting, and self-undermining in the SD-R framework.

The second research goal was to investigate dynamic fluctuations in student well-being and their causes and consequences derived from within-person research on the JD-R model (Bakker, 2015). Study 1 confirmed that weekly changes in study characteristics affect students' levels of engagement and exhaustion, which in turn affect their study crafting and self-undermining behaviors. Thus, Study 1 validated the extended SD-R framework at the intraindividual level.

The third research goal was to evaluate three different SD-R-based interventions, inspired by the practical application of the JD-R model (see Bakker, Demerouti, & Sanz-Vergel, 2023). Although there were partially heterogeneous effects across the three SD-R-based interventions, positive intervention effects were observed on personal resources (see Study 3), engagement (see Study 2), exhaustion (see Study 3), different study crafting strategies (see Studies 2 and 3), and self-undermining (see Study 3). These findings underscore the practical applicability of the SD-R framework in interventions.

The fourth research goal was to investigate mediating processes to improve the understanding of underlying mechanisms that drive the effects of the SD-R-based interventions (see Mukherjee & Dhar, 2023). Intervention effects were mediated by study crafting (see Study 2) and mindfulness (see Study 3). These findings emphasize the key role of personal resources and study crafting within the SD-R framework and contribute to its longitudinal validation in an intervention context.

Theoretical Implications

The three empirical studies make important contributions to the literature on self-regulation behavior, the SD-R framework, and interventions aimed at improving student well-being. First, this dissertation contributes to the literature on job crafting and self-undermining

by confirming that these adaptive and maladaptive self-regulation behaviors are common not only among employees, but also among students. The concept of crafting has been extended to different contexts in recent years (see, e.g., de Bloom et al., 2020), and this dissertation confirms that higher education is another context in which crafting behaviors are applicable. Derived from the concept of job crafting in the work context (see Tims & Bakker, 2010), this dissertation introduces study crafting as the proactive adjustments that students make to their study demands and study resources to better align their studies with their personal skills, preferences, and strengths. The studies in this dissertation confirm that the four job crafting strategies specified in the JD-R model (see Tims et al., 2012, 2013) are transferable to the higher education context. Students can increase structural resources (see Studies 1 and 3), increase social resources (see Study 1), increase challenging demands (see Study 3), and decrease hindering demands (see Studies 2 and 3). Moreover, this dissertation provides evidence that interventions can promote study crafting (see Studies 2 and 3), which is consistent with job crafting in the work context (Bakker & Demerouti, 2014).

Furthermore, to the best of my knowledge, the research in this dissertation is the first to transfer the concept of self-undermining to the higher education context (see Studies 1 and 3). Derived from the work context (see Bakker & Costa, 2014; Bakker & Wang, 2020), this dissertation introduces self-undermining as a behavior that creates barriers to learning and thereby undermines academic performance. An important contribution in this context is the empirical evidence that SD-R-based interventions can reduce self-undermining (see Study 3), which is a novel finding in both the higher education context and the work context.

Second, and building on the introduction of self-regulation behaviors into the higher education context, this dissertation makes significant theoretical contributions to the extension and refinement of the SD-R framework, bringing it closer to the current version of the JD-R model (Bakker, Demerouti, & Sanz-Vergel, 2023). Unlike previous research on the SD-R framework, which has only validated the central paths from study characteristics to

engagement and exhaustion (e.g., Lesener, Pleiss, et al., 2020), this dissertation provides empirical evidence for the significant roles of personal resources, study crafting, and self-undermining within the framework.

Regarding personal resources, Study 3 found that mindfulness predicts subsequent engagement, study crafting, and self-undermining. These relationships are consistent with the JD-R model, which has identified personal resources as predictors of engagement (for a meta-analysis, see Mazzetti et al., 2023) and job crafting (e.g., van Wingerden & Poell, 2019) in the motivational path. Research on the JD-R model has also shown that personal resources can impact the health-impairment path (e.g., reduce exhaustion; Y. Wang et al., 2016; Xanthopoulou et al., 2007). This theoretically suggests a relationship between personal resources and self-undermining as well (Bakker & de Vries, 2021). However, to the best of my knowledge, this dissertation represents the first empirical confirmation of this relationship.

Regarding study crafting, this dissertation found that increasing structural resources and increasing social resources are positively predicted by engagement and study resources (Study 1). Study 2 further demonstrated that study crafting positively predicts subsequent engagement and negatively predicts subsequent exhaustion, while Study 3 confirmed that increasing structural resources and increasing challenging demands are positively predicted by personal resources. These findings are again consistent with the JD-R model, where job crafting has been identified as a positive antecedent and outcome of engagement (e.g., Harju et al., 2016; Tims et al., 2013, 2015b; Zeijen et al., 2021) and a negative antecedent of burnout (e.g., Tims et al., 2013). In addition, job and personal resources have been confirmed as positive antecedents of job crafting (Rudolph et al., 2017; F. Zhang & Parker, 2019).

Regarding self-undermining, this dissertation demonstrated that self-undermining is positively predicted by exhaustion and study demands (Study 1), but negatively predicted by personal resources (Study 3). Consistent with this, initial empirical evidence from the JD-R

model confirms that job demands (e.g., Döbler et al., 2022; Golu et al., 2022) and burnout (e.g., Golu et al., 2022) show positive relationships with self-undermining.

Consequently, based on their multiple relationships with the other variables within the SD-R framework, I recommend integrating personal resources and study crafting into the motivational path and self-undermining into the health-impairment path. Because these three variables have relationships with variables from both the motivational path and the health-impairment path, I further recommend considering the interdependencies between the two paths rather than examining them in isolation. This inclusion contributes to a more holistic understanding of engagement and exhaustion by considering not only study characteristics (cf. Lesener, Pleiss, et al., 2020), but also personal characteristics and adaptive and maladaptive self-regulation behaviors, both as their antecedents and outcomes.

In addition, this dissertation provides initial evidence for a refinement of the health-impairment path by differentiating two types of study demands (see Study 1). Although both types of study demands investigated were positively related to exhaustion and self-undermining, psychological demands were positively related to engagement, whereas overload was negatively related to engagement. This finding can be explained by the challenge-hindrance framework (LePine et al., 2004), which distinguishes between challenging and hindering demands (Cavanaugh et al., 2000; Crawford et al., 2010; LePine et al., 2005). While an a priori classification of demands based on logical grounds is considered critical (Bakker & Sanz-Vergel, 2013), the JD-R model distinguishes between challenging job demands and hindering job demands based on empirical evidence of their different roles within the model (e.g., Bakker & Sanz-Vergel, 2013; Tadić et al., 2015; van den Broeck et al., 2010). The challenge-hindrance framework has not previously been considered in the SD-R framework (Lesener, Pleiss, et al., 2020). However, in addition to the differential relationships with engagement demonstrated in this dissertation (see Study 1), recent research has also confirmed distinct relationships between challenges and hindrances and academic

performance (Travis et al., 2020). Consequently, I recommend differentiating between challenging study demands and hindering study demands within the SD-R framework based on their distinct relationships with variables of the motivational path.

Third, in addition to theoretical extensions, this dissertation also contributes to the methodological refinement of the SD-R framework. In the weekly diary study (Study 1), the intraclass correlation coefficients for the SD-R variables ranged from .33 to .73, indicating sufficient intraindividual variation and justifying the applicability of this research approach to the SD-R framework. Study 1 replicated the findings of previous between-person and initial within-person studies of the SD-R framework (e.g., Bakker et al., 2015; Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Mokgele & Rothmann, 2014; Robayo-Tamayo et al., 2020). However, Study 1 also extended these findings by showing that weekly fluctuations in study characteristics and well-being also cause fluctuations in study crafting and self-undermining. These findings are unique in the context of higher education, but are in line with findings on the JD-R model, where daily or weekly fluctuations in job crafting and self-undermining have already been confirmed (e.g., Bakker & Oerlemans, 2019; Bakker, Xanthopoulou, & Demerouti, 2023; Petrou et al., 2017; Petrou et al., 2012; Roczniowska & Bakker, 2021). Consequently, the results of Study 1 confirm the validity of the SD-R framework at the intraindividual level, thereby complementing findings from cross-sectional between-person studies and contributing to a more comprehensive understanding of short-term variations in well-being and self-regulation behavior.

Fourth, this dissertation includes the first research that practically applied the theoretical principles of the SD-R framework to interventions (Studies 2 and 3). The SD-R-based interventions produced mixed effects on the variables within the SD-R framework: Regarding study and personal characteristics, there were no changes in study characteristics in the IGs in Study 3, whereas the WLC showed a decrease in study resources and an increase in study demands (time effect; Study 3). However, both interventions improved the personal

resource of mindfulness (interaction effect; Study 3). Regarding well-being, the study crafting intervention increased engagement (interaction effect; Study 2), whereas no effect on engagement was observed in Study 3. On the contrary, the demands- and the resources-intervention prevented an increase in exhaustion, as observed in the WLC (interaction effect; Study 3), whereas the study crafting intervention led to a reduction in exhaustion from the pre- and post-measurement to follow-up (time effect; Study 2). With regard to self-regulation behavior, the study crafting intervention showed an effect on the study crafting strategy of decreasing hindering demands (interaction effect), but not on other strategies (Study 2). The demands-intervention also showed an increase in this strategy (time effect; Study 3), whereas both interventions affected increasing structural resources by preventing a decrease, as observed in the WLC (interaction effect; Study 3). Furthermore, the resources-intervention produced improvements in increasing challenging demands and reduced self-undermining (interaction effects; Study 3).

Thus, some of the hypothesized intervention effects were confirmed, while others had to be rejected. These different and partly contradictory results of the three interventions mirror similar discrepancies found for JD-R-based interventions (e.g., Demerouti, Peeters, & van den Heuvel, 2019; Devotto & Wechsler, 2019; Mukherjee & Dhar, 2023; Oprea et al., 2019), which can be attributed to several factors. First, situational circumstances may have influenced the results. Restrictions on social interactions and activities, as well as online lectures due to the COVID-19 pandemic, contributed to increased demands and decreased resources among students (Aristovnik et al., 2020; Elmer et al., 2020; e.g., Hoss et al., 2021; Kohls et al., 2021; Tsiouris et al., 2023). Furthermore, the post-measurement in Studies 2 and 3 and the follow-up measurement in Study 3 were conducted at the end of the semester, when stressors accumulate (Pitt et al., 2018). In particular, these circumstances may explain the lack of intervention effects on study characteristics and engagement (Study 3) and the heterogeneous effects on study crafting strategies (Studies 2 and 3).

Second, findings from a job crafting intervention suggest that some intervention effects only occur over time (van Wingerden, Bakker, & Derks, 2017b). Thus, the lack of improvements in increasing structural resources and increasing challenging demands may also be due to the fact that the successful implementation of these strategies may require more time, as opportunities, such as a semester abroad, need to be available (van Wingerden, Bakker, & Derks, 2017b).

Third, the content of the interventions may have played a role. Task analysis (Study 2) and stressor collection (demands-intervention; Study 3) may have increased students' awareness of numerous study demands, making it particularly beneficial to decrease hindering demands (van Wingerden, Bakker, & Derks, 2017b). Conversely, focusing on resources (resources-intervention; Study 3) may have diminished the salience of demands, which might explain why students participating in the resources-intervention did not decrease hindering demands, but instead increased challenging demands and decreased self-undermining. In addition, the demands-intervention and resources-intervention targeted resources and demands broadly, whereas only one specific demand and resource was measured (Study 3). Thus, it cannot be ruled out that other study characteristics beyond those measured were influenced.

Furthermore, although the results of the SD-R-based interventions and those of JD-R-based interventions are equally diverse, the findings of Study 2 provide initial evidence for a possible distinction between job crafting interventions and study crafting interventions. Job crafting interventions mainly showed no intervention effect on engagement when they increased the strategy of decreasing hindering demands (e.g., van Wingerden, Bakker, & Derks, 2017b; van Wingerden, Derks, & Bakker, 2017). However, in Study 2, only the strategy of decreasing hindering demands was significantly increased, and at the same time, engagement increased.

While studying and working are generally comparable (Ouweneel et al., 2011), there are also some differences between students and employees. On the one hand, initial results from comparisons of the same demands and resources between employees and students show that students generally report fewer resources (e.g., autonomy, private support) and more demands (e.g., time pressure, overload) than employees (Wittner et al., 2023). On the other hand, students and employees differ in their interactions. While Tims et al. (2015a) found that decreasing hindering demands is positively related to the level of colleagues' workload, conflict, and burnout, this finding cannot be directly applied to students. Although negative effects may occur in group projects when one student decreases demands and thus contributes less than others, students often work more independently than employees. These differences between the work and higher education context could explain why the strategy of decreasing hindering demands might differ in effectiveness between students and employees. Thus, this dissertation provides initial evidence that decreasing hindering demands could be an effective approach that allows students to balance demands and resources during stressful and overwhelming times (see Demerouti, 2014; Tims et al., 2016).

Regarding the results of the mediation analyses, Study 2 confirmed study crafting as a mediator between the study crafting intervention and engagement and exhaustion, while Study 3 confirmed mindfulness as a mediator in the relationship between the resources- and demands-intervention and engagement, increasing structural resources, increasing challenging demands, and self-undermining.

Although there is limited research on the underlying mechanisms of JD-R-based interventions, one review highlights job crafting as a mediator in job crafting interventions (Mukherjee & Dhar, 2023), consistent with the findings of Study 2. The authors also recommend examining intervention-induced changes in job and personal characteristics as additional potential mediators (Mukherjee & Dhar, 2023). Personal resources interventions have previously confirmed this mediating role of personal resources (Bakker & van

Wingerden, 2021), which was substantiated for the personal resource of mindfulness in Study 3. However, contrary to the hypotheses, no mediation effects of study demands and study resources were observed. This may again be due to the specificity of the study characteristics examined, for which no intervention effects were observed. Other study demands and resources may mediate the effects of SD-R-based interventions.

Taken together, the effects of the three SD-R-based interventions were also found in JD-R-based interventions, which were similarly successful in increasing personal resources (e.g., van Wingerden, Bakker, & Derks, 2017b), engagement (e.g., van Wingerden et al., 2016), and various job crafting strategies (e.g., Dubbelt et al., 2019), while reducing exhaustion (e.g., Gordon et al., 2018). Thus, these findings contribute to the practical applicability of the SD-R framework in interventions. In addition, the findings confirm the key role of study crafting and personal resources in mediating the effects of SD-R-based interventions over time, which also contributes to the longitudinal validation of the SD-R framework processes. However, as Studies 2 and 3 represent the first evaluations of SD-R-based interventions, which partially yielded heterogeneous effects, showed partial deviations from JD-R-based interventions, and may have been influenced by the aforementioned circumstances, further research is needed.

Finally, Studies 2 and 3 contribute to the body of research on interventions aimed at improving student well-being. The finding that interventions based on the SD-R framework can effectively improve personal resources, well-being, study crafting, and self-undermining is unique in the higher education context. Thus, the SD-R framework emerges as a novel and valuable intervention approach that complements previous ones that have mainly focused on topics such as stress management (for a meta-analysis, see, e.g., Amanvermez et al., 2020), mindfulness (for a meta-analysis, see, e.g., Dawson et al., 2020), or mental health (for a meta-analysis, see, e.g., Harrer et al., 2019). Applying the SD-R framework to interventions, inspired by JD-R-based interventions in the work context, thus also addresses the

recommendation to transfer interventions designed for other populations to the higher education context (Reavley & Jorm, 2010).

Strengths and Limitations

The research conducted in this dissertation has strengths and limitations, the most important of which are discussed below. A major strength of the dissertation lies in its diverse methodologies, including a diary study (Study 1) and randomized controlled trials (Studies 2 and 3). Diary studies offer a process-oriented perspective by applying a state approach to variables rather than static models that adopt a trait approach (Ohly et al., 2010). Thus, diary studies complement the findings of cross-sectional between-person studies by contributing to the understanding of short-term variations in well-being within individuals (Bakker, 2015; Ilies et al., 2015). Although the JD-R model has been extensively examined through diary studies (Bakker, Demerouti, & Sanz-Vergel, 2023), this research strategy has been underutilized in higher education contexts, particularly in studies of the SD-R framework. Study 1 addressed this gap by implementing the recommendation to use diary studies in educational contexts (Bakker et al., 2015). The inclusion of autoregressors in the analyses ensured robust results, which is another methodological strength of Study 1.

Randomized controlled trials were used in Studies 2 and 3 to address the methodological concerns of previous intervention studies (e.g., Amanvermez et al., 2020; Mukherjee & Dhar, 2023). Considered as the gold standard in intervention research (Guyatt et al., 1995; Schulz et al., 2011), randomized controlled trials have been proposed to evaluate health interventions for higher education students (e.g., Farrer et al., 2013) and job crafting interventions (e.g., Mukherjee & Dhar, 2023). Therefore, the use of this research design underscores a commitment to methodological rigor.

A second methodological strength is the inclusion of follow-up measurements in the intervention studies (Studies 2 and 3), which extends the investigation beyond immediate intervention effects and is consistent with previous recommendations to assess sustainability

(e.g., Alrashdi et al., 2023; Devotto & Wechsler, 2019; Winzer et al., 2018). In Study 3, a follow-up measurement was administered after 5 weeks, coinciding with exam preparation weeks, to examine the sustainability of intervention effects toward the end of the semester. In Study 2, on the other hand, a follow-up measurement was conducted after 20 weeks in the following semester to examine sustained effects over a semester.

The inclusion of three measurement time points in Studies 2 and 3 also allowed for a nuanced examination of how the effects of the intervention on outcome variables evolved over time (van Wingerden, Bakker, & Derks, 2017a). Following the suggestion for intervention studies in higher education (e.g., Amanvermez et al., 2020) and job crafting interventions (e.g., Mukherjee & Dhar, 2023) to conduct mediation analyses, this helped to understand the underlying mechanisms driving the intervention effects.

In addition to their methodological strengths, the interventions in Studies 2 and 3 had strengths related to their content and implementation. Both interventions used the SD-R framework as their theoretical foundation, thus addressing the growing demand for evidence-based support programs, especially during the challenging times of the COVID-19 pandemic (e.g., Mülder et al., 2022). Furthermore, the interventions were accessible to all students regardless of their baseline symptom levels or academic field, distinguishing them from previous interventions that were often targeted to specific groups, such as medical students (e.g., Amanvermez et al., 2020; Dietz et al., 2020). Finally, while there are only few JD-R-based online interventions to date (e.g., Verelst et al., 2021), our online interventions leveraged the various advantages of this intervention format, such as a broader reach, anonymity, and flexibility (e.g., D. D. Ebert et al., 2019; Lutz-Kopp et al., 2019). Thereby, they addressed potential structural or personal barriers associated with using in-person services, such as time issues or stigma (e.g., D. D. Ebert et al., 2019).

However, the three studies also had certain methodological limitations. First, only a limited number of study demands (overload and psychological demands), study resources

(decision latitude, social support from lecturers, social support from fellow students), and personal resources (mindfulness) were examined. Although these variables were selected based on their importance in previous research on the SD-R framework (e.g., Cilliers et al., 2017; Gusy, Wörfel, & Lohman, 2016; Lesener, Pleiss, et al., 2020; Robins et al., 2015; Schaufeli, Martínez, et al., 2002), this selection implies that the role of other demands and resources within the extended SD-R framework remains unclear.

A second methodological limitation stems from the measurement of study crafting and self-undermining. To the best of my knowledge, there were no validated and reliable scales to measure these concepts at the time the studies were conducted. As a result, adapted versions of the job crafting scale (Lichtenthaler & Fischbach, 2016) and the self-undermining scale (Bakker & Wang, 2020), which were originally developed for the work context, were applied in the context of higher education. Although these scales showed satisfactory reliability across the three studies, further validation is needed.

Third, all studies were conducted during the COVID-19 pandemic, which limits the external validity of the results. Variations in pandemic phases and associated restrictions, such as open or closed campuses, face-to-face or online lectures, and different regulations for interpersonal contacts (Bundesministerium für Gesundheit, 2024), make it difficult to compare results. For example, differences in lecture formats between Study 2 (mostly online) and Study 3 (switch from face-to-face to online) limit direct comparisons of the intervention studies. Although the SD-R framework and the JD-R model are considered robust and valid even in times of crisis (Demerouti & Bakker, 2023; Koob et al., 2021; van der Ross et al., 2022), it is difficult to directly extrapolate the results of these studies to non-pandemic times.

A final limitation is the homogeneity of the samples. Female students were overrepresented in all three studies (Study 1: 66.34% women; Study 2: 78.95% women; Study 3: 68.78% women). Although this is consistent with the known trend of greater interest in and use of health services among women (Eisenberg et al., 2009; Stock et al., 2010), it limits the

generalizability of the study results and suggests a potential self-selection bias. In addition, Studies 1 and 3 were conducted exclusively at a university of applied sciences with a technical and business profile, limiting the diversity of disciplines represented. This limitation restricts the generalizability of the results to students in other disciplines, such as medicine or law, or to those attending different types of higher education institutions, such as traditional or private universities.

Directions for Future Research

Based on the identified limitations and drawing on insights from the most recent version of the JD-R model (Bakker, Demerouti, & Sanz-Vergel, 2023), in the following, I will outline possible directions for future research within the SD-R framework. First, with respect to further theoretical extension and refinement, future research should consider a broader range of study and personal characteristics. While the latest version of the JD-R model specifies key job and personal characteristics that predict engagement, exhaustion, and job crafting (for reviews and meta-analyses, see, e.g., Aronsson et al., 2017; Guthier et al., 2020; Halbesleben, 2010; R. T. Lee & Ashforth, 1996; Lesener, Gusy, et al., 2020; Mäkikangas et al., 2014; Mazzetti et al., 2023; Rudolph et al., 2017; Swider & Zimmerman, 2010; Young et al., 2018), there is limited research within the SD-R framework.

Therefore, I recommend a more comprehensive examination of various study characteristics to identify key study demands and resources within the SD-R framework. This should include study characteristics not yet considered but potentially relevant to students based on their importance in the JD-R model, such as role conflict (e.g., Tremblay & Messervey, 2011) or task variety (e.g., van Ruysseveldt et al., 2011). Furthermore, future research should expand the investigation of personal characteristics by exploring additional personal resources, such as optimism (e.g., Huang et al., 2016) or psychological capital (e.g., Grover et al., 2018), while also conducting research on personal demands (Barbier et al., 2013). These demands are assumed to play a similar role to study demands (see Bakker & de

Vries, 2021), which has been supported by initial empirical evidence, for example, for the personal demand of perfectionism (e.g., Harari et al., 2018; Y. Zhang et al., 2007).

Furthermore, there is substantial empirical evidence demonstrating the influence of personality traits in the JD-R model (e.g., Bipp & Demerouti, 2015; Borst & Knies, 2023), and initial studies confirm this influence within the SD-R framework (e.g., Bakker et al., 2015; Cilliers et al., 2017). Therefore, a more comprehensive investigation of individual characteristics within the SD-R framework, such as the Big Five or regulatory focus, is warranted.

A second area of research for theoretical extension and refinement of the SD-R framework involves a more thorough examination of outcomes. While the most recent version of the JD-R model specifies various motivational, health and work-related outcomes of engagement and exhaustion (for reviews and meta-analyses, see, e.g., Mazzetti et al., 2023; Patel et al., 2018; Swider & Zimmerman, 2010; Yang & Hayes, 2020), research within the SD-R framework has focused on a limited range, including life satisfaction, performance, well-being, and health-related productivity losses (e.g., Gusy et al., 2021; Lesener, Pleiss, et al., 2020; Mokgele & Rothmann, 2014; Schaufeli, Martínez, et al., 2002). To advance understanding of the consequences of student engagement and exhaustion, it is critical to systematically examine additional health and study-related outcomes, such as mental health (e.g., Simbula, 2010) or study satisfaction (e.g., Han et al., 2020). The existing reviews and meta-analyses of the JD-R model mentioned above can serve as a basis for selecting study and personal characteristics and outcomes to be explored within the SD-R framework.

A prerequisite for a comprehensive examination of antecedents and consequences of engagement and exhaustion within the SD-R framework is the use of valid and reliable measurement instruments. In contrast to job demands and job resources, study demands and study resources are a newer area of research, which is associated with a limited number of available instruments that have mainly been adapted from those developed for the work

context (Lesener, Pleiss, et al., 2020; Schmidt et al., 2019). Therefore, future research should also focus on methodological improvements in research on the SD-R framework by prioritizing the development and validation of measurement instruments tailored to the higher education context. The *Resources and Demands for Students inventory (ReA_Stud)*, which is currently undergoing validation, stands as a comprehensive measurement tool for assessing a wide array of study and personal demands and resources (e.g., learning opportunity, self-discipline, pressure to perform, private stress; Wittner et al., 2022). Derived from the *Resources and Demands in the workplace inventory* (Schulte et al., 2021), the ReA_Stud has been adapted to the higher education context through extensive literature review, interview studies, and focus groups. Initial factor-analytical evaluations show predominantly good model fits and provide evidence for the validity of this inventory (Wittner et al., 2022). I recommend using this instrument to assess resources and demands in future research on the SD-R framework or developing and validating additional instruments. Another related methodological suggestion for future research is to consider variables that could potentially be assessed using alternative methods, such as ratings by others or objective measures. For example, academic performance could be assessed through lecturer ratings or grades. This approach could help reduce the exclusive reliance on self-reports and the associated common method bias (Podsakoff et al., 2003).

A third area for future research is the investigation of study crafting. Crafting behavior has gained considerable popularity in recent years and has been studied in various life domains (e.g., Tims et al., 2021; van Zyl et al., 2023). However, aside from the studies in this dissertation, there are very few studies that examine crafting behavior in students (e.g., Mülder et al., 2022; Tho, 2023). Given the parallels between studying and working (Ouweneel et al., 2011), I recommend building on the established foundation of job crafting to further explore study crafting. Recent studies have identified additional and more specific job crafting strategies (Bindl et al., 2019; Bruning & Campion, 2018; Lichtenthaler & Fischbach,

2019; F. Zhang & Parker, 2019) compared to the original framework proposed by Tims et al. (2012), which formed the basis for this dissertation. For example, job crafting strategies such as task prioritization, building networks, foreseeing positive outcomes, or accepting negative things (for a meta-synthesis, see Lazazzara et al., 2020) have been identified that may also be applicable to students. Advancements in the study of job crafting have also led to the development of new and comprehensive measurement instruments (e.g., Lopper et al., 2024; Slemp & Vella-Brodrick, 2013).

Given the current lack of valid and reliable instruments to measure study crafting, I recommend that future research prioritize the development and validation of such instruments. Validated job crafting questionnaires that also include strategies not previously considered in the higher education context, such as cognitive crafting, could serve as a basis. However, as this dissertation provides initial evidence for possible differences between job crafting and study crafting (i.e., the role of decreasing hindering demands; see Study 2), it is important to also consider the specific context of higher education, as recommended by Lazazzara et al. (2020). Therefore, qualitative data on study crafting behaviors could be collected through student interviews or focus groups to capture a broad range of possible study crafting behaviors. From the collected data, specific study crafting factors can be derived and measurement instruments can be developed and thoroughly validated. Subsequently, a more comprehensive exploration of the relationships between these specific study crafting strategies and the other variables within the SD-R framework can be conducted.

A fourth area for future theoretical refinement is the investigation of processes within the SD-R framework. Similar to the JD-R model (see Bakker, Demerouti, & Sanz-Vergel, 2023), this dissertation provides initial evidence for a gain cycle, as well as interrelations between the motivational path and the health-impairment path. However, these findings are based on a diary study (Study 1) and intervention studies (Studies 2 and 3), so caution should be exercised when generalizing or inferring causality. Therefore, future research should use

longitudinal studies to examine causal relationships between study and personal characteristics, engagement, exhaustion, study crafting (strategies), and self-undermining. Methodologically, the choice of measurement points should be carefully considered (Lesener et al., 2019), taking into account the stability of the variables on the one hand (Dormann & Griffin, 2015) and the structure of the semester on the other, as student well-being can fluctuate significantly within a semester (Pitt et al., 2018).

A final area for future research on the SD-R framework is its practical implementation. This dissertation provides an initial test of SD-R-based interventions, and future research should replicate and extend on these findings. This is particularly important given that both intervention studies (Studies 2 and 3) were conducted during the COVID-19 pandemic, highlighting the need to examine their applicability beyond pandemic circumstances. I recommend that future intervention studies consider the following points:

First, the impact of SD-R-based interventions should be examined on a broader range of variables, including additional study and personal characteristics (e.g., self-efficacy; van Wingerden, Bakker, & Derks, 2017b), specific study crafting strategies, and additional outcomes such as performance (Gordon et al., 2018) and person-study fit (Kooij et al., 2017).

Second, collecting qualitative data after participating in SD-R-based interventions, focusing on aspects such as comprehensibility and applicability, can inform the ongoing development of intervention content. As the interventions in this dissertation were based on interventions developed for employees (Berg et al., 2008; Janneck et al., 2018; Paulsen & Kortsch, 2020), this data could also help to understand whether further adaptations are needed for the target population of students.

Third, an initial study from the work context showed that combining a job crafting intervention with a personal resources intervention led to more positive effects than each intervention alone (van Wingerden, Derks, & Bakker, 2017). The study crafting intervention (Study 2) showed different effects compared to the resources- and demands-intervention

(Study 3). There is further evidence for the effectiveness of interventions aimed at increasing personal resources such as self-efficacy or resilience among students (Ang et al., 2022; Bresó et al., 2011). Thus, a combination of different SD-R-based interventions may also be beneficial and should be explored in future studies.

Fourth, the implementation of measurement time points requires careful consideration. On the one hand, examining different timing of intervention implementation within the semester and testing different intervals for follow-up assessments may improve the understanding of intervention effectiveness (Oprea et al., 2019). On the other hand, based on findings on spillover effects of job crafting to other contexts (Creed et al., 2020; e.g., de Bloom et al., 2020; Haun et al., 2023), I encourage future research to follow students during their transition to the workforce and investigate the transferability of study crafting skills to later job crafting skills.

Finally, empirical evidence from the work context suggests that sociodemographic variables or job characteristics moderate the impact of job crafting interventions on outcomes (Mukherjee & Dhar, 2023). In the higher education context, factors that may influence the effectiveness of SD-R-based interventions, such as sociodemographic variables (e.g., age or semester) or personality traits (e.g., regulatory focus), also warrant investigation. These findings may provide valuable information for tailoring interventions to specific student populations.

Practical Implications

According to the setting approach (Hartung & Rosenbrock, 2022; World Health Organization, 1986), higher education institutions are important life settings for promoting health and well-being (Cawood et al., 2010). Building on this, the Okanagan Charter encourages higher education institutions to integrate health considerations into all aspects of campus life and to provide support for students (Okanagan Charter, 2015). Therefore, in the following section, I will outline practical implications for higher education institutions based

on the recommendation of the Okanagan Charter and derived from the findings of this dissertation.

With increasing challenges to student well-being, it is imperative to reduce burnout while focusing on increasing engagement among students (e.g., Agarwal et al., 2020; Marôco et al., 2020; Robins et al., 2015). This dissertation confirms the significant influence of study characteristics on engagement and exhaustion, but also on adaptive and maladaptive self-regulation behaviors (see Study 1). Therefore, a first practical implication for university decision makers, management teams, and faculty, based on the recommendation of the Okanagan Charter to integrate health considerations into all aspects of campus life, is the active design of the study environment. Study 1 provides some specific starting points.

With regard to study demands, I suggest using the challenge-hindrane framework (LePine et al., 2004) because the two types of demands have different implications. A first recommendation is to minimize hindering study demands, such as qualitative overload (see Study 1), as much as possible because of their detrimental effect on student well-being. This can be achieved through academic support services such as preparatory courses, lecture-based tutorials, or peer tutoring platforms. In contrast, challenging study demands should neither be completely eliminated, as this may reduce engagement, nor be excessively increased, as this may lead to exhaustion. Therefore, another recommendation is to strategically manage challenging demands such as workload or time pressure by providing voluntary opportunities for students, such as taking additional courses from other study programs or engaging in extended projects beyond regular lectures.

However, some structural conditions in higher education institutions are difficult to change (Büttner & Dlugosch, 2013), and a complete elimination of stressors is impossible (Olson et al., 2023). Therefore, in line with the concept of salutogenesis (Antonovsky, 1987; Dooris et al., 2022), another recommendation is to enhance study resources such as decision latitude or social support. Decision latitude showed the most beneficial effect in Study 1,

suggesting that study programs should offer flexibility that allows students to actively shape their studies. This could include offering a wide range of electives and specialization options to accommodate students' personal preferences and abilities. In addition, a variety of teaching formats should be considered, including lectures, exercises, projects, seminars, and possibly laboratory work, in order to promote the varied development of students' skills. I further recommend improving social support systems for students. Support from lecturers can be improved by providing feedback to students and being available outside of class time. Lecturers can also encourage peer support during lectures through group work or the introduction of peer feedback processes to foster supportive relationships among fellow students. At the administrative level, easily accessible centralized student advising services, along with program-specific advising services, should assist students with academic organization, and peer mentoring programs should also be established.

Since Study 3 indicated an increase in study demands and exhaustion, and a loss of study resources as the semester progressed, especially during the exam period, it is important to also consider these variations. Therefore, I continue to recommend striving for a more even distribution of study demands throughout the semester. This can be achieved by introducing a wider range of assessment methods, such as continuous assessments through the submission of sub-projects or giving presentations throughout the semester, rather than relying solely on end-of-semester exams. It is also important to ensure that study resources, such as social support from lecturers, are available, especially in the last weeks of the semester.

However, there is no universally applicable optimal balance between study demands and study resources; instead, it varies between individuals and depends on their specific needs (see van Wingerden, Bakker, & Derks, 2017a). Consequently, "one size does not fit all" (Leiter & Maslach, 2016, p. 99), which is why the design of the study environment by higher education institutions alone is insufficient. Instead, this dissertation confirms that students can actively and individually design their study environment bottom-up through study crafting

(see Demerouti, Bakker, & Xanthopoulou, 2019). Due to its individualized approach, the concept of study crafting is also in line with the OECD's vision of a "personalised learning environment that supports and motivates each student to nurture his or her passions, make connections between different learning experiences and opportunities, and design their own learning projects and processes in collaboration with others" (Organization for Economic Cooperation and Development [OECD], 2018, p. 4). Although some students may spontaneously adapt their study environment on their own, it cannot be assumed that all do so (see Schaufeli, 2017; Tims & Bakker, 2010). Moreover, evidence from the work context suggests that the work environment and the behavior of supervisors significantly influence the successful application of job crafting (e.g., Lazazzara et al., 2020; Petrou et al., 2012; Hai-jiang Wang & Demerouti, 2016).

Therefore, a second practical implication for university decision makers, management teams, and faculty is to actively promote study crafting. On the one hand, I recommend becoming familiar with the concept of study crafting and creating an environment that allows students to successfully implement this behavior. For example, opportunities for skill development and voluntary supplemental programs such as language courses, interdisciplinary skills seminar, participation in student councils or committees, and study abroad opportunities should be offered to facilitate the crafting of structural resources and challenges. Faculty should develop supportive relationships that help students achieve their learning goals and be available for questions and feedback to facilitate the crafting of social resources. In addition, reducing unrealistic expectations on the part of the faculty may contribute to the successful implementation of decreasing hindering demands.

On the other hand, based on the findings of this dissertation, I recommend actively promoting study crafting through SD-R-based interventions (see Studies 2 and 3). This also aligns with the second recommendation of the Okanagan Charter to provide support to students (Okanagan Charter, 2015) and addresses the increasing need for support services due

to the COVID-19 pandemic (Dodd et al., 2021; Kohls et al., 2021; Tsiouris et al., 2023; X. Wang et al., 2020). In addition to increasing study crafting, the SD-R-based interventions demonstrated sustained positive effects on personal resources, engagement, exhaustion, and self-undermining, making them a valuable and meaningful investment for higher education institutions. With regard to the three interventions examined in this dissertation, I strongly recommend offering the study crafting intervention (Study 2). Study crafting is a flexible approach that allows students to respond to different situations and personal needs (see Petrou et al., 2012), which is becoming increasingly important due to rapidly changing circumstances (Grant & Parker, 2009). Furthermore, based on the findings of Study 3, I recommend prioritizing the resources-intervention over the demands-intervention due to its more beneficial outcomes.

Despite this, many students do not take advantage of available support services due to barriers such as a preference to deal with problems on their own or a lack of awareness of their need for help (D. D. Ebert et al., 2019; Eisenberg et al., 2009; Herbst et al., 2016). Therefore, a third practical implication for university decision makers, management teams, and faculty is to consider and address these barriers and actively promote available interventions.

In this regard, I recommend the use of easily accessible, low-threshold online interventions, such as those examined in this dissertation. Online interventions can reach a larger number of participants than in-person interventions, offer flexibility in terms of time and location, and provide the option for anonymous use (Lutz-Kopp et al., 2019).

Moreover, I recommend promoting the interventions through multiple communication channels to ensure that all students are reached. In addition to email and campus advertising campaigns, in-person promotion should be used at welcome events for first-year students, through the student advising service, and during lectures by faculty. I further recommend promoting the interventions through peer endorsements from fellow students who have

already participated. To counter skepticism about the effectiveness of treatment (Eisenberg et al., 2007), I recommend presenting the results of evaluations of the effectiveness of interventions (see Cuijpers et al., 2010). In light of the finding that female students and those studying business disciplines use interventions more (see Studies 2 and 3), tailored promotion strategies can be developed specifically for underrepresented groups, such as male students or students of technical disciplines.

Furthermore, interventions aimed at improving mental health often face low uptake rates due to stigmatization (Benjet, 2020). Although SD-R-based interventions also aim to improve mental health by reducing exhaustion, I suggest actively promoting these interventions as “study crafting intervention” or “resources-intervention”. These terms may carry less stigma than “health intervention” or “burnout intervention”.

General Conclusion

“Health-promoting universities and colleges transform the health and sustainability of our current and future societies, strengthen communities, and contribute to the well-being of people, places and the planet” (Okanagan Charter, 2015 p. 2).

The quoted self-understanding of the Okanagan Charter underscores the pivotal role of higher education institutions in promoting the well-being and holistic development of students. The central aim of this dissertation was to expand on and apply the SD-R framework that provides a foundation for this aim. The three empirical studies first extended the SD-R framework by integrating personal resources (Study 3), study crafting (Studies 1-3), and self-undermining (Studies 1 and 3), which contributes to a more comprehensive theoretical foundation for researching student well-being. Second, they validated both the extended motivational path and the extended health-impairment path at the weekly within-person level, thus confirming short-term fluctuations in well-being and self-regulation behavior due to variations in study characteristics (Study 1). Third, they confirmed the practical applicability of the SD-R framework in interventions that led to significant improvements in personal

resources, well-being, and self-regulation behavior. Fourth, they demonstrated the key role of study crafting and personal resources as mediators of the effects of SD-R-based interventions, thereby also validating the processes of the SD-R framework longitudinally (Studies 2 and 3).

Thus, this dissertation contributes significantly to narrowing the research gaps between the established JD-R model and the emerging SD-R framework. On the one hand, it underscores the robustness of the SD-R framework as a theoretical foundation for studying student exhaustion and engagement, taking into account the interplay between study and personal characteristics, as well as study crafting and self-undermining. On the other hand, it presents the SD-R framework as an evidence-based intervention approach to improve student well-being, personal resources, and self-regulation behavior. It is my hope that this work will inspire further exploration of the SD-R framework and the concept of study crafting, thereby contributing to supporting students' overall well-being and personal development.

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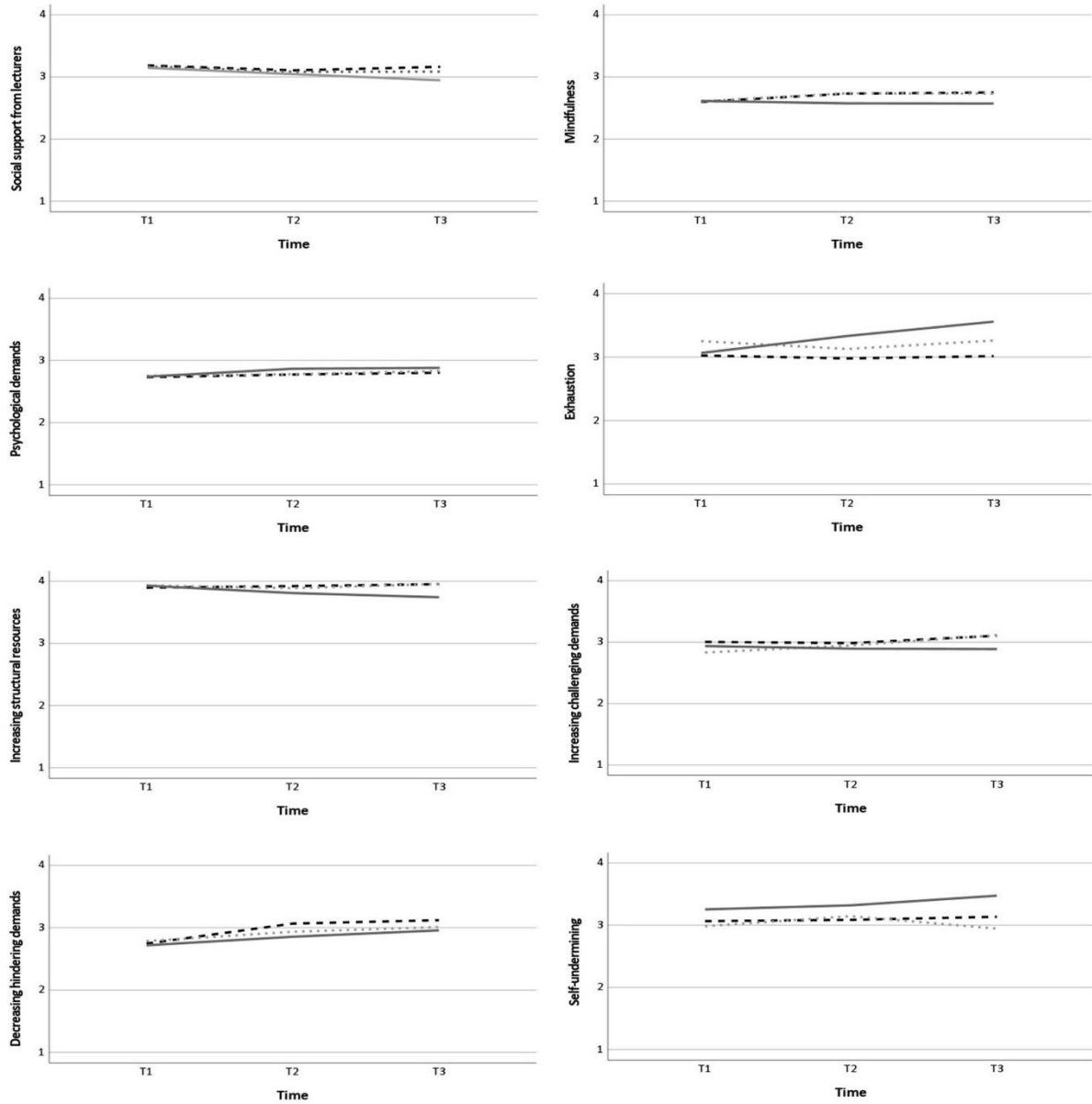
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Appendix A. Supplementary Material to Study 3

Figure A1

Results of the RM ANOVA for the Study Variables With Significant Interaction Effects or Significant Main Time Effects



Note. IG1 - - - IG2 WLC ———

Table A1*Significant Time Effects Between Each of the two Measurement Time Points for the Three Groups*

| Variable | Group | T1-T2 | | T1-T3 | | T2-T3 | |
|----------------------------|-------|------------------------------|------------|------------------------------|------------|----------------------------|------------|
| | | <i>F</i> -value | η_p^2 | <i>F</i> -value | η_p^2 | <i>F</i> -value | η_p^2 |
| Social support | WLC | $F(1, 70) = 5.66, p < .05$ | .08 | $F(1, 70) = 21.06, p < .001$ | .23 | $F(1, 70) = 5.00, p < .05$ | .07 |
| Mindfulness | IG1 | $F(1, 63) = 10.10, p < .01$ | .14 | $F(1, 63) = 15.99, p < .001$ | .20 | | |
| | IG2 | $F(1, 69) = 11.89, p < .001$ | .15 | $F(1, 69) = 9.81, p < .01$ | .12 | | |
| Psychological demands | WLC | $F(1, 70) = 8.10, p < .01$ | .10 | $F(1, 70) = 7.09, p < .05$ | .09 | | |
| Exhaustion | WLC | $F(1, 70) = 5.38, p < .05$ | .07 | $F(1, 70) = 12.36, p < .001$ | .15 | | |
| Incr. structural resources | WLC | | | $F(1, 70) = 8.78, p < .01$ | .11 | | |
| Incr. challenging demands | IG2 | | | $F(1, 69) = 12.77, p < .001$ | .16 | $F(1, 69) = 6.73, p < .05$ | .09 |
| Decr. hindering demands | IG1 | $F(1, 63) = 11.84, p < .01$ | .16 | $F(1, 63) = 14.18, p < .001$ | .18 | | |
| | WLC | | | $F(1, 70) = 5.53, p < .05$ | .07 | | |
| Self-undermining | IG2 | | | | | $F(1, 66) = 4.83, p < .05$ | .07 |
| | WLC | | | $F(1, 70) = 7.27, p < .01$ | .09 | $F(1, 70) = 4.94, p < .05$ | .07 |

Note. Empty cells indicate non-significant effects. Incr. = Increasing, Decr. = Decreasing.

Appendix B. Formalities

Appendix B includes the following formally required information and documents:

- An Abstract of this Dissertation Written in German (Zusammenfassung)
- Overview of Academic Teachers
- Curriculum Vitae
- Declaration Regarding the Doctoral Examination Procedure
- Declaration of Authorship
- Course of Higher Education

German Abstract: Zusammenfassung

Das wachsende Forschungsinteresse an Erschöpfung und Engagement unter Studierenden (z.B. Gusy, Wörfel, & Lohman, 2016) kann mithilfe des kürzlich eingeführten Study Demands-Resources (SD-R) Modells (Lesener, Pleiss, et al., 2020) adressiert werden, welches aus dem etablierten Job Demands-Resources (JD-R) Modell im Arbeitskontext abgeleitet wurde (Demerouti et al., 2001). Das übergreifende Ziel dieser Dissertation ist es, das SD-R Modell theoretisch und methodisch zu erweitern und gleichzeitig dessen praktische Anwendbarkeit in Interventionen zu evaluieren.

Im Vergleich zur JD-R Theorie ist das SD-R Modell noch relativ wenig erforscht und einige Variablen der JD-R Theorie wurden bisher noch nicht in diesem Modell untersucht. Daher ist das erste Forschungsziel dieser Dissertation, das SD-R Modell durch die Integration von drei Variablen aus der JD-R Theorie – persönliche Ressourcen (vgl. Xanthopoulou et al., 2007), study crafting (vgl. Tims & Bakker, 2010) und self-undermining (vgl. Bakker & Wang, 2020) – zu erweitern und deren Rolle im SD-R Modell zu untersuchen.

Basierend auf dem Forschungstrend zu within-person Designs bestätigen Studien, dass die JD-R Theorie auch auf der intraindividuellen Ebene gültig ist, wobei die Variablen auf täglicher oder wöchentlicher Ebene schwanken (Bakker, 2015). Daher ist das zweite Forschungsziel dieser Dissertation, das erweiterte SD-R Modell auf wöchentlicher within-person Ebene zu testen, indem die Auswirkungen kurzfristiger Schwankungen in den Studiencharakteristiken auf studentisches Wohlbefinden, study crafting und self-undermining untersucht werden.

Die zunehmenden Erschöpfungswerte und verringertes Engagement unter Studierenden (z.B. Grützmaker et al., 2018; Olson et al., 2023; Techniker Krankenkasse, 2023) unterstreichen die Notwendigkeit evidenzbasierter und niedrighwelliger Unterstützungsprogramme (z.B. Mülder et al., 2022). Basierend auf der praktischen Anwendung der JD-R Theorie in Interventionen (vgl. Bakker, Demerouti, & Sanz-Vergel,

2023) ist das dritte Forschungsziel dieser Dissertation, verschiedene SD-R-basierte Interventionen zu entwickeln und deren Auswirkungen auf die Variablen des SD-R Modells sowohl kurz- als auch langfristig zu evaluieren.

Damit verbunden ist das vierte Forschungsziel, welches darauf abzielt, die zugrunde liegenden Mechanismen zu untersuchen, die die Effekte der SD-R-basierten Interventionen über die Zeit vermitteln, wobei Anforderungen und Ressourcen sowie study crafting als potentielle Mediatoren untersucht werden. Dies trägt auch zur längsschnittlichen Validierung der Prozesse innerhalb des SD-R Modells bei (Lesener, Pleiss, et al., 2020).

Zur Erreichung dieser vier Forschungsziele wurden drei empirische Studien durchgeführt. Studie 1 führte die Variablen study crafting und self-undermining in das SD-R Modell ein und untersuchte den erweiterten motivationalen Pfad und den erweiterten gesundheitsbeeinträchtigenden Pfad auf wöchentlicher within-person Ebene. Insgesamt 205 Studierende lieferten über einen Zeitraum von vier Wochen wöchentliche Tagebuchdaten. Die Ergebnisse der Multilevel-Strukturgleichungsmodellierung, unter Kontrolle von Autoregressoren, bestätigten die Gültigkeit der erweiterten Pfade auf intraindividuellem Ebene. Konsistent mit den Hypothesen wurde eine positive Beziehung zwischen Studienressourcen und study crafting, vermittelt durch Engagement, und zwischen Studienanforderungen und self-undermining, vermittelt durch Erschöpfung, auf wöchentlicher within-person Ebene festgestellt.

Studie 2 evaluierte die Effekte einer study crafting Intervention auf study crafting, Engagement und Erschöpfung. Es wurde eine randomisierte kontrollierte Studie mit einer Interventionsgruppe ($n = 149$) und einer Warte-Kontrollgruppe ($n = 60$) durchgeführt. Drei Messungen (Prä-, Post-, Follow-up nach 20 Wochen) wurden durchgeführt, um die langfristigen Effekte der Intervention zu untersuchen. Darüber hinaus wurden Mediationseffekte durch study crafting untersucht. Die Ergebnisse der Varianzanalysen mit Messwiederholung zeigten, dass die Intervention study crafting, die study crafting Strategie

Verringerung hinderlicher Anforderungen und Engagement sowohl nach der Intervention als auch beim follow-up erhöhte. Darüber hinaus wurde in der Interventionsgruppe ein Zeiteffekt auf die Erschöpfung beobachtet, welche beim follow-up signifikant reduziert war. Study crafting vermittelte die Beziehung zwischen der Intervention und Engagement sowie Erschöpfung.

Studie 3 evaluierte die Auswirkungen von zwei weiteren SD-R-basierten Interventionen auf die Variablen des Modells, wobei eine auf die Anpassung von Anforderungen abzielte und die andere auf die Erhöhung von Ressourcen. Es wurde eine weitere randomisierte kontrollierte Studie mit zwei Interventionsgruppen ($n_{IG1} = 64$, $n_{IG2} = 70$) und einer Warte-Kontrollgruppe ($n = 71$), sowie drei Messungen (Prä-, Post-, Follow-up nach 5 Wochen) durchgeführt. Mediationseffekte durch Anforderungen und Ressourcen wurden ebenfalls untersucht. Die Ergebnisse der Varianzanalysen mit Messwiederholung zeigten Interventionswirkungen auf die persönliche Ressource Achtsamkeit, Erschöpfung, die study crafting Strategien Erhöhung struktureller Ressourcen, Erhöhung herausfordernder Anforderungen und Verringerung hinderlicher Anforderungen sowie auf self-undermining. Achtsamkeit vermittelte die Beziehung zwischen der Intervention und den Variablen Erhöhung struktureller Ressourcen, Erhöhung herausfordernder Anforderungen, Engagement und self-undermining.

Die kombinierten Ergebnisse der drei Studien zeigen, dass die JD-R Theorie gut auf den Hochschulkontext übertragbar ist. Die Studien bestätigen die Erweiterbarkeit des SD-R Modells um persönliche Ressourcen, study crafting und self-undermining, sowie seine Gültigkeit auf within-person Ebene und im Längsschnitt. Sie bestätigen weiterhin die praktische Anwendbarkeit des Modells in Interventionen zur Verbesserung von Studien- und persönlichen Charakteristiken, Wohlbefinden, study crafting und self-undermining und betonen die zentrale Rolle von study crafting und Achtsamkeit als Mediatoren von Interventionswirkungen. Diese Dissertation liefert somit eine solide theoretische Grundlage

für eine umfassende Erforschung von Erschöpfung und Engagement unter Studierenden, einschließlich ihrer Antezedenzen und Konsequenzen, sowie erste Hinweise auf die Wirksamkeit von SD-R-basierten Interventionen, was in zukünftiger Forschung genutzt und weiterentwickelt werden sollte.

Overview of Academic Teachers

Bachelor's thesis: *Erstevaluation fußballspezifischer Messinstrumente zur Erfassung des Selbstbildes [First Evaluation of Soccer-Specific Measurement Instruments for Assessing Self-Image]*, supervised by [REDACTED], Julius-Maximilians-University, Würzburg, Germany

Master's thesis: *Entwicklung und Überprüfung einer Job Crafting Intervention für an den Arbeitsplatz zurückgekehrte Krebspatienten [Development and Evaluation of a Job Crafting Intervention for Cancer Patients who Returned to the Workplace]*, supervised by [REDACTED] and [REDACTED], Julius-Maximilians-University, Würzburg, Germany

Doctoral thesis: *Improving Student Well-Being: Theoretical Extensions and Practical Application of the Study Demands-Resources Framework*, supervised by **Prof. Dr. Thomas Rigotti**, Johannes Gutenberg-University Mainz, Germany, and **Prof. Dr. Kerstin Rieder**, Aalen University, Germany

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Publikationen

Peer-reviewed:

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<https://doi.org/10.3390/ijerph18137090>

Körner, L. S., Mülder, L. M., Bruno, L., Janneck, M., Dettmers, J., & Rigotti, T. (2023). Fostering study crafting to increase engagement and reduce exhaustion among higher education students: A randomized controlled trial of the STUDYCoach online intervention. *Applied Psychology: Health and Well-Being*, 15(2), 776-802.

<https://doi.org/10.1111/aphw.12410>

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Konferenzen

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Declaration Regarding the Doctoral Examination Procedure**ERKLÄRUNG**

gemäß § 6 Absatz 2 f) der Promotionsordnung der Fachbereiche 02, 05, 06, 07, 09 und 10 vom 04. April 2016

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- Methodenlehre
- Statistik
- Klinische Psychologie und Interventionspsychologie
- Pädagogische Psychologie
- Wirtschaftspsychologie
- Neuroanatomie und Physiologie
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- Arbeits-, Kognitions- und Sozialpsychologie 3
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- Experimentelle Klinische Psychologie 2
- Kinder- und Jugendpsychiatrie