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Doctor of Philosophy (Dr. phil.)
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*Development and evaluation of interventions based on self-regulation
for workers with flexible work designs*

presented by
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Personal contribution to publications of author teams based on various components

	Paper 1	Paper 2	Paper 3	Paper 4	Paper 5
Overall Idea and Conceptualization	0	6	6	7	7
Literature Research; Theoretical and Empirical Embedding	7	7	7	7	7
Development or Design of Methodology; Creation of Models	0	7	7	7	7
Data Collection and Preparation	0	7	7	7	7
Implementation of Data Analysis	4	7	7	7	7
Interpretation of Results	7	7	7	7	7
Writing of the Manuscript – Initial Draft, Reviewing and Editing	7	7	7	7	7

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Congress contributions:

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Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2021, October). *Das FlexAbility-Training – für eine gesunde Gestaltung orts- und zeitflexibler Arbeit*. Talk at the 37th International A+A Congress for Occupational Safety and Health 2021, Düsseldorf, Germany.

Wöhrmann, A.M., Althammer, S.E., & Michel, A. (2021, October). *How do employees in different age groups benefit from an online self-regulation intervention in the context of flexible working?* Poster presented at the 6th Age in the Workplace Small Group Meeting, Groningen, Netherlands.

Wöhrmann, A.M., Althammer, S.E., & Michel, A. (2021, October). *Die Rolle organisationaler Rahmenbedingungen für die Effektivität eines Online-Trainings zur Förderung der Selbstregulation bei orts- und zeitflexiblem Arbeiten*. Poster presented at the 9th Symposium of the Working Time Society, Fribourg, Switzerland.

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2021, September). *Flexible and healthy working - effectiveness of a resource-oriented online training for employees with flexible working conditions*. Talk at the 4th PEROSH Research Conference, Madrid, Spain.

Althammer, S. E. & Michel, A. (2021, September). Interventionen zur Förderung von Selbstwirksamkeit, Selbstregulation und Emotionsregulation. In A. Michel & A. Hoppe (Chair), *Gesundheitsförderung bei der Arbeit – personenbezogene Interventionen*. Symposium conducted at the 12th AOWI Congress of the German Psychological Society (DGPs), Chemnitz, Germany.

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2021, September). Flexibel und gesund arbeiten – Wirksamkeit eines ressourcenorientierten Online-Trainings für orts- und zeitflexibel arbeitende Beschäftigte. In A. M. Wöhrmann & A. Michel (Chair), *Entgrenzung der Arbeitszeit*. Symposium conducted at the 12th AOWI Congress of the German Psychological Society (DGPs), Chemnitz, Germany.

Althammer, S. E. (2021, Juni). *Flexibel und gesund arbeiten - Meine persönliche Balance finden*. Talk at the Sifa-Workshop 2021 "Gesund im Homeoffice".

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2020, October). *Flexibel und gesund arbeiten: Ein ressourcenorientiertes Online-Training*. Poster presented at the 8th Symposium of the Working Time Society, Online.

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2020, September). Working flexible, staying healthy – Development of a resource-oriented web-based training. In M. Kujanpää (Chair), *Craft and recover: Creating well-being in a changing working life*. Symposium conducted at the 14th European Academy of Occupational Health Psychology (EAOHP) Conference, Online.

ABSTRACT

The aim of this dissertation is to deepen the understanding of effects, mechanisms and individual boundary conditions of interventions that help workers self-regulate in the context of flexible work designs (FWD). Because FWD require a high level of self-regulation, four interventions based on self-regulation were developed to help workers cope with challenges of FWD. They were evaluated in four randomized controlled trials to examine the role of different mechanisms and individual boundary conditions, compare the effect of different training formats, and investigate the effectiveness of transferring individual self-regulation processes to the team level. This publication-based dissertation consists of five empirical articles: Paper 1 evaluated an online training based on mindfulness as a self-regulatory strategy. Paper 2 and Paper 3 evaluated an online training based on self-regulation that integrates the mindfulness-based training. Building on the effectiveness of the online approach, Paper 4 evaluated the effectiveness of a blended training format. Extending the focus from individuals to teams, Paper 5 evaluated an intervention for hybrid work teams to promote their team regulation. The overall goal of the interventions was to promote self-regulation to help workers cope with challenges of FWD and improve their well-being, work–life balance, and recovery.

Paper 1 evaluated a mindfulness-based online training to support workers in mentally detaching from work, focusing on change trajectories over the course of the intervention and person characteristics as a moderator. Mindfulness serves a self-regulatory function (Brown & Ryan, 2003) and facilitates the conscious regulation of thoughts, emotions, and behaviors (Good et al., 2016; Koole et al., 2013). Thus, mindfulness may function as a cognitive-emotional segmentation strategy to disengage from work-related thoughts and emotions after work. Daily effects of the mindfulness-based intervention were assessed with a randomized waitlist control group design ($n = 190$). Based on boundary theory (Ashforth et al., 2000) and its person–environment fit perspective (Kreiner, 2006; Kreiner et al., 2009), it was examined whether segmentation preference would moderate training effectiveness. Growth curve analyses revealed positive effects on psychological detachment, psychological work–life conflict, and satisfaction with work–life balance. No effects were found for strain-based work–life conflict, and affective well-being increased in both groups. Participants with low segmentation preference reported stronger intervention effects on psychological detachment.

Practicing mindfulness as a means of cognitive and emotional segmentation to detach from work is particularly important for workers with FWD. Therefore, we integrated the

mindfulness-based training from Paper 1 into the development of an online training based on self-regulation to help workers cope with challenges of FWD. The online training for workers with FWD was evaluated in a randomized controlled trial and resulted in two articles: Both articles evaluated short- and long-term effects on various outcomes of well-being, work–life balance, and recovery. In addition, Paper 2 examined self-regulation as a mechanism of the online training, whereas Paper 3 focused on positive emotions and behaviors as mechanisms as well as on individual boundary conditions.

Paper 2 evaluated short- and long-term effectiveness of the intervention with a randomized waitlist control group design ($n = 358$). Based on self-regulation theories (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000), self-regulation was examined as a mechanism to explain intervention effects. Covariance analyses revealed that the self-regulation intervention improved positive affect and work engagement, and reduced stress and strain-based work–life conflict. Effects on psychological detachment were found for participants with low baseline levels of psychological detachment. Except for work engagement, intervention effects sustained over four weeks and six months. Self-regulation mediated intervention effects on positive affect and work engagement.

Paper 3 also evaluated short- and long-term effectiveness of the intervention with a randomized waitlist control group design ($n = 288$), but with regard to other outcomes. Based on the positive-activity model (Lyubomirsky & Layous, 2013), changes in positive emotions and boundary management were examined as mechanisms. Further, depressive symptoms were examined as a moderator of this relationship. Mixed variance analyses revealed that the intervention improved emotional exhaustion and satisfaction with work–life balance. Effects persisted over four weeks. Changes in positive emotions and boundary management mediated intervention effectiveness. Results indicated no moderator effect, that is, the intervention was effective regardless of participants' baseline level of depressive symptoms.

Expanding on Paper 2 and Paper 3 and building on the effectiveness of the online intervention based on self-regulation, we examined whether a blended training format, in which participants attended three group sessions in addition to the online modules, would be more effective than the online training format. Paper 4 evaluated short- and long-term effectiveness of the blended intervention for workers with FWD with a randomized waitlist control group design with two intervention groups and one control group ($n = 373$). Based on social identity theory and self-determination theory (Haslam et al., 2019; Ryan & Deci, 2000), the effectiveness was investigated in comparison to the online training format. Multilevel analyses revealed that the blended training format, like the online training, improved psychological

detachment, satisfaction with work–life balance, and well-being. These effects sustained over four weeks, and, with regard to psychological detachment, over six months. That is, blended training participants did not benefit more from the intervention than online training participants. However, they reported more sharing of experiences and emotional support. They were also more compliant in completing modules and practicing exercises. Thus, group sessions in addition to the online modules increased social exchange processes and compliance.

In addition to testing different training formats and building on the effectiveness of the individual interventions, we investigated whether the individual training approach could be transferred to the team level. We developed a two-session team workshop in which hybrid work teams learned to practice team regulation strategies based on models of individual self-regulation. Paper 5 evaluated short- and long-term effectiveness of this team regulation intervention with a cluster-randomized waitlist control group design with two intervention groups and one control group, including data from 750 individuals across 84 teams. Multilevel analyses revealed that the intervention increased team regulation. This mediated effects on improved social support, psychological safety, and collaboration in the FWD context. The effects on team regulation, collaboration, and psychological safety persisted over nine weeks. Aggregated individual self-regulation did not improve, suggesting that team regulation is conceptually distinct from team-level aggregated self-regulation.

The results of the five articles presented in this dissertation reveal that web-based individual interventions based on self-regulation can help workers recover, improve their work–life balance, and increase their well-being. The role of mechanisms of intervention effectiveness such as self-regulation, positive emotions, and positive behaviors, as well as moderators such as segmentation preference, is demonstrated. Additional group sessions can increase social exchange processes and training compliance. Team regulation of hybrid work teams can be enhanced in a team intervention, which increases team resources. The findings contribute to the development of effective interventions based on self-regulation to promote well-being, work–life balance, and recovery of workers with FWD.

Keywords: intervention, randomized controlled trial, recovery, self-regulation, well-being, work–life balance

ZUSAMMENFASSUNG

Ziel dieser Dissertation ist ein vertieftes Verständnis der Effekte, Mechanismen und individuellen Rahmenbedingungen von Interventionen, die Erwerbstätige bei der Selbstregulation im Kontext orts- und zeitflexibler Arbeitsgestaltung unterstützen. Da orts- und zeitflexible Arbeitsgestaltung ein hohes Maß an Selbstregulation erfordert, wurden vier auf Selbstregulation basierende Interventionen entwickelt, um den Erwerbstätigen bei der Bewältigung der Herausforderungen orts- und zeitflexibler Arbeit zu helfen. Die Interventionsstudien wurden in vier randomisierten kontrollierten Studien evaluiert, um die Rolle verschiedener Mechanismen und individueller Rahmenbedingungen zu ermitteln, die Wirkung verschiedener Trainingsformate zu vergleichen und die Wirksamkeit der Übertragung individueller Selbstregulationsprozesse auf die Teamebene zu überprüfen. Die vorliegende publikationsbasierte Dissertation umfasst fünf empirische Artikel: Artikel 1 evaluierte ein Online-Training, das auf Achtsamkeit als Selbstregulationsstrategie basiert. Artikel 2 und Artikel 3 evaluierten ein auf Selbstregulation beruhendes Online-Training, welches das achtsamkeitsbasierte Training integriert. Aufbauend auf der Wirksamkeit des Online-Ansatzes wurde in Artikel 4 die Wirksamkeit eines Blended-Training-Formats evaluiert. In Artikel 5 wurde der Fokus von Einzelpersonen auf Teams erweitert und eine Intervention für hybride Arbeitsteams zur Förderung ihrer Teamregulation evaluiert. Das übergeordnete Ziel der Interventionen war die Förderung von Selbstregulation, um Erwerbstätigen zu helfen, die Herausforderungen orts- und zeitflexibler Arbeit zu bewältigen und ihr Wohlbefinden, ihre Work-Life-Balance und ihre Erholung zu verbessern.

Artikel 1 evaluierte ein achtsamkeitsbasiertes Online-Training zur Unterstützung von Erwerbstätigen, sich mental von der Arbeit zu lösen, und legt dabei den Schwerpunkt auf Veränderungspfade im Verlauf der Intervention sowie persönliche Merkmale als Moderator. Achtsamkeit hat eine selbstregulierende Funktion (Brown & Ryan, 2003) und erleichtert die bewusste Steuerung von Gedanken, Emotionen und Verhalten (Good et al., 2016; Koole et al., 2013). Somit kann Achtsamkeit als kognitiv-emotionale Segmentationsstrategie dienen, um sich von arbeitsbezogenen Gedanken und Emotionen nach der Arbeit zu lösen. Die täglichen Effekte des achtsamkeitsbasierten Trainings wurden mit einem randomisierten Wartelisten-Kontrollgruppendesign ($n = 190$) evaluiert. Auf der Grundlage der Boundary-Theorie (Ashforth et al., 2000) und ihrer Person-Umwelt-Fit-Perspektive (Kreiner, 2006; Kreiner et al., 2009) wurde untersucht, ob Segmentationspräferenz die Effektivität des Trainings moderiert.

Wachstumskurvenanalysen zeigten positive Effekte auf das mentale Abschalten, auf psychologische Konflikte zwischen Arbeit und Privatleben und auf die Zufriedenheit mit der Work-Life-Balance. Es wurden keine Effekte für belastungsbasierte Konflikte zwischen Arbeit und Privatleben gefunden, und das affektive Wohlbefinden nahm in beiden Gruppen zu. Teilnehmende mit geringer Segmentationspräferenz berichteten stärkere Interventionseffekte in Bezug auf das mentale Abschalten.

Das Praktizieren von Achtsamkeit als Mittel zur kognitiven und emotionalen Segmentation, um sich von der Arbeit zu lösen, ist für Erwerbstätige mit orts- und zeitflexiblen Arbeitsbedingungen besonders wichtig. Daher integrierten wir das achtsamkeitsbasierte Training aus Artikel 1 in die Entwicklung eines Online-Trainings, das auf Selbstregulierung basiert, um Erwerbstätigen bei der Bewältigung der Herausforderungen orts- und zeitflexibler Arbeit zu unterstützen. Das Online-Training für Erwerbstätige mit orts- und zeitflexiblen Arbeitsbedingungen wurde in einer randomisierten kontrollierten Studie evaluiert und resultierte in zwei Artikeln: In beiden Artikeln wurden kurz- und langfristige Effekte auf verschiedene Aspekte des Wohlbefindens, der Work-Life-Balance und der Erholung untersucht. Darüber hinaus befasste sich Artikel 2 mit Selbstregulation als Mechanismus des Online-Trainings, während sich Artikel 3 auf positive Emotionen und Verhaltensweisen als Mechanismen sowie auf individuelle Rahmenbedingungen fokussierte.

Artikel 2 evaluierte die kurz- und langfristige Wirksamkeit der Intervention mit einem randomisierten Wartelisten-Kontrollgruppendesign ($n = 358$). Auf der Grundlage von Selbstregulationstheorien (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000), wurde Selbstregulation als Mechanismus zur Erklärung der Interventionseffekte untersucht. Kovarianzanalysen ergaben, dass die Selbstregulationsintervention das Wohlbefinden und das Arbeitsengagement verbesserte und Stress sowie belastungsbedingte Konflikte zwischen Arbeit und Familie reduzierte. Effekte auf das mentale Abschalten wurden bei Teilnehmenden mit niedrigem Ausgangsniveau des mentalen Abschaltens festgestellt. Mit Ausnahme des Arbeitsengagements hielten diese Wirkungen über vier Wochen und sechs Monate an. Selbstregulation medierte die Effekte der Intervention auf Wohlbefinden und Arbeitsengagement.

Artikel 3 untersuchte ebenfalls die kurz- und langfristige Wirksamkeit der Intervention mit einem randomisierten Wartelisten-Kontrollgruppendesign ($n = 288$), jedoch in Bezug auf andere Ergebnisvariablen. Auf der Grundlage des Positive-Activity-Modells (Lyubomirsky & Layous, 2013) wurden Veränderungen positiver Emotionen und des Boundary Managements als Mechanismen untersucht. Darüber hinaus wurden depressive Symptome als Moderator

dieser Beziehung überprüft. Gemischte Varianzanalysen ergaben, dass die Intervention die emotionale Erschöpfung und die Zufriedenheit mit der Work–Life-Balance verbesserte. Diese Effekte hielten über vier Wochen an. Veränderungen positiver Emotionen und des Boundary Managements vermittelten die Interventionswirksamkeit. Die Ergebnisse zeigten keinen Moderationseffekt, das heißt, die Intervention war unabhängig vom Ausgangsniveau der depressiven Symptome der Teilnehmenden wirksam.

Aufbauend auf Artikel 2 und Artikel 3 sowie der Wirksamkeit der auf Selbstregulation basierenden Online-Intervention wurde untersucht, ob ein Blended-Trainingsformat, bei dem Teilnehmende zusätzlich zu den Online-Modulen an drei Gruppensitzungen teilnahmen, effektiver ist als das Online-Trainingsformat. Artikel 4 untersuchte die kurz- und langfristige Wirksamkeit des Blended-Trainings für Erwerbstätige mit orts- und zeitflexiblen Arbeitsbedingungen anhand eines randomisierten Wartelisten-Kontrollgruppendesigns mit zwei Interventionsgruppen und einer Kontrollgruppe ($n = 373$). Basierend auf der Theorie der sozialen Identität und der Selbstbestimmungstheorie (Haslam et al., 2019; Ryan & Deci, 2000) wurde die Wirksamkeit im Vergleich zum Online-Trainingsformat untersucht. Mehrebenen-Analysen ergaben, dass das Blended-Training das mentale Abschalten, die Zufriedenheit mit der Work-Life-Balance und das Wohlbefinden verbesserte, ebenso wie das Online-Training. Diese Effekte hielten über vier Wochen an, hinsichtlich des mentalen Abschaltens über sechs Monate. Die Teilnehmenden des Blended-Trainings profitierten also nicht mehr von der Intervention als die Teilnehmenden des Online-Trainings. Sie berichteten allerdings von mehr Erfahrungsaustausch und emotionaler Unterstützung. Auch die Bereitschaft zur Teilnahme an den Modulen und Übungen war bei ihnen höher. Zusätzlich zu den Online-Modulen stattfindende Gruppensitzungen erhöhten also soziale Austauschprozesse und die Compliance.

Neben der Überprüfung verschiedener Trainingsformate und aufbauend auf der Wirksamkeit der individuellen Interventionen untersuchten wir, ob der individuelle Trainingsansatz auf die Teamebene übertragen werden kann. Wir entwickelten einen Team-Workshop, bestehend aus zwei Sitzungen, in dem hybride Arbeitsteams lernten, Teamregulationsstrategien auf der Grundlage von Modellen der individuellen Selbstregulation zu praktizieren. Artikel 5 evaluierte die kurz- und langfristige Wirksamkeit dieser Teamregulierungsintervention mit einem cluster-randomisierten Wartelisten-Kontrollgruppendesign mit zwei Interventionsgruppen und einer Kontrollgruppe, wobei Daten von 750 Personen aus 84 Teams einbezogen wurden. Mehrebenen-Analysen ergaben, dass die Intervention die Teamregulation steigerte. Dies medierte Effekte auf verbesserte soziale Unterstützung, psychologische Sicherheit und Zusammenarbeit im Kontext orts- und

zeitflexibler Arbeitsbedingungen. Die Effekte auf die Teamregulation, die Zusammenarbeit und die psychologische Sicherheit hielten über neun Wochen an. Die aggregierte individuelle Selbstregulation verbesserte sich nicht, was darauf hindeutet, dass sich Teamregulation konzeptionell von auf Teamebene aggregierter Selbstregulation unterscheidet.

Die Ergebnisse der fünf in dieser Dissertation vorgelegten Artikel verdeutlichen, dass webbasierte individuelle Interventionen, die auf Selbstregulation basieren, Erwerbstätigen helfen können, sich zu erholen und ihre Work-Life-Balance und ihr Wohlbefinden zu verbessern. Die Rolle von Mechanismen der Interventionswirksamkeit wie Selbstregulation, positive Emotionen und positive Verhaltensweisen werden ebenso wie moderierende Variablen wie Segmentationspräferenz aufgezeigt. Zusätzliche Gruppensitzungen können Prozesse sozialen Austauschs und die Trainings-Compliance erhöhen. Die Teamregulation hybrider Arbeitsteams kann durch eine Teamintervention gefördert werden, welche Teamressourcen erhöht. Die Ergebnisse tragen zur Entwicklung effektiver auf Selbstregulation basierender Interventionen bei, um das Wohlbefinden, die Work-Life-Balance und die Erholung von Erwerbstätigen mit orts- und zeitflexiblen Arbeitsbedingungen zu fördern.

Schlüsselwörter: Erholung, Intervention, Randomisierte kontrollierte Studie, Selbstregulation, Wohlbefinden, Work-Life-Balance

1 INTRODUCTION

Information and communication technologies such as computers and smartphones have made it possible to work almost anywhere and anytime. This allows the rise of flexible work designs (FWD) such as remote work and mobile work. Such FWD provide workers with spatial and temporal flexibility (Demerouti et al., 2014; Lewis, 2003), that is, autonomy in choosing their working time and workplaces. In the European Union, about 11% of employees and almost 36% of self-employed workers worked from home at least sometimes in 2019 (Milasi et al., 2021). In Germany, every second employee worked partly or mainly at remote or changing workplaces in 2017 (Wöhrmann et al., 2020). The COVID-19 pandemic has dramatically increased the number of teleworkers around the globe, with highly digitalized industries achieving rates of more than 50% of employees working from home (OECD, 2021). In the European Union, the number of teleworkers doubled between 2019 and 2021, with two out of ten employees teleworking (Eurofound, 2022). In Germany, similar numbers were observed in 2021, with more people working from home than ever before: Almost 25 percent of employees in Germany worked from home at least occasionally, and 10 percent worked from home every day (Destatis, 2022). According to Destatis, in industries such as information technology services, three-quarters of employees worked from home in 2021. Numbers had already doubled from about 13 percent working from home in 2019 to 21 percent working from home in the first year of the pandemic in 2020. The share of workers with FWD is expected to remain at a high level in the post-pandemic future, as technological developments increase the number of jobs with spatial and temporal flexibility and both employee and employer preferences for remote working change (Eurofound, 2022).

FWD present both opportunities and risks. Being able to work anytime and anywhere has benefits. Workers can organize their workday around their needs, reduce commuting time, work without interruptions, and more easily balance work and nonwork roles. These aspects can help workers meet both work and private life demands, thereby reducing work–life conflicts (Allen et al., 2013; Liao et al., 2019) and improving job satisfaction and satisfaction with work–life balance¹ (BAuA, 2016). On days when employees work from home, they experience less

¹ Although it has been criticized for implying that work is not part of life, this term is used in this thesis because it is the common umbrella term for research on the interface of different life domains (Casper et al., 2018).

time pressure and, in turn, perceive less work–life conflict (Darouei & Pluut, 2021). FWD are also associated with physical health, fewer somatic symptoms, and less absenteeism (Shifrin & Michel, 2021). Moreover, they are also associated with psychological health and job satisfaction (Kröll et al., 2017). Last, autonomy is often considered an important job resource that can help cope with job demands and instigate processes that lead to increased motivation (Bakker & Demerouti, 2017). Thus, changes associated with spatial and temporal flexibility may be perceived as an advantage.

However, FWD also poses specific challenges and risks to well-being, work–life balance, and recovery. FWD are concomitant with fewer physical boundaries between work and private life, as these domains are no longer tied to different locations, for example, when working from home. As a result, boundaries between work and private life are more likely to blur (Glavin & Schieman, 2012). Thus, workers with FWD often find it difficult to establish boundaries between work and private life (Rau & Hyland, 2002). This elevates the risk for boundaryless working hours such as working overtime, being available during free time, working on Sundays, or taking fewer breaks (Demerouti et al., 2014; Wöhrmann et al., 2020; Wöhrmann & Ebner, 2021). Such potentially self-endangering work behaviors also include work intensification (Deci et al., 2016; Kelliher & Anderson, 2010). Extended workdays, facilitated by permanent availability, result in reduced or interrupted rest periods from work and insufficient detachment, which can impede recovery processes (Deci et al., 2016; Demerouti et al., 2014; Pak et al., 2021; Vieten et al., 2022). Insufficient recovery can impair well-being (Park et al., 2011) and performance (BAuA, 2018; Volman et al., 2013). Extended availability and blurred boundaries between work and private life may increase the experience of work–life conflict (Ashforth et al., 2000; Cho et al., 2020; Powell & Greenhaus, 2010) and decrease satisfaction with one’s work–life balance (BAuA, 2016; Rexroth et al., 2014). FWD may also hamper the achievement of psychosomatic health (Wöhrmann & Ebner, 2021). Such adverse effects on satisfaction with work–life balance, work–life conflict, health, and exhaustion are particularly distinct when availability is perceived as illegitimate (i.e., people are contacted frequently and perceive high availability expectations, but do not perceive availability as necessary and reasonable; Brauner et al., 2022). This makes both scientists and practitioners wonder how they can support workers in ways that ensure their well-being, work–life balance, and recovery.

Consistent with the recognition that FWD can bring both benefits and challenges, research shows conflicting results regarding the impact of FWD on work–life balance, recovery, well-being, mental and physical health, and work engagement (Boell et al., 2016; Demerouti et

al., 2014; Oakman et al., 2020). Meta-analytic findings underline adverse effects of extended availability on recovery, well-being, work–life balance, and work-related outcomes (Thörel et al., 2022). However, they also reveal beneficial effects on positive affect and positive attitudes toward work. Similarly, from an energy resource perspective, working hours can lead to either work-to-family enrichment or conflict via vigor or exhaustion (Pak et al., 2022). Moreover, theories have elaborated on why FWD may have different effects not only between individuals, but also within individuals. For example, commuting may have positive and negative effects on well-being depending on whether commuters engage in role transitions (Nolan et al., 2022) or recreational activities (McAlpine & Piszczek, 2022). Consistent with these models, a recent meta-analysis highlighted that commuting time is associated with strain, but the role of subjective evaluations of commuting remains to be addressed (Murphy et al., 2022). Conflicting findings on the effects of FWD and within-person variation in FWD effects result from different occupational factors as well as personal behaviors and abilities (Bjærntoft et al., 2020; Demerouti et al., 2014). This is where interventions can take effect.

A key individual ability pivotal in the context of FWD is self-regulation, the ability to steer thoughts, feelings, and actions toward a goal (Bandura, 1991). FWD provide fewer physical, temporal, and psychosocial structures than traditional work environments such as spatial separation of work and private life, fixed working hours and breaks, or direct supervision and monitoring of work behaviors and practices by supervisors and peers (Allen et al., 2003). Workers then need to manage their work routines themselves, and according to their individual needs (Allen et al., 2013; Kubicek et al., 2015; Mellner et al., 2015). A high level of self-regulation is required to tailor working conditions (e.g., ways, methods and times of work) in an individual and suitable way and to develop own work practices (Mäkikangas et al., 2022). For example, to achieve their work-related and private life goals, people need to plan, structure, and organize their workday, including the design of their working time and workplace (e.g., prioritize and select tasks, establish boundaries between work and private life, schedule breaks). This includes optimizing resource allocation, that is, allocating resources such as time and energy to life domains, to attain both work and private life goals (Grawitch et al., 2010; Hirschi et al., 2019). Consistent with this, employees use self-regulation strategies such as goal setting and planning (Troll et al., 2022) and self-reward, self-goal setting, and visualization of successful performance more frequently when working from home (Müller & Niessen, 2019). Hence, FWD place additional responsibility on individuals to manage their own behavior and design some or all aspects of their work environment (Allen et al., 2003). Thus, it requires but also offers workers the opportunity to self-regulate (Müller & Niessen, 2019). That is, self-

regulation is not only a crucial ability when working with FWD, but can also be used as a resource that can help cope with FWD challenges (Mander & Antoni, 2022; Mander et al., 2021). Hence, it is important to empower workers to cope with challenges of FWD and to have the confidence that they can do so (Mäkikangas et al., 2022). Individual web-based interventions can provide strategies to help workers self-regulate the challenges associated with FWD (Demerouti, 2023). Thus, promoting self-regulation should help guide effective individual interventions for workers with FWD.

Building on the central role of self-regulation for workers with FWD, the aim of this dissertation was to evaluate interventions to help workers self-regulate in the context of FWD to improve their well-being, work–life balance, and recovery. Four interventions were developed to promote self-regulation to help workers cope with challenges associated with FWD. To evaluate the interventions, we conducted one randomized controlled trial in cooperation with Heidelberg University and three randomized controlled trials in a project at the Federal Institute for Occupational Safety and Health. Based on the studies, we wrote five articles, in which the following research questions were investigated and discussed.

The first research question is whether interventions that promote self-regulation to cope with challenges of FWD are effective in improving well-being, work–life balance, and recovery. Previous research has shown that training participants to practice mindfulness to mentally and emotionally segment boundaries between work and private life by facilitating self-regulation (i.e., consciously directing work-related thoughts and emotions) can improve well-being, work–life balance, and recovery (Michel et al., 2014; Rexroth et al., 2017). Although this training was not originally developed with a focus on workers with FWD, knowing ways to detach from work is particularly important for this target group. Thus, complementing previous research on overall effectiveness, trajectories of daily effects of this mindfulness-based training were analyzed in Paper 1 (Althammer et al., 2021). In response to the call for interventions that provide strategies for managing challenges related specifically to FWD (Allen et al., 2021), we adapted the mindfulness-based training for workers with FWD and integrated it into an online training to promote self-regulation for coping with challenges of FWD. As interventions in the context of FWD should address the different challenges faced by workers, and previous research has emphasized that self-regulation is important for facilitating behavior change but is rarely targeted in interventions (Michie et al., 2008), the online training for workers with FWD teaches several goal-directed activities and general self-regulation strategies, thereby combining two aspects of promoting self-regulation. This is of high practical relevance as workers with FWD need to adapt to rapidly changing working conditions.

Addressing the first research question, Paper 2 (Althammer et al., under review) reports immediate and long-term effects of the online training on well-being, stress, work engagement, work–life conflict, and psychological detachment. Paper 3 (Althammer et al., under review) reports immediate and long-term effects on emotional exhaustion and satisfaction with work–life balance.

Second, besides the question of whether a given intervention is effective, previous research has called for research on why interventions work and what their underlying working mechanisms are (Michel et al., 2015). To address this second research question, the mediating effect of self-regulation was investigated in Paper 2 based on self-regulation theories (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000), and mediating effects of positive emotions and boundary management as a positive behavior were investigated in Paper 3 based on the positive-activity model (Lyubomirsky & Layous, 2013).

Third, previous research has emphasized the need to identify who may benefit most from interventions to address a problem for which there is a high need (Briner & Walshe, 2015). Building on the proposition that person characteristics affect training effectiveness (Lyubomirsky & Layous, 2013), the third research question is whether participants with certain characteristics particularly benefit from self-regulation interventions. To address this research question, Paper 1 examined the role of segmentation preference for outcome trajectories during the implementation of the mindfulness-based training, and Paper 3 examined depressive symptoms at baseline as a potential moderator of the effectiveness of the online training for workers with FWD.

Building on the effectiveness of the individual web-based training for workers with FWD, the fourth research question is whether a blended training, offering three group sessions in addition to the online training, would increase intervention effectiveness. Although intervention characteristics have been proposed to moderate training effectiveness (Lyubomirsky & Layous, 2013), and group sessions have beneficial characteristics such as social support and social interaction (Salas & Cannon-Bowers, 2001; Vuori et al., 2005), there is a paucity of research comparing the effectiveness of occupational training formats (Phillips et al., 2019). To address this research question, Paper 4 (Althammer et al., under review) reports immediate and long-term effects of the blended training compared to the web-based training. As social isolation is a risk factor of FWD (Mann et al., 2000), answering this question is of practical relevance.

Extending the focus from individuals to work teams, the fifth research question was whether self-regulation processes can be adapted to the team level and serve as a framework

for designing an effective team intervention to promote team regulation, the ability of teams to steer team-level actions to achieve collective team goals, in hybrid work teams. As hybrid work teams become more common as FWD increase, this is of high practical relevance. This extends research on regulation, which has traditionally focused on individual self-regulation rather than team regulation (Zacher & Frese, 2018), and contributes to the aim of building resources at multiple levels, namely individual and team levels (Nielsen et al., 2017). To address the fifth research question, Paper 5 (Althammer et al., under review) examined the immediate and long-term effectiveness of the team regulation intervention.

This dissertation is structured as follows: Following this introduction, in Chapter 2, I provide an overview of self-regulation models as the general theoretical framework of this dissertation and theories that are relevant to the development of interventions for workers with FWD. Moreover, I describe the current state of research on interventions based on these theories. The second chapter concludes with the derivation of the research questions of this dissertation. In Chapter 3, after providing an overview of the theoretical background, content, and structure of the interventions developed as part of this dissertation, I present the research design used to evaluate them and then present the five articles of this publication-based dissertation. For each article, I summarize the theoretical background and briefly derive hypotheses, measures, and analysis strategy before presenting and discussing the results of each article. A detailed description of the original studies is provided in the Appendix. Concluding, Chapter 4 integrates and discusses the findings of the five dissertation articles, leading to overarching implications for theory and practice. I also reflect on the strengths and limitations of the studies and derive implications for future research.

2 THEORETICAL AND EMPIRICAL BACKGROUND

In this chapter, I introduce key psychological theories and models that were the basis for the development of the interventions in this dissertation. Since the overall goal of this dissertation was to develop interventions that would promote self-regulation to cope with challenges of FWD, self-regulation models are introduced as the general theoretical framework upon which interventions were based. In addition, I provide an overview of theories that guided the development of interventions that address the various challenges people face when working with FWD. Because FWD presents challenges that are particularly threatening to well-being, work–life balance, and recovery, boundary theory, recovery theories, and conservation of resources theory were used as theoretical foundations for intervention development. After reviewing the theoretical frameworks for intervention development for workers with FWD, I describe the current state of empirical evidence regarding interventions based on these theories and discuss how they have been incorporated into intervention development. Based on these considerations, I then derive the research questions for this dissertation.

2.1 SELF-REGULATION THEORY

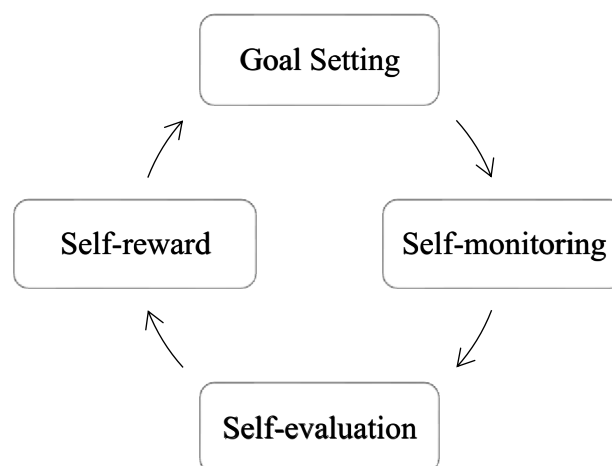
Self-regulation is considered an essential ability in the context of FWD. FWD place additional responsibility on individuals to tailor their work routines and practices according to individual needs (Allen et al., 2003; Allen et al., 2013; Kubicek et al., 2015; Mäkikangas et al., 2022; Mellner et al., 2015). As self-regulation is required to adjust and change behavior (Inzlicht et al., 2021; Michie et al., 2008), it can help workers cope with challenges of FWD.

Self-regulation is an umbrella term for diverse aspects of adaptive behavior (Matthews et al., 2000), with many different definitions and models describing processes and mechanisms of self-regulation. In this thesis, self-regulation refers to the ability to steer thoughts, feelings, and actions toward a self-determined goal (Bandura, 1991). Process models of self-regulation suggest that people regulate their actions in a sequential process of self-regulation strategies (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zacher & Frese, 2018;

Zimmerman, 2000). They do not always follow this sequence of processes rigidly; they may move back and forth between phases, repeat or skip phases, or engage in phases simultaneously (Zacher & Frese, 2018). First, they form objectives and performance standards (*goal setting*). Goal setting is often described as a result of self-monitoring or as part of self-evaluation (Bandura, 1991; Zimmerman, 2000). Because self-set goals guide people's behavior, it is useful to mention goal setting explicitly as the first step in the sequential process. Then, people scrutinize their own thoughts, emotions, and behaviors (*self-monitoring*), which is necessary to evaluate progress toward the goal. A certain level of self-monitoring is of course a prerequisite for setting realistic goals. Moreover, self-monitoring itself can cause behavior change and positively influence well-being (Bakker & Rickard, 2018; Goldstein et al., 2019; Yan et al., 2020). Then, people judge their progress toward their standards, that is, whether their behavior aligns with their self-set goals (*self-evaluation*). They may also compare themselves to others or to their own past behavior. Last, they affirm themselves (*self-reward*) through positive affective reactions (e.g., satisfaction) or tangible rewards (e.g., leisure activities), the anticipation of which serves as an incentive for goal attainment, that is, motivates goal-directed behavior. Moreover, the achieved goal itself may be associated with positive consequences (e.g., the goal of engaging in more restorative leisure activities is associated with improved well-being via increased recovery). Hence, the self-regulation process involves four key general self-regulation strategies that people use to regulate their goal-oriented behaviors (i.e., behaviors directed toward a goal, also called actions) and motivate themselves (see Figure 1).

Figure 1

The Self-Regulation Process



Kanfer introduced the three components of self-monitoring, self-evaluation, and self-reward under the term self-control (Kanfer, 1977; Kanfer & Karoly, 1972). Bandura also described the process of action control with these three components in the social learning theory

(Bandura, 1977) and the social cognitive theory of self-regulation (Bandura, 1991). Other social-cognitive models of self-regulation incorporate the four concepts mentioned above (Zimmerman, 2000). Action regulation theory (Frese & Zapf, 1994; Zacher & Frese, 2018) describes the processes of goal development and selection, orientation, and planning (similar to goal setting), monitoring of execution (similar to self-monitoring and self-evaluation), and feedback processing (including elements of evaluation and reward, albeit from the environment). Thus, all of these theories propose proactive self-regulation, that is, guiding goal-directed activities by setting personal standards. Specifically, people not only reduce a discrepancy between their actual and target behavior, but also increase this discrepancy by setting challenging goals that motivate behavior change. This is one of the major differences from conceptualizations of self-regulation based on negative feedback control systems (e.g., Carver & Scheier, 2013; Lord et al., 2010).

Distinguishing self-regulation from related concepts. Self-regulation is often used synonymously with other concepts that are related but clearly distinguishable. *Emotion regulation* describes strategies that influence which emotions occur and how these emotions are experienced and expressed (Gross, 2001). Thus, it is a form of self-regulation in which emotional responses (e.g., specific emotions such as anger, attention, stress, or other affective reactions) are regulated (Koole et al., 2013). *Self-control* describes regulation in the face of conflicting behavioral alternatives (Kanfer et al., 2006; Kotabe & Hofmann, 2015). Thus, it focuses on the control or suppression of undesirable behaviors, not taking into account behaviors to attain personal goals. Self-regulation theories have been integrated into professional contexts under the terms self-management or self-direction (Manz, 1986). *Self-management* is conceptually close to the definition of self-regulation in this thesis. Self-management techniques for behavior change (Kanfer et al., 2006) are derived from the concept of self-regulation and evolved originally in a clinical context. They include goal setting, self-observation, self-assessment, reinforcement, stimulus control, behavior planning, and relapse prevention (i.e., identifying obstacles and planning to overcome them). *Self-leadership* is a normative concept that operates within the theoretical context of self-regulation and describes the management of thoughts, feelings, and behaviors in the work context (Manz, 1986). It consists of behavior-focused strategies, natural reward strategies and constructive thought pattern strategies (Neck & Houghton, 2006). Each strategy affects outcomes differently (Harari et al., 2021). Self-management strategies were the theoretical basis for behavior-focused strategies (Manz, 1986). Because of the conceptual overlap of self-regulation with self-

management and self-leadership, I will also draw on empirical research on these constructs in the following.

The relationship between mindfulness and self-regulation. Mindfulness is closely related to self-regulation. According to the two-component model of mindfulness, mindfulness involves self-regulation of attention and orientation toward one's experiences with curiosity, openness, and acceptance (Bishop et al., 2004). Self-regulation of attention describes bringing awareness to current, immediate experiences, thereby increasing recognition of thoughts and feelings (Bishop et al., 2004). Mindfulness facilitates self-regulation as it increases awareness of immediate experiences, interrupts automatic thought and behavior patterns, and thus allows individuals to consciously regulate undesirable behaviors or emotional responses (Brown & Ryan, 2003; Good et al., 2016). Thus, mindfulness serves an important self-regulatory function (Brown & Ryan, 2003). Beyond that, mindfulness practice enhances emotion regulation because it incorporates several elements of emotion regulation strategies (Gross, 2001, 2015), such as attention regulation and cognitive reappraisal.

Interventions to Enhance Self-Regulation

As the aim of the developed interventions was to promote self-regulation in the context of FWD, I will provide an overview of the current state of empirical evidence regarding interventions based on self-regulation and discuss how these findings were incorporated into the development of the interventions. In interventions designed to promote self-regulation, people learn to steer their own behavior. I will focus on interventions that promote self-regulation as defined above by teaching (among others) self-regulation strategies of goal setting, self-monitoring, self-evaluation, or self-reward. Research shows that individual self-regulation in the work context is malleable, that is, training self-regulation strategies can improve self-regulation capacity (e.g., Ebner et al., 2018; Klein et al., 2003; Landmann et al., 2005; Marques-Quinteiro et al., 2019; Mrazek et al., 2021; Yeow & Martin, 2013).

In early self-regulation interventions, self-management techniques, as conceptualized by Kanfer et al. (Kanfer et al., 2006), were transferred to the occupational context (Frayne & Latham, 1987; Gintner & Poret, 1988). Such self-management trainings have been shown to increase self-efficacy (Frayne & Geringer, 2000; Klein et al., 2003), change work-related behaviors (Godat & Brigham, 1999), enhance job performance (Frayne & Geringer, 2000; Gist et al., 1991), and improve goal setting and problem solving (Saborowski & Muellerbuchhof, 2010). Moreover, self-management techniques have been shown to facilitate the transfer of training content to new situations better than goal setting training alone (Stevens et al., 1993). Internalization of goals seems to be a success factor for behavior change through self-

management strategies (Unsworth & Mason, 2016). Intervention studies also draw on the concept of self-leadership. Intervention studies have adapted this concept since the early years of self-regulation intervention research (Neck & Manz, 1996; Stewart et al., 1996). Self-leadership interventions, both as a web-based training (Unsworth & Mason, 2012) and as group-based coaching (Ebner et al., 2018), can positively influence stress management and self-efficacy. Moreover, self-leadership trainings can improve task-relevant skills, team and leadership performance (Yeow & Martin, 2013), and adaptive performance and job satisfaction (Marques-Quinteiro et al., 2019).

Trainings that teach self-regulation strategies such as goal setting and self-evaluation can improve mental well-being and, in highly committed participants, improve job control (Müller et al., 2016). Self-regulation training can also improve well-being indicated, for instance, by increases in life satisfaction and positive affect and decreases in stress and negative affect (Mrazek et al., 2021). The trainings mentioned so far aim to train the entire self-regulation cycle. There are interventions that focus on specific components of self-regulation, such as goal setting. One self-regulation strategy that combines metacognitive self-regulation strategies is mental contrasting with implementation intentions. This meta-strategy was designed to increase goal commitment and support goal attainment. A brief training that teaches this meta-strategy can have positive effects on decision making (Oettingen et al., 2010), time management (Oettingen et al., 2015), stress, and work engagement (Gollwitzer et al., 2018). Self-monitoring is another strategy that often plays a role in self-regulation interventions, both for goal development and pursuit (e.g., van den Heuvel et al., 2015). In addition to interventions explicitly designed to promote self-regulation, interventions that target behavior change must address causal determinants of behavior change such as self-regulation (Michie et al., 2008). Thus, interventions that promote self-regulation in addition to the behavior of interest may be more effective. For example, prompting self-regulation may bolster training effectiveness (Sitzmann et al., 2009). However, few interventions target self-regulation in addition to goal-directed behaviors.

Concluding, intervention studies have shown that self-regulation is malleable. Self-regulation models and interventions based on self-regulation inform how self-regulation can be trained. Particularly in the context of FWD, training self-regulation is important to empower workers to adjust their working practices according to their needs (Mäkikangas et al., 2022). Based on this, the developed interventions aimed to promote self-regulation as we assumed that this would enable participants to attain their goals for coping with specific challenges of FWD. Specifically, mindfulness as a means to self-regulate work-related thoughts, emotions and

actions was evaluated in Paper 1, based on the work of Michel et al. (2014). Building on the effectiveness of this intervention and research showing that self-regulation is helpful for developing effective strategies and changing behaviors, we aimed to strengthen two aspects of self-regulation in the web-based training for workers with FWD, which was mainly evaluated in Paper 2 and Paper 3. On the one hand, we taught goal-directed activities workers engage in to attain their goals in the FWD context (e.g., segmentation strategies to set clear boundaries, respite exercises to recover during breaks, mindfulness exercises to disengage from work-related thoughts). These activities direct thoughts, emotions, and actions toward a goal and are thus a form of self-regulation. On the other hand, we taught general self-regulation strategies that facilitate the implementation of goal-directed activities (i.e., goal setting, self-monitoring, self-evaluation, and self-reward) to effectively promote behavior change. We expected this combination to enable workers with FWD to change their behavior toward their goals, thereby improving their recovery, work–life balance, and well-being. Models of individual and team motivation suggest that self-regulation processes traditionally studied at the individual level are functionally similar to regulation processes at the team level (Chen & Kanfer, 2006). Consistent with this, previous research has postulated similar regulation processes at individual and team levels (Chen et al., 2005; DeShon et al., 2004; Gevers et al., 2009; Panadero et al., 2015). Extending the focus from the individual to the team level, in Paper 5 we examined whether a team-level intervention developed based on self-regulation models effectively promotes team regulation, the ability of teams to guide team-level actions to achieve collective team goals.

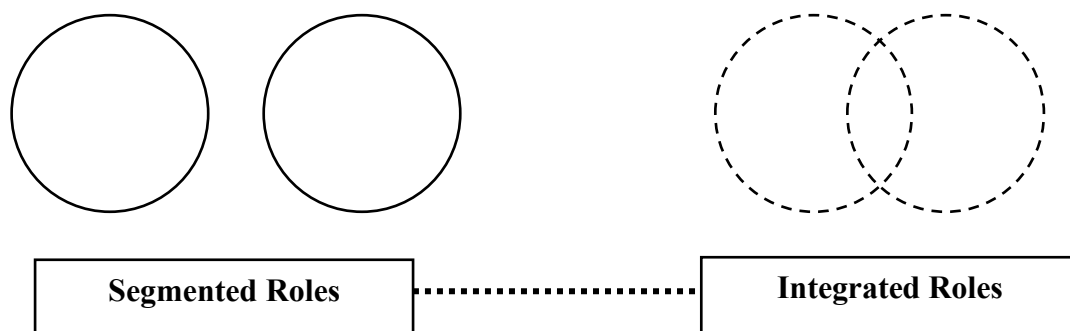
2.2 BOUNDARY THEORY

In the context of FWD, workers need to actively manage boundaries between life domains because FWD reduce the separation between work and private life, making it more likely that boundaries will blur (Glavin & Schieman, 2012) and making it more difficult to establish boundaries between work and private life (Rau & Hyland, 2002). Boundary theory (Ashforth et al., 2000) describes the nature of roles transitions, that is, disengagement from one role and engagement in another. According to boundary theory, people create and maintain boundaries around their roles, resulting in distinct life domains such as work and private life. The flexibility (i.e., the extent to which roles are tied to specific settings and times) and permeability (i.e., the extent of cross-role interruptions, describing psychological involvement in one role while being physically located in another role) of role boundaries affect how easy it is to transition between roles. Role boundaries can be segmented (i.e., inflexible and

impermeable) or integrated (i.e., flexible and permeable), reflecting the poles of the segmentation-integration continuum (see Figure 2). Highly segmented roles are associated with a clear separation between roles and few cross-role interruptions, hence, less role blurring. However, crossing role boundaries is more difficult. Rituals may facilitate role transitions. Highly integrated roles are characterized by frequent cross-role transitions and interruptions. This requires people to use boundary management strategies to reduce role overlap.

Figure 2

The Segmentation-Integration Continuum According to Ashforth et al., 2000



People differ in their preference to segment or integrate roles of different life domains, which is referred to as segmentation preference. Boundary theory proposes that higher integration may allow for either less conflict between life domains, because people can transition between roles when necessary, or more conflict, because people and their environment are confused about which role is most salient. According to boundary theory's person-environment fit perspective (Kreiner, 2006), incongruence between personal segmentation preference and environmental segmentation possibilities (e.g., non-supportive work climate) may increase conflict. Vice versa, when individual boundary management strategies match segmentation preference, people possess greater boundary fit, which can improve role satisfaction and, thus, well-being (Michel et al., 2022). Boundary fit is also related to family satisfaction through its impact on work-life conflict (De Gieter et al., 2022).

However, organizational supplies and culture shape individual boundary management and individual outcomes. For example, Foucreault et al. (2018) have shown that segmenters were less able to detach after work when they perceived their organizational culture as strongly supportive of integration, but integrators were unaffected by a culture of integration. Hence, provision of segmentation supplies may be at least as important as matching boundary preferences and environmental possibilities. In line with this, Brauner et al. (2020) have found the possibility for segmentation to improve satisfaction with work-life balance. Furthermore, Rexroth et al. (2014) have shown that both segmenters and integrators without the possibility

to segment are more emotionally exhausted and less satisfied with their work–life balance. Pointing in the same direction, individual segmentation preference played only a minor role in the relationship between individual-oriented or organization-oriented working time flexibility and work–life balance; individual-oriented working time flexibility (i.e., working time control) improved work–life balance, whereas organization-oriented working time flexibility demands were related to disruptions in work–life balance (Wöhrmann et al., 2021). Moreover, individual segmentation preference may influence the effectiveness of work–nonwork policies such as restricting work-related communication on well-being (Mueller & Kempen, 2022).

Boundary Management Strategies. Boundary management strategies help people create and maintain boundaries, thereby constructing or modifying role boundaries to be more or less segmented or integrated. Particularly when working with FWD, people employ such strategies to segment work and private life domains (Allen et al., 2021; Troll et al., 2022). Kreiner et al. (2009) have categorized strategies that can be used to establish boundaries into four categories: physical, temporal, behavioral, and communicative. Others have described technological strategies, which Kreiner et al. had subsumed under behavioral strategies, as a further category (Schlachter, 2017). In addition, rituals can ease role transitions (Ashforth et al., 2000). We refer to these six boundary managements strategies as behavioral strategies, complemented by cognitive-emotional strategies, a term introduced by Michel et al. (2014).

Interventions to Promote Boundary Management Strategies

The aim of the developed interventions was to promote self-regulation in the context of FWD. This includes helping participants manage boundary transitions as they steer their thoughts, emotions, and behaviors (i.e., self-regulate) in ways that allow for more or less segmentation, depending on their preference. Therefore, I will review the current state of empirical evidence on interventions based on boundary theory and discuss how these findings have been incorporated into intervention development.

Few interventions have been designed to train boundary management strategies. Among the first were Rexroth et al. (2016), who designed a two-day training that combined reflection on segmentation preference and teaching segmentation strategies with self-regulation strategies such as mental contrasting with implementation intentions to improve goal pursuit. This training approach increased boundary creation and detachment, and decreased control during leisure time. It did not affect well-being. A similar training approach that taught participants specific boundary management tactics (i.e., temporal, physical, communicative, and behavioral) increased psychological detachment, relaxation, and control during leisure time, and decreased work–life conflict and emotional exhaustion (Binnewies et al., 2020). Building

on the concept of boundary management strategies and integrating them with strategies for setting boundaries with technology, the 3-day training of Schlachter (2017) reduced voluntary use of information and communication technology on weekends and increased of technology-related self-control. This training also reduced the need for recovery in the long term, but did not affect self-efficacy, detachment, satisfaction with work–life balance, or well-being.

Integrating boundary theory (Ashforth et al., 2000) with mindfulness theories (Bishop et al., 2004), Michel and colleagues (Michel et al., 2014; Rexroth et al., 2017) taught mindfulness as a cognitive-emotional boundary management strategy in a 3-week web-based training. This training approach facilitated psychological detachment from work, improved satisfaction with work–life balance, and reduced strain-based work–life conflict (Michel et al., 2014). It also fostered boundary management competence and improved well-being, as indicated by reduced emotional exhaustion and negative affect and increased life satisfaction (Rexroth et al., 2017). A mindfulness-based workshop followed by two weeks of self-observation also decreased work-to-family conflict, and for those who completed self-observation, family-to-work conflict as well (Kiburz et al., 2017).

Concluding, boundary theory and interventions based on boundary theory inform how boundary management strategies can be trained, with positive effects on work–life balance and well-being, and in accordance with segmentation preference. This is particularly important in the context of blurring boundaries when working with FWD. Hence, boundary management strategies were included in the developed interventions as we assumed that they would help participants detach from work, experience fewer work–life conflicts, be more satisfied with their work–life balance, and thus experience higher well-being. Specifically, strategies of cognitive-emotional boundary management were evaluated in Paper 1, based on the work of Michel et al. (2014). Building on the effectiveness of this intervention, strategies of cognitive-emotional and, in addition, behavioral boundary management were taught in the web-based training for workers with FWD, which was mainly evaluated in Paper 2 and Paper 3.

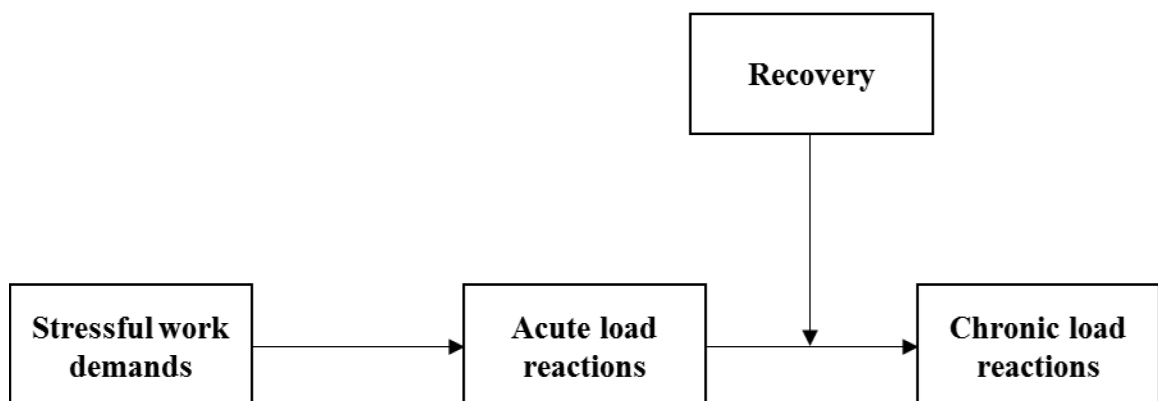
2.3 RECOVERY THEORY

In the context of FWD, workers need to actively manage their recovery periods because FWD reinforce boundaryless work such as working longer hours and taking fewer breaks (Demerouti et al., 2014; Wöhrmann et al., 2020; Wöhrmann & Ebner, 2021). This impedes adequate rest periods, detachment from work, and recovery (Deci et al., 2016; Demerouti et al., 2014; Pak et al., 2021; Vieten et al., 2022). Recovery refers to the process that counteracts the

strain process triggered by work demands and other stressors, resulting in restoration of resources and a decrease in strain indicators (Geurts & Sonnentag, 2006; Sonnentag et al., 2017). Theories such as the conservation of resources theory (see 2.3) or the effort-recovery model can be drawn upon to understand recovery processes. The effort-recovery model (Meijman & Mulder, 1998) proposes that effort expenditure at work leads to acute load reactions with strain indicators such as fatigue, physiological activation, accelerated heart rate. These reactions are reversed when there is no further exposure to work or similar demands, or more specifically, when there are no further demands on the functional systems activated during work (i.e., recovery; see Figure 3). Continued exposure to workload and incomplete recovery can develop into chronic load reactions and poor health, indicated by prolonged fatigue, sleep problems, or chronic tension (Geurts & Sonnentag, 2006). Thus, recovery occurs when there is no exposure to work demands, when leisure activities require different functional systems or resources than those used at work (effort-recovery model), and when new personal resources (e.g., energy, positive mood, self-efficacy) are built up during leisure time to restore threatened resources (conservation of resources theory).

Figure 3

The Recovery Process According to Geurts & Sonnentag, 2006



According to Sonnentag and Fritz (2007), underlying processes and attributes of off-job activities rather than specific activities per se help recover from work stress. They propose that these psychological experiences are similar across individuals and are critical to recovery. They propose four recovery experiences: detachment from work, relaxation, mastery, and control. *Psychological detachment* describes when people become mentally disengaged from work and its stressors (Etzion et al., 1998). It is considered a particularly important recovery experience and is associated with benefits for a range of health, well-being, and work performance

outcomes (Sonnentag & Fritz, 2007, 2015; Wendsche & Lohmann-Haislah, 2017). *Relaxation* describes a state of low activation (Sonnentag & Fritz, 2007). *Mastery experiences* describe challenging experiences and learning opportunities in off-job settings that provide chances to feel achievement and competence (Sonnentag & Fritz, 2007). *Control* during leisure time is experienced when one can decide what activity to pursue and when and how to pursue it. Building on the idea of recovery experiences, the DRAMMA model (Newman et al., 2014) integrates them with need satisfaction models such as self-determination theory. Self-determination theory (Ryan & Deci, 2000) proposes that the satisfaction of basic psychological needs facilitates intrinsic motivation, that is, self-determined behavioral engagement. These basic psychological needs (Ryan & Deci, 2017) include competence (i.e., feeling effectiveness and mastery), autonomy (i.e., enacting self-endorsed behaviors), and relatedness (i.e., belonging and feeling cared for by others). The DRAMMA model proposes that the satisfaction of psychological needs during off-job activities improves well-being. Combining basic psychological needs and recovery experiences, these needs encompass detachment, relaxation, autonomy, mastery, meaning, and affiliation (DRAMMA). Off-job activities may best promote well-being when they address multiple psychological needs.

Interventions to Improve Recovery

The aim of the developed interventions was to promote self-regulation in the context of FWD. This includes helping participants cope with recovery burdens during and after work by steering their thoughts, emotions, and behaviors (i.e., self-regulation) in ways that facilitate recovery. Therefore, I will review the current state of empirical evidence on recovery interventions and discuss how findings have been incorporated into intervention development.

Numerous intervention approaches have been shown to enhance recovery (Verbeek et al., 2018) and a recent meta-analysis provides an overview of training concepts that have been shown to be most effective in enhancing psychological detachment (Karabinski et al., 2021). One of the most well-known is by Hahn et al. (2011), who provided participants with input and practical exercises to foster experiences of control, psychological detachment, mastery, and relaxation (i.e., recovery experiences). The intervention increased recovery experiences, recovery-related self-efficacy, improved sleep quality, and decreased levels of stress and negative affect. Another six-session recovery training combined psychoeducation, self-regulation strategies such as stimulus control and mindfulness, boundary management strategies, and positive activities such as practicing gratitude and reflecting on personal helpful strategies (Ebert et al., 2015; Thiart et al., 2015). This training increased recovery activities and experiences, improved mental health-related outcomes and sleep, and reduced perseverative

cognitions and insomnia severity. Moreover, mindfulness trainings have been shown to improve sleep quality and duration (Hülshager et al., 2015) and to reduce affective rumination, problem-solving pondering, and fatigue (Querstret et al., 2017). A 4-week training approach that combined a brief mindfulness component with guided imagination techniques and presentation of auditory stimuli from a natural environment increased afternoon vigor levels and decreased evening fatigue (Steidle et al., 2017).

Concluding, recovery theories and interventions based on recovery theories provide insights how recovery experiences can be promoted, with positive effects on recovery and well-being. This is particularly important given the elevated risk of extended workdays when working with FWD. Hence, the web-based training for workers with FWD that was primarily evaluated in Paper 2 and Paper 3 included recovery strategies. We encouraged participants to engage in off-job activities that involved or addressed different recovery experiences (Sonnentag & Fritz, 2007) or needs (Newman et al., 2014). To this end, we adapted exercises similar to the training of Hahn et al. (2011). In addition, we taught participants how to spend recreative work breaks, adapting the training of Steidle et al. (2017). We expected that these recovery strategies would help participants detach from work and experience higher well-being.

2.4 CONSERVATION OF RESOURCES THEORY

From a resource perspective, focusing on their resources can help workers with FWD cope with challenges of FWD and achieve their goals, such as setting more boundaries or detaching from work in the evening. Resources are anything that is valued by the individual or that serves as a means to attain resources (Hobfoll, 1989) and goals (Halbesleben et al., 2014). Resources include personal resources (e.g., skills and traits such as self-efficacy or optimism), object resources (e.g., car), condition resources (e.g., employment), and energy resources (e.g., knowledge). Conservation of resources theory states that people strive to obtain, retain, foster, and protect their resources (Hobfoll et al., 2018). According to conservation of resources theory, people experience stress when resources are lost, threatened to be lost, or when resources cannot be gained. When they obtain and retain resources, they feel capable of coping with stressful situations. Thus, people employ resources to respond to stress, but also to meet future challenges. The conservation of resources theory (Hobfoll et al., 2018) further states that 1) resource loss is more salient than resource gain, 2) people must invest resources to gain resources, and protect against or recover from resource loss, 3) resource gains become more important when resource loss is likely, 4) people become defensive (e.g., aggressive and

irrational) to preserve the self when their resources are overstretched or exhausted, 5) resources exist in so-called caravans and occur in fostering or limiting conditions, and 6) people with more resources are more capable of gaining resources and less vulnerable to losing resource. Last, both resource loss and resource gain have a spiraling nature, although loss spirals develop more rapidly. Therefore, stress may harm well-being because it threatens resources. Put another way, building resources helps restore threatened or lost resources, which reduces stress and improves well-being.

Interventions to Strengthen Resources

The aim of the developed interventions was to promote self-regulation in the context of FWD. Self-regulation is not only a crucial ability when working with FWD, but can also be a resource to help cope with FWD challenges (Mander & Antoni, 2022; Mander et al., 2021). Furthermore, it may help participants focus on resources they have to cope with FWD challenges and achieve their goals. Therefore, I will review the current state of empirical evidence on resource-oriented interventions and discuss how these findings have been incorporated into intervention development.

There is a broad stream of research conducting interventions to strengthen resources. Most of this literature is found in the context of positive psychology interventions or positive activity interventions (for a review, see Meyers et al., 2013). The term resource-oriented interventions has been frequently used in recent years to describe interventions of different breadth and scope that have in common that they address any resources (Michel et al., 2015). Resource-oriented interventions in the work context aim to build volatile personal resources; simple interventions that are commonly used include mindfulness, nature exposure, positive psychology interventions, expressive writing, capitalization, or work breaks, and these interventions have small to moderate effects on psychological, cognitive, or physiological resources (Gilbert et al., 2018).

The *positive-activity model* (Lyubomirsky & Layous, 2013) provides a framework for how positive activity interventions work. According to the positive-activity model, people can improve their well-being by engaging in positive activities. Positive activities are simple, intentional, and regular practices that emulate thoughts and behaviors of happy people (Lyubomirsky & Layous, 2013) and require self-regulation (Lyubomirsky et al., 2005). The positive-activity model states that positive activities increase positive emotions, thoughts, and behaviors, as well as need satisfaction, which mediate the relationship between activities and well-being. Positive activity characteristics (e.g., variety, sequence, dose), person

characteristics (e.g., efficacy beliefs, baseline affective state), and person-activity fit (i.e., fit between person and activity characteristics) moderate the effect of activities on well-being.

In the following, I highlight exemplary studies that have evaluated resource-oriented interventions. In a three-session personal resources training (Bakker & van Wingerden, 2021), three different personal resources (assertiveness, self-efficacy, and resilience) were addressed with exercises for sharing career-related thoughts and feelings, giving and receiving feedback, and refusing requests. This increased both strengths use (i.e., the use of internal resources at work) and personal resources. Moreover, work engagement improved through changes in self-efficacy and resilience. Another web-based intervention that included happiness, goal setting, and resource-building exercises had positive effects on antecedents of engagement, namely positive emotions and self-efficacy, but only for those with initially low baseline engagement scores (Ouweneel et al., 2013). A two-session intervention that aimed at identifying, developing, and utilizing employee strengths to stimulate personal growth initiative improved self-efficacy directly and personal growth initiative via self-efficacy (van Woerkom & Meyers, 2019). A recent meta-analysis revealed positive effects of strengths use interventions on individual strategies, personal resources, workplace and general well-being, and performance (Virga et al., 2022). A 10-day positive work reflection intervention combined with components of meaningful work and mindfulness practices reduced emotional exhaustion and fatigue (Clauss et al., 2018). A 3-week positive work reflection intervention improved detachment in the evening and reduced stress and physical and mental complaints (Bono et al., 2013).

Concluding, resource theories and resource-oriented interventions inform how resources can be strengthened and demonstrate that there are many ways to stimulate resource gains for workers with positive effects on well-being. This is particularly important in the context of FWD, when people set goals for how they want to shape their workday and need resources, such as self-regulation, to achieve them. Based on this consideration, the interventions in this dissertation focused on strengthening participants' resources. Specifically, the mindfulness-based intervention evaluated in Paper 1 helps build mindfulness as a self-regulatory strategy to attain goals of detaching from work. The web-based training primarily evaluated in Paper 2 and Paper 3 helps build self-regulation to engage in specific positive activities and regulate their implementation to achieve goals of improved well-being, work-life balance, and recovery. To increase the person-activity fit, consistent with the positive-activity model (Lyubomirsky & Layous, 2013), we encouraged participants to continue to engage in activities that they found most helpful and matched their preferences and needs (i.e., toolkit design). In addition, participants reflected on personal and contextual resources and strategies

they were already using to cope with challenges of FWD. They also learned an exercise to activate resources. Moreover, positive language that consistently focused on resources and strengths was used to activate resources. In addition, the blended training evaluated in Paper 4 focused on building social resources such as social exchange through interaction in group sessions. Focusing on resources at the team level, the team intervention evaluated in Paper 5 teaches team regulation strategies to facilitate collective goal attainment. We expected the focus on resources to help participants achieve their goals and experience increased well-being.

2.5 RESEARCH QUESTIONS

As outlined above, FWD pose certain challenges to well-being, work–life balance, and recovery, and self-regulation is an important ability for coping with these challenges. Based on empirical findings on FWD challenges and theories introduced in this chapter, the aim of this dissertation was to develop interventions that help workers self-regulate to cope with challenges of FWD. To contribute to open research questions, the interventions were evaluated in randomized controlled trials. In a mindfulness-based intervention, workers learned how to practice mindfulness as a cognitive-emotional segmentation strategy to disengage from work mentally and emotionally. We aimed to extend research on the effectiveness of this approach by examining how effects unfold over time and person characteristics as boundary conditions. Although interventions that teach strategies to cope with challenges of blurred boundaries, insufficient recovery, or impaired well-being may be adopted by workers with FWD, there is a paucity of interventions specifically for this target group that provide a more holistic intervention focusing on different challenges of FWD (Allen et al., 2021). The web-based intervention based on self-regulation was developed with the aim of focusing on the target group of workers with FWD, and integrated the mindfulness-based intervention. In addition to examining the general effectiveness of this intervention, we investigated the nature of specific intervention mechanisms and individual boundary conditions. Moreover, we aimed to extend the literature on training formats by comparing the effectiveness of intervention formats with different degrees of social interaction. Finally, we aimed to extend the literature on self-regulation interventions by developing and evaluating a team intervention to promote team-level regulation processes. In the following, I summarize the research questions addressed in this dissertation and describe how the five dissertation articles contribute to answering these questions.

2.5.1 Research Question 1: Are interventions that promote self-regulation to cope with challenges of flexible work designs effective in improving well-being, work–life balance, and recovery?

The interventions were developed based on theories and empirical evidence of challenges associated with FWD and provided participants with ways to address these challenges. Therefore, the effectiveness on several variables at risk when working with FWD (i.e., well-being, work–life balance, and recovery) was examined, with a focus on changes during and after the intervention. Although the mindfulness-based training was not originally developed with a focus on workers with FWD, participants learned how to direct their thoughts and emotions (i.e., self-regulate) in ways that helped mentally and emotionally segment boundaries between work and private life. This is particularly important for workers with FWD. Paper 1 evaluated the mindfulness-based online training regarding its effects on psychological detachment, well-being, work–life conflict, and satisfaction with work–life balance. Complementing previous research examining the overall effectiveness of this intervention, daily effects and their trajectories were analyzed. The online training based on self-regulation was designed to promote self-regulation for coping with challenges of FWD. Because the mindfulness-based intervention taught activities (i.e., mindfulness exercises) that are helpful in increasing detachment from work by facilitating self-regulation (i.e., allowing individuals to consciously regulate work-related thoughts and emotions, see Chapter 2.1), it was integrated and adapted for workers with FWD. The online training combined two aspects of promoting self-regulation. As opposed to existing interventions, which have mostly focused on teaching one specific goal-directed activity, participants learned multiple goal-directed activities. In addition, as noted in the review of the current state of research on self-regulation interventions, there has been a gap in targeting general self-regulation ability, which is important for facilitating behavior change (Michie et al., 2008), thus participants also learned to steer the implementation of goal-directed activities with general self-regulation strategies (see Chapter 3.1.2). Paper 2 reports immediate effects of the online training on well-being, stress, work engagement, work–life conflict, and psychological detachment, as well as long-term effects at four weeks and six months. Paper 3 reports effects on emotional exhaustion and satisfaction with work–life balance, as well as long-term effects at four weeks.

2.5.2 Research Question 2: What are underlying mechanisms of self-regulation intervention effectiveness?

This dissertation does not only investigate whether, but also how interventions work. Building on different theoretical frameworks on which the online intervention for workers with

FWD was based (self-regulation theories, boundary theory, recover theories conservation of resources theory, see Chapter 2), two main mechanisms were investigated because effects on these personal resources were expected to explain training effects. In Paper 2, the mediating effect of self-regulation was investigated based on assumptions of self-regulation models (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000). In Paper 3, the mediating effect of positive emotions and boundary management as a positive behavior was examined based on the positive-activity model (Lyubomirsky & Layous, 2013). Researching intervention mechanisms is important because findings provide empirical evidence for the theoretical basis of the intervention, and answer the call to evaluate the underlying mechanisms of resource-oriented intervention effects (Michel et al., 2015). Moreover, this contributes to extending and empirically testing the assumptions of two major theoretical foundations of the intervention: self-regulation models and the positive-activity model.

2.5.3 Research Question 3: Do participants with specific characteristics particularly benefit from self-regulation interventions?

This dissertation investigates whether workers with certain characteristics may particularly benefit from interventions. Building on theoretical frameworks upon which the interventions were built, the role of two potential moderators of intervention effectiveness was examined. Paper 1 examined the role of segmentation preference for outcome trajectories of the mindfulness-based training. Segmentation preference describes the extent to which people favor to segment or integrate aspects of work and private life and employ boundary tactics accordingly, following boundary theory (Ashforth et al., 2000) and its person–environment fit perspective (Kreiner, 2006; Kreiner et al., 2009). Paper 3 examined depressive symptoms at baseline as a potential moderator of the effectiveness of the online training for workers with FWD, based on the positive-activity model (Lyubomirsky & Layous, 2013). Identifying potential moderators of training effectiveness is important because interventions are more likely to work if they address a problem for which there is a high need for training in the target group (Briner & Walshe, 2015). Thus, knowing who is most likely to benefit from an intervention allows for an efficient implementation of interventions.

2.5.4 Research Question 4: Do additional group sessions increase effectiveness of an online self-regulation intervention?

Building on insights about effectiveness of the intervention approach of the online training for workers with FWD, a blended training was developed that, in addition to online modules, offers three group sessions in which participants discuss the online modules and share

their experiences and goals with group-based methods. Paper 4 reports the effectiveness of the blended training approach, including immediate and long-term effects at four weeks and six months. As intervention characteristics have been proposed to moderate training effectiveness (Lyubomirsky & Layous, 2013) and group sessions have beneficial characteristics such as a supportive environment and peer interaction (Salas & Cannon-Bowers, 2001; Vuori et al., 2005), we examined whether blended training would lead to better results than web-based training. We based this reasoning on self-determination theory and social identity theory, theorizing that satisfying the need for relatedness in group sessions may enhance motivation for training participation (Ryan & Deci, 2000; Ryan & Deci, 2017), and that the sense of belonging to a group may improve social support and thus training outcomes (Haslam et al., 2019; Nielsen, 2013). There is a paucity of research comparing the effectiveness of occupational training formats, and previous research has focused on comparing the effectiveness of face-to-face versus online interventions (Phillips et al., 2019). Answering the research question of whether participants benefit from additional group sessions is important for providing trainings in the FWD context as social isolation is a risk factor of remote work (Mann et al., 2000), and social support could therefore be a crucial resource.

2.5.5 Research Question 5: Can self-regulation process models serve as a framework for a team intervention?

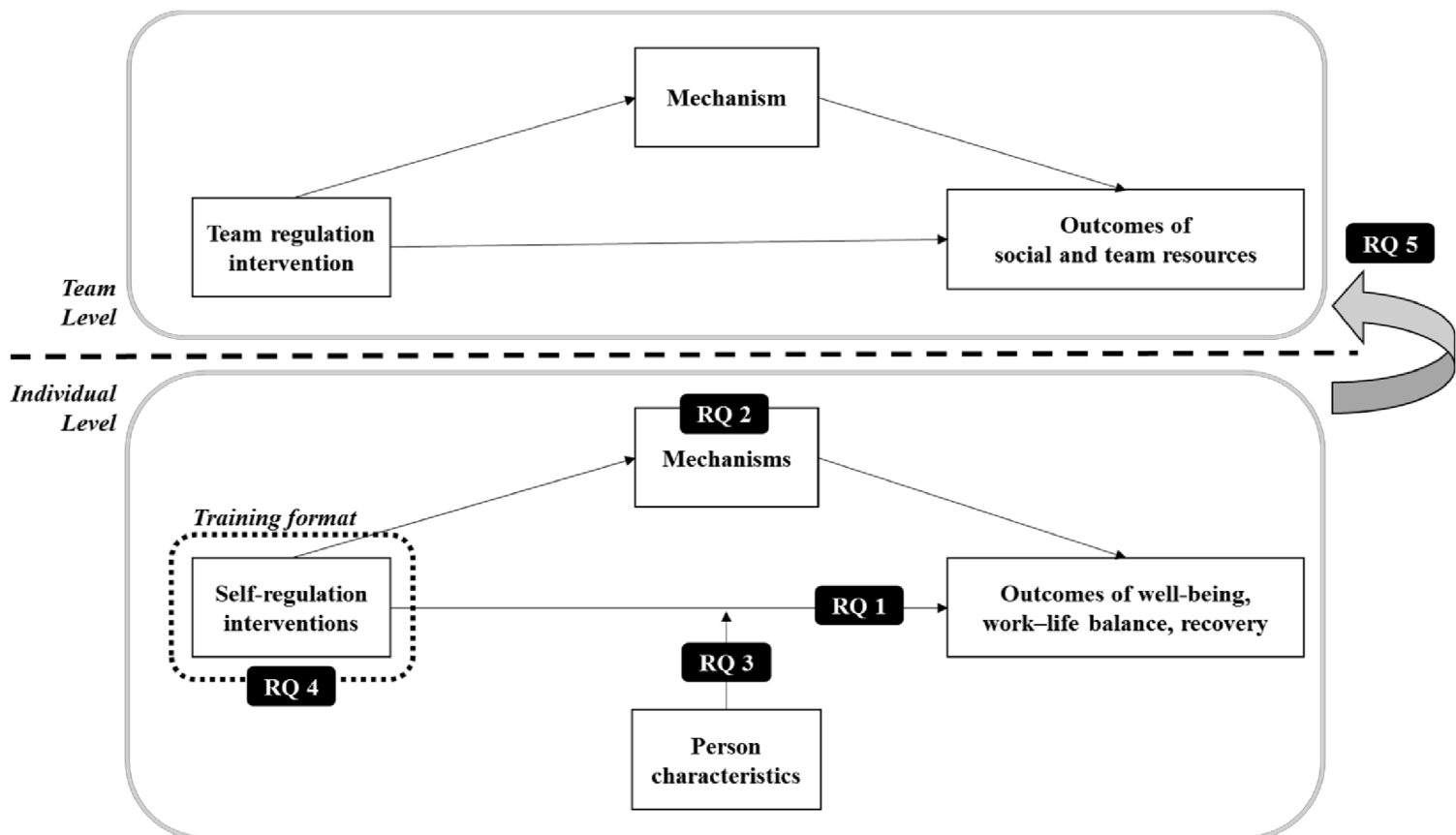
Extending the focus from individuals to work teams, this dissertation investigates the effectiveness of a team intervention to promote team regulation in hybrid work teams. Based on self-regulation process models, a team intervention was developed with the objective of implementing team regulation strategies of team-goal setting, team-monitoring, team-evaluation, and team-reward to achieve collective goals regarding collaboration in the context of FWD. Paper 5 examined the immediate and long-term effectiveness of the team regulation intervention after nine weeks. In examining the effectiveness of promoting team regulation, we aimed to determine whether individual process models are an adequate basis for designing a team intervention. This builds on research proposing self-regulation processes to be functionally similar to regulation processes at the team level (Chen & Kanfer, 2006; Chen et al., 2005; DeShon et al., 2004; Gevers et al., 2009; Panadero et al., 2015). As the relationship between team and individual regulation (Dierdorff & Ellington, 2012; van Hooft & van Mierlo, 2018) is still debated, we assessed aggregated individual regulation and team regulation. We evaluated the effectiveness of enhanced team regulation on social support, psychological safety, and collaboration to understand the role of team regulation as a resource in hybrid work teams. Expanding research on regulation, which has traditionally focused on individual self-regulation

rather than team regulation (Zacher & Frese, 2018), is particularly important for hybrid work teams due to the need to adapt to rapidly changing working conditions.

To answer the research questions (see Figure 4), four studies were conducted. In the following chapter, I will present the developed interventions and summarize the five articles that are part of this dissertation. Paper 1 evaluated the effectiveness of a mindfulness-based online training, focusing on trajectories of effects and segmentation preference as a potential moderator of effects. Paper 2 and Paper 3 assessed short- and long-term effectiveness and mechanisms of the online training based on self-regulation for workers with FWD. Paper 3 also examined the role of baseline depression symptoms as a potential moderator of intervention effectiveness. Paper 4 compared the effectiveness of the online with a blended training format. Paper 5 evaluated the effectiveness of a team regulation intervention. The complete publications are provided in the Appendix.

Figure 4

Conceptual Model of Research Questions



Note. RQ = Research Question.

3 SUMMARY OF DISSERTATION STUDIES

In this chapter, I describe the design and structure of the self-regulation interventions, the research design used to evaluate them, and then summarize the five papers that formed the basis for this dissertation. For comprehensive descriptions of the studies, please refer to the full manuscripts in the Appendix. The aim of the five dissertation articles was to develop and evaluate self-regulation interventions to support workers in coping with challenges of FWD and to improve well-being, work–life balance, and recovery. Change trajectories and short- and long-term-effectiveness (Research Question 1) as well as mediating mechanisms (Research Question 2) and individual boundary conditions (Research Question 3) of the interventions were investigated. Furthermore, different training formats were compared (Research Question 4) and the individual and team level were addressed (Research Question 5). The interventions were developed based on psychological theories and empirically validated trainings. Self-regulation models (see Chapter 2.1) served as the overarching theoretical framework for intervention development. The selected exercises provide workers with activities to cope with challenges of FWD that have been shown to increase psychological detachment, satisfaction with work–life balance, and well-being (Althammer et al., 2021; Hahn et al., 2011; Michel et al., 2014; Rexroth et al., 2016; Rexroth et al., 2017; Steidle et al., 2017). Coaching and training techniques were adapted and integrated into the intervention design.

3.1 INTERVENTION DESIGN AND STRUCTURE

3.1.1 The Online Training Teaching Mindfulness as a Cognitive-Emotional Segmentation Strategy

This web-based training was developed to help workers disengage mentally and emotionally from work by practicing mindfulness as a cognitive-emotional segmentation strategy and thereby improving their work–life balance. Michel and colleagues originally developed the mindfulness-based intervention and have examined pre-post-intervention effects of this intervention on strain-based work–life conflict, psychological detachment, and satisfaction with work–life balance (Michel et al., 2014) and pre-post-follow-up-intervention

effects on emotional exhaustion, negative affect, and life satisfaction (Rexroth et al., 2017). They developed the intervention based on psychological theories such as the two-component model of mindfulness (Bishop et al., 2004) and boundary theory (Ashforth et al., 2000). Further, it draws on empirically validated mindfulness exercises related to mindfulness-based stress reduction (Kabat-Zinn, 1982, 2006), mindfulness-based cognitive therapy (Segal et al., 2002), and self-education mindfulness guides (Siegel, 2010; Weiss et al., 2010). Mindfulness practice allows for a more distinct segmentation between work and private life because by increasing awareness of immediate experiences and thus facilitating self-regulation, it allows individuals to consciously regulate unwanted thoughts and emotions (Brown & Ryan, 2003; Good et al., 2016), such as disengaging from work-related thoughts during leisure time.

The intervention included three modules. Each module consisted of two parts to be completed over the weekend (PART A and B) and a daily task to be practiced during the five workdays following the weekend. Part A provided participants with background information combined with practical exercises that lasted approximately 20 minutes. Part B was a practical exercise that took approximately 3 to 5 minutes to complete. The daily task was similar to Part B. Participants received information and instructions in a written format and could access audio files of the mindfulness exercises. We sent reminder e-mails at the beginning of each week and three text messages during the week to remind participants to complete daily questionnaires and to remind intervention group participants to practice daily tasks. Below, I describe the content of the online modules.

Overview of the Modules in the Mindfulness-Based Training

Module 1: *Reflecting on segmentation* taught participants about the role of detachment for health and well-being (Sonnetag, 2012) to create awareness of work-private life-segmentation. In PART A, participants learned what obstacles prevented detachment from work and that cause conflict between work and private life (Carlson & Frone, 2003). Participants reflected on how they usually mentally detached from work; what they found difficult, and what thoughts and reactions they experienced. In Part B, participants assessed their daily detachment and related thoughts, feelings, and actions. The daily task was to continue to reflect on how well they were able to detach from work each evening and to identify work-related thoughts, feelings, and actions during leisure time.

Module 2: *Mindfulness and being in the present moment* introduced and explained how mindfulness can serve as a cognitive-emotional segmentation strategy. In Part A, participants learned about mindfulness according to the two-component model of mindfulness (Bishop et al., 2004). It proposes that mindfulness requires (1) self-regulation of attention through

momentary observations of thoughts, feelings, and sensations, and (2) curiosity, openness, and acceptance of momentary experiences without elaborating on thoughts, feelings, and sensations. Focusing on the first mindfulness component, participants learned to self-regulate their attention by focusing on the here and now and disengaging from past- or future-related thoughts. Because focusing on the breath is one of the most successful ways to self-regulate attention (Kabat-Zinn, 2006), participants were guided through a 7-minute mindfulness breathing exercise. The audio instructed them to focus on their breathing and to bring their attention back to the breath when their mind wandered. They were then taught how to use this exercise to be present and disengage from work-related thoughts. In PART B, participants received a short version of the audio exercise, an adapted version of the 3-minute breathing space exercise (Segal et al., 2008). The daily task was to practice the 3-minute breathing exercise after work and when they noticed work-related thoughts during leisure time, to facilitate the transition from work to private life.

Module 3: *Mindfulness and coping with undesired thoughts and feelings* focused on the second component of mindfulness, a mindful orientation to experience, applied to disengage from work-related thoughts and emotions. In Part A, participants learned that thoughts are interpretations of reality and therefore not objective, and that emotions are consequences of evaluating these subjective interpretations (Segal et al., 2008). They were taught how to adopt a mindful orientation toward unwanted thoughts and emotions to gain distance from them. In Part B, participants received a 4-minute audio exercise that guided them to experience thoughts and emotions from an observer's perspective (Kabat-Zinn, 2006; Siegel, 2010). They received information on how mindfulness can help separate work from private life and manage work-related thoughts and emotions. The daily task was to continue practicing the 3-minute breathing exercise after work, and, in addition, to strive for mindful orientation to experiences.

3.1.2 The FlexAbility-Online Training

The web-based training was developed for workers with FWD who experience common challenges such as difficulties in separating work and private life, detaching and recovering from work, or organizing work. These key challenges were identified from the literature (see Chapter 1) and verified in a small target group analysis with four participants. In developing the training, we built on the mindfulness-based training. Although the latter was not designed specifically for workers with FWD, they may benefit from using mindfulness as a cognitive-emotional strategy; disengaging from work-related thoughts and emotions allows for a more distinct segmentation between boundaries, which is particularly important in the context of

FWD, when boundaries are more likely to blur. Therefore, the mindfulness-based training served as the basis for Module 3 in the training for workers with FWD.

Self-Regulation. Self-regulation served as the overarching framework for the intervention (Bandura, 1991; Kanfer et al., 2006; Zacher & Frese, 2018; Zimmerman, 2000). The training was designed as a multicomponent self-regulation training that empowers workers to cope with specific challenges of FWD. That is, the training enables them to attain their goals of improving their recovery, work–life balance, or well-being by teaching goal-directed activities that steer their thoughts, emotions, and actions toward their goals (Frese & Zapf, 1994; Zacher & Frese, 2018) and general self-regulation strategies to implement these goal-directed activities and facilitate behavior change (Michie et al., 2008).

On the one hand, the training teaches goal-directed activities workers engage in to achieve their goals of coping with challenges in the context of FWD (Kubicek et al., 2015; Mellner et al., 2015). To provide activities that address the various challenges faced by workers with FWD, we developed a toolkit of segmentation, mindfulness, work organization, and recovery activities. These encompass behavioral and cognitive-emotional segmentation strategies to manage boundaries between work and private life with, recovery strategies, and strategies to help organize the workday and stay focused at work. Goal-directed activities involve positive activities such as performing a ritual before starting work (behavioral segmentation strategies), practicing mindfulness (cognitive-emotional segmentation strategies), taking work breaks, practicing respite exercises, or spending leisure times in a recreative way (recovery strategies), and rewarding oneself for completing tasks (work organization strategies). As these activities direct thoughts, emotions, and actions toward a goal, they are also a form of self-regulation. The link between these activities and self-regulation has been discussed in the past: Boundary management and recovery (Zijlstra et al., 2014) as a form of self-regulation (Grawitch et al., 2010; Hirschi et al., 2019), mindfulness as serving a self-regulatory function (Brown & Ryan, 2003), work organization, stress management, and time management as requiring self-regulation (Aspinwall & Taylor, 1997; Oettingen et al., 2015). The selected exercises have been shown to increase well-being and work–life balance (Hahn et al., 2011; Michel et al., 2014; Rexroth et al., 2016; Rexroth et al., 2017; Steidle et al., 2017). Thus, training participants are encouraged to engage in several positive goal-directed activities to cope with specific challenges of FWD.

On the other hand, the training teaches general self-regulation strategies that enhance the ability to implement a goal-directed activity (i.e., goal setting, self-monitoring, self-evaluation, and self-reward), based on self-regulation process models. In each module,

participants learned about at least one general self-regulation strategy and applied it to implement a goal-directed activity in the context of FWD. As a strategy for goal setting and goal striving, we introduced mental contrasting with implementation intentions, a self-regulation strategy that reduces stress and increases work engagement (Gollwitzer et al., 2018). Participants practiced mental contrasting with implementation intentions in each module. Participants set goals for their overall training goals (Module 1) and their daily tasks (each module). Moreover, participants implemented general self-regulation strategies to improve their work organization and to conduct daily tasks (e.g., by planning self-rewards for practicing new exercises) in Module 4.

Person-Activity Fit. Participants were encouraged to continue engaging in activities that they found most helpful and matched their preferences and needs. The toolkit design can increase the person-activity fit, that is, the fit between person and activity characteristics, and is thus consistent the positive-activity model (Lyubomirsky & Layous, 2013). Research has shown that toolkit interventions that combine different positive activities can be effective (Hendriks et al., 2020; Michel et al., 2021; Pogrebtsova et al., 2022).

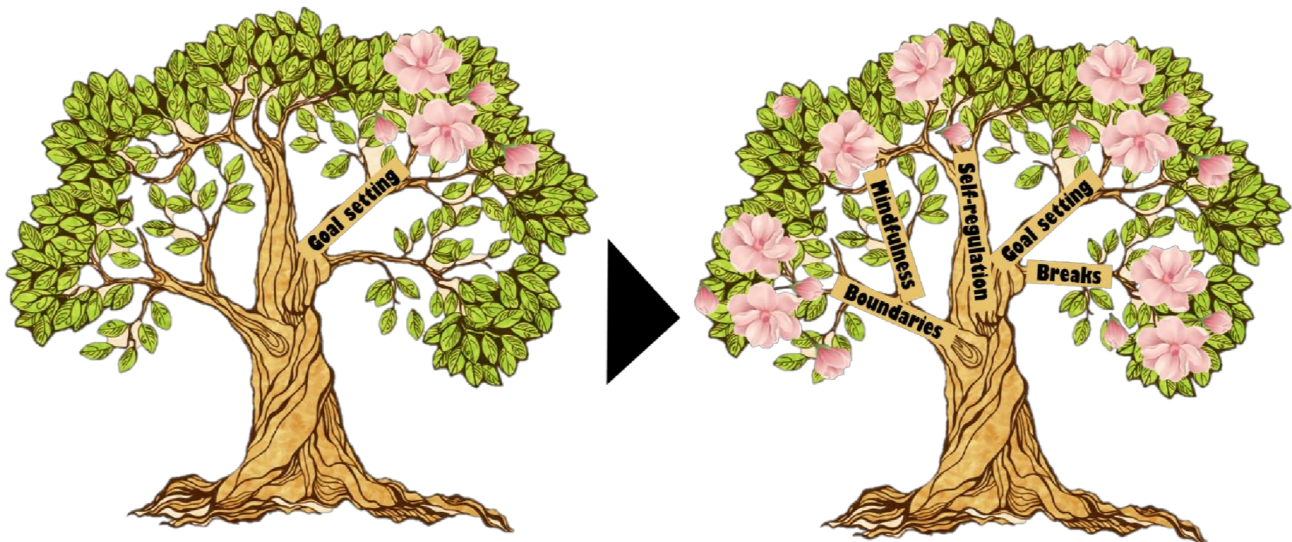
Learning Principles and Interactivity. Before developing the intervention, I interviewed 13 experts in the field of resource-oriented intervention research to gather experience values for both the instructional design and programming of a web-based training. We designed the training based on learning principles. To enable information processing and facilitate learning, we implemented various sensory modalities and interactive multimedia elements; the modules were a mix of input in the form of written explanations, audios explaining exercises, and videos of a trainer welcoming participants and explaining training content (Moreno, 2006). Welcome videos in each module were recorded with a professional moderator to create a sense of continuous guidance through the training. Audio files were professionally recorded. To promote the sensation of being in the moment, audio exercises began with a brief mindfulness component (Michel et al., 2014; Steidle et al., 2017). Further, interactive practical exercises required participants to self-reflect, write, or listen to guided imaginations.

To increase behavioral modeling, learning, and transfer, we developed four fictional characters who shared their experiences and provided examples of how they implemented the exercises (Burke & Hutchins, 2007; Moreno, 2006). We used gamification techniques (Hoffmann et al., 2017) to enhance training effectiveness (Johnson et al., 2016). Participants viewed an illustration of a tree that bloomed as they completed each module (Figure 5 shows a simplified, recreated representation of the blooming tree for copyright reasons). Blossoms indicated learning levels and served as a visual reward. They also reminded participants of their

resources in each module. At the beginning of each module, participants created a personal toolbox that they could access at any time, containing their favorite exercises from the previous week. Last, we chose a positive language that was oriented toward resources and strengths to activate participants' autonomy and competence and to promote positive experiences.

Figure 5

Recreation of the Blooming FlexAbility Tree



Note. This illustration has been designed using assets from Freepik.com.

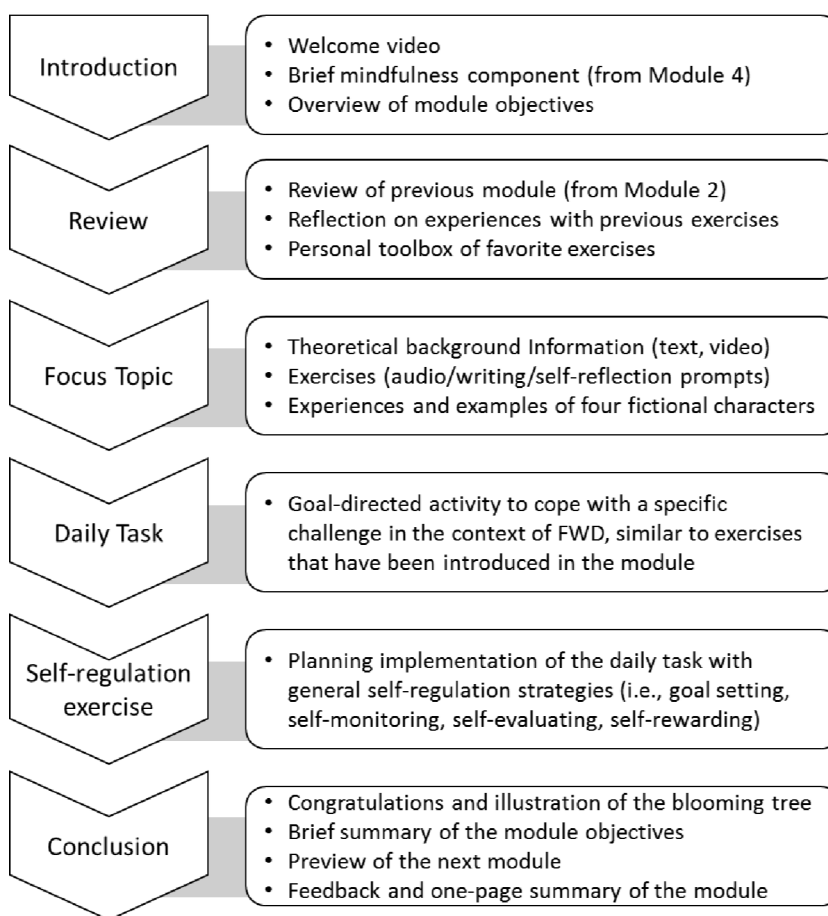
To facilitate the recognition of recurring elements in the module structure, such elements were illustrated with icons and photos. To increase the interactivity of the web-based content, we displayed participants' previous entries again in subsequent modules, and we included information or feedback that was provided depending on the participants' answer to a particular question. For example, at the beginning of Module 3, participants could choose to continue with their chosen strategies from the previous module, adjust their implementation of the strategy, or choose a different strategy, and corresponding text elements were then displayed.

Module Structure. The training consisted of six 45-minute online modules that were to be completed between Thursdays and Sundays each week for six weeks. Each module followed the same structure (see Figure 6). First, participants were introduced to the topic of the week and the objectives of the module were summarized. After a brief review of the previous module (except of course in Module 1), participants were asked how well they had integrated the exercises into their daily lives. Then, participants received theoretical background information, followed by self-reflection prompts and practical exercises. To stimulate active learning and enhance training transfer (Burke & Hutchins, 2007), participants were assigned a 5 to 10 minute task to perform on the five workdays following each module. To further facilitate task

engagement, we sent three e-mails or text messages each week reminding participants to perform daily tasks. Each module concluded with a self-regulatory exercise, such as setting a specific goal for the next week. Concluding each module was a summary of key learnings and the daily task, followed by a preview of the next module. Last, participants provided feedback to support further development of the training. We ensured accessibility of the online modules. The training was pilot-tested with the target group and revised after each study based on user feedback. In the following, I describe the content of the online modules.

Figure 6

Structure of Intervention Modules



Overview of Online Training Modules

Module 1: *Working flexibly – healthy and happy* started with a video introduction, followed by an overview of the aim and general information about training conduction. Two videos then explained the content and structure of the web-based training. Participants then reflected on a previous situation in which they had achieved a goal in a guided imagination to activate their personal resources and sense of competence for goal attainment. To increase motivation and goal commitment, they were asked to reflect on their reasons for participation

in a written exercise, by writing down desires for change and then formulating the most important one as their training goal (“By participating in this training, I want to achieve...”). They then wrote down their “good reasons” for achieving their goal (i.e., why they wanted to achieve that goal and why it was worth working on it). To further strengthen goal striving, participants reflected on their personal training motivation using mental contrasting with implementation intentions (Gollwitzer & Oettingen, 2013): They imagined outcomes of their goal in a guided imagination and wrote down the best outcome and associated thoughts and images. Next, they identified obstacles to their goal (i.e., be distracted from training participation), and wrote down a main obstacle and associated thoughts and images. Finally, they planned how to overcome these obstacles by thinking of coping strategies in a guided imagination, then formulating an “If-Then-Plan”. To ensure regular participation, participants set a specific, measurable, achievable, relevant, and time-bound (SMART) goal for working on modules each week (Doran, 1981). Last, to activate and focus on resources, participants reflected on strategies they had already used to cope with challenges of FWD. The **daily task** for the following workweek was an adapted version of the 54321 exercise (Dolan, 1991), in which participants were asked to focus on the moment when they were ruminating about work during leisure time. **Self-regulatory elements** in this module were mental contrasting with implementation intentions to set an overall training goal and a specific participation goal.

Module 2: *Finding personal balance* gave theoretical background in the context of FWD about conflict between work and nonwork roles (Greenhaus & Beutell, 1985), boundary theory, and the segmentation-integration continuum (Ashforth et al., 2000). Participants learned about establishing boundaries that align with segmentation preferences (Kossek & Lautsch, 2012), but also beneficial effects of segmentation on well-being and satisfaction with work–life balance, which is why integrators might also profit from segmentation strategies. Participants were then to reflect on their actual and preferred separation or integration between work and nonwork domains in a guided imagination. Then, behavioral segmentation strategies to separate work from nonwork were introduced with specific examples (similar to the training from Rexroth et al., 2016). Specifically, participants learned about physical, temporal, communicative, and technological boundary management tactics (Kreiner et al., 2009) and transition rituals (Ashforth et al., 2000). Participants could add additional segmentation strategies, and were then to select two segmentation strategies to apply in the following workweek as the **daily task**. A short optional audio exercise was offered to help overcome inner resistances toward separating work and private life more strongly. As a **self-regulatory element**, participants set a specific (SMART) goal regarding the implementation of their

segmentation strategies, and they practiced mental contrasting with implementation intentions to increase goal commitment (i.e., imagine outcomes and plan to overcome potential obstacles).

Module 3: *Switching off from work – setting boundaries* introduced mindfulness as a cognitive-emotional segmentation strategy, based on the mindfulness-based training developed by Michel et al. (2014). After an introduction to the significance of detaching from work during leisure time for health and well-being (e.g., Sonnentag, 2012), participants reflected on situations in the past week in which they had difficulties detaching. They then wrote down activities during which they forgot about work and, based on the recovery training from Hahn et al. (2011), rated how well they could detach during these activities. This exercise focused participants' attention to their innate ability to detach during certain activities and encouraged them to consciously engage in these activities. We then introduced the two-component model of mindfulness (Bishop et al., 2004) and described the positive effects of mindfulness on stress and well-being (e.g., Bartlett et al., 2019; Eby et al., 2019; Lomas et al., 2019; Virgili, 2015). First, we focused on self-regulation of attention, the first component of mindfulness. Participants were given an audio exercise to focus on their breathing, and to draw their attention back to their breath when their minds wanders (Kabat-Zinn, 2006; Segal et al., 2002; Weiss et al., 2010). This way, participants learned to distance themselves from work-related thoughts by turning attention to the current moment and away from past or future-orientated cognitions. Participants were encouraged to use mindfulness to consciously detach from work, including by being present in the moment during their daily routines. Second, we focused on mindful orientation to experience, the second component of mindfulness. After illustrating how events can evoke subjective views, an audio exercise showed how mindful orientation helps escape undesired work-related thoughts and feelings (Kabat-Zinn, 2006; Segal et al., 2002; Siegel, 2010; Weiss et al., 2010). As the **daily task**, we presented the adapted version (Michel et al., 2014) of the 3-minute breathing exercise (Segal et al., 2002; Weiss et al., 2010) to support the transition from work to private life and distance from work-related thoughts and feelings. As a **self-regulatory element**, participants set a specific goal when to practice the 3-minute exercise and practiced mental contrasting with implementation intentions.

In Module 4: *Staying focused – working concentrated*, participants applied general self-regulation strategies to organize daily work routines. Participants first performed the 3-minute breathing exercise (Michel et al., 2014) they had learned in the previous module because mindfulness helps focus on the present and promote openness to new experiences (Michel et al., 2021). This element was also included in Module 5 and Module 6. Participants were then introduced to the concept of self-regulation and its four key processes of self-regulation (see

Chapter 2.1): self-goal setting, self-monitoring, self-evaluation, and self-reward (Bandura, 1991; Kanfer et al., 2006; Zimmerman, 2000). They were reminded that setting specific goals and mental contrasting with implementation intentions are part of self-goal setting. Using the selection, optimization, and compensation model as a framework (Moghimi et al., 2017; Müller et al., 2016), participants learned about strategies to improve work organization, including strategies for selecting (e.g., setting daily goals, prioritizing goals), optimizing (e.g., reviewing and adjusting goals, avoiding interruptions), and compensating (e.g., seeking support from others, delegating tasks). They then wrote down aspects of their daily work organization that they would like to change. Based on this, they formulated a specific (SMART) goal for organizing their daily work, followed by imagining positive outcomes of achieving this goal and planning how to overcome potential obstacles (i.e., mental contrasting with implementation intentions). Participants were instructed on how to improve self-control when dealing with situations in which there are attractive alternatives to desired behaviors (e.g., avoiding conflicting situations, sharing goals, confronting long-term consequences). In addition to SMART goals and mental contrasting with implementation intentions, participants reflected on how to remind themselves of their goals as part of the goal setting phase. Then, participants were introduced to the steps of self-monitoring, self-evaluation, and self-reward. They learned about the concepts, collected ideas on how to implement them, and selected one idea to help them attain their self-set work organization goal. The latter was the **self-regulatory element** of this module. The **daily task** was to use self-regulation strategies (self-remind, self-monitor, self-evaluate, and self-reward) they had selected to improve their work organization.

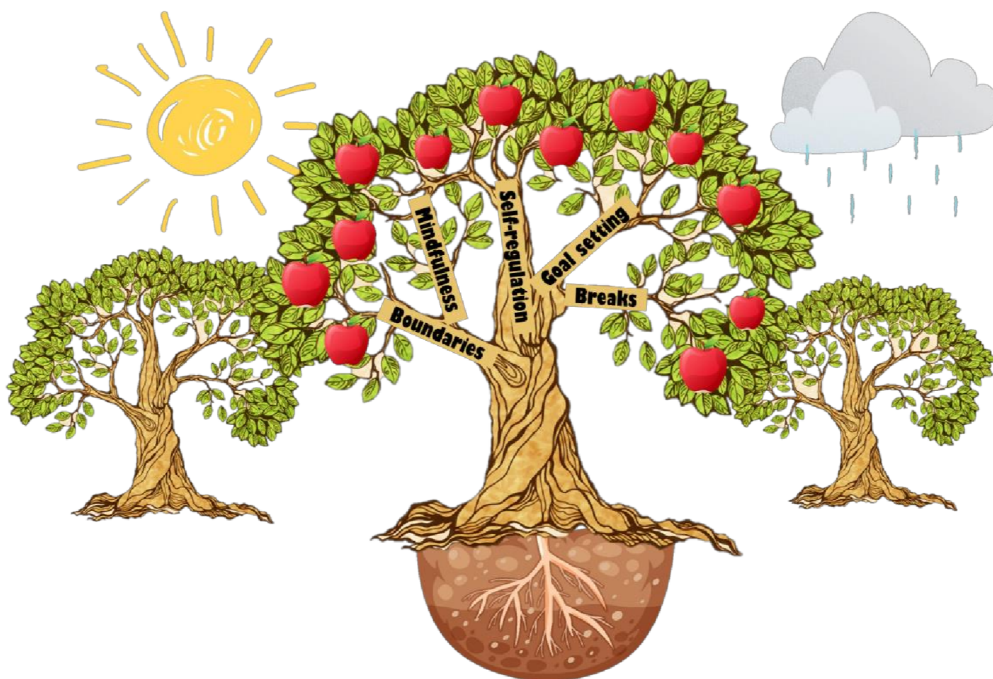
Module 5: *Looking after myself – everyday rest and recharge* focused on recovery and respite from work through rest periods in leisure time and work breaks (Hahn et al., 2011; Steidle et al., 2017). Participants learned about the concept of recovery, the importance of recovery during leisure time, and the risks of boundaryless working hours (Sonnentag & Fritz, 2007). They were introduced to the concept of recovery experiences (i.e., detachment, relaxation, mastery, and control). Similar to the training of Hahn et al. (2011), participants listed all of their leisure activities and then assigned them to recovery experiences. They were asked to intentionally engage in these activities over the next week. Next, participants learned about the importance of daily recovery during work breaks, particularly short breaks, and received suggestions for a recreative break. In a guided imagination, they reflected on past recreative work breaks and wrote down break activities that worked well for them. Participants performed a respite exercise of listening to a natural soundscape combined with a short mindfulness component, a guided imagination technique, and a savoring component (Steidle et

al., 2017). The daily practice of this exercise during work breaks was their **daily task**. As a **self-regulatory element**, participants again set a specific goal when to practice the respite exercise and applied mental contrasting with implementation intentions. Now that they knew the remaining steps in the self-regulation process, they planned how to remind themselves of their practicing goal and how to self-monitor, self-evaluate, and self-reward their progress.

In Module 6: *My strategies, my sources of strength* the previous modules and exercises were reviewed, leading to an appreciation of the tree in full bloom, symbolizing participants' learning progress. The change from blooms to apples was to symbolize that participants would soon reap the fruits of their labor (i.e., regularly practicing new activities) by feeling improvements in their daily lives. Participants reflected on what they had learned and what they had accomplished. This way, training content was repeated and reinforced to increase sustainability of training effects. Next, participants were introduced to the concept of resources and the relevance of retaining and building resources for achieving goals (Halbesleben et al., 2014; Hobfoll et al., 2018). Using the tree metaphor (see Figure 7 for a simplified, recreated representation of the final tree), they reflected on their personal and contextual resources (ten Brummelhuis & Bakker, 2012) that were beneficial for improving self-regulation in the FWD context: their personal resources (roots and soil), resources in their social environment (neighbor trees), in their job (sun), as well as material resources (cloud).

Figure 7

Recreation of the Final FlexAbility Tree



Note. This illustration has been designed using assets from Freepik.com.

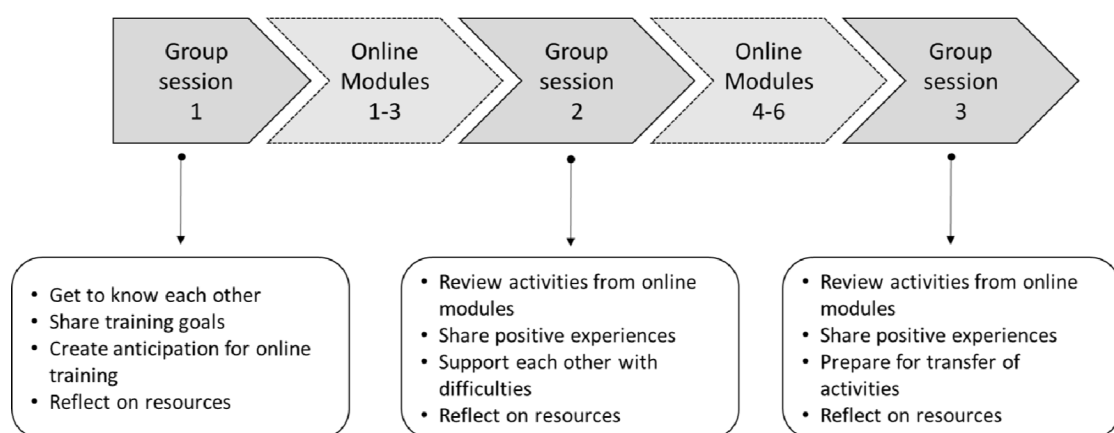
They then reflected on how to use and expand resources. Their **daily task** was to think about resources they would need in challenging situations, and then reflect on a previous situation in which they had successfully utilized that resource. In the first study, the daily task was to consciously use resources, but participants perceived this exercise as too abstract, so it was slightly modified for subsequent studies. As a **self-regulatory element**, participants were reminded that they could use their general self-regulation strategies to become aware of their resources (e.g., identifying resources through self-observation, reminding oneself of resources). Moreover, filling the tree with resources was to serve as a self-reward for training completion.

3.1.3 The FlexAbility-Blended Training

Blended training combines face-to-face with online self-learning elements, thus combining the virtues of face-to-face and online approaches while compensating for their disadvantages (Graham, 2006; Liu et al., 2016). The main shortcomings of online interventions are high and easy dropout and feelings of isolation (Lehr et al., 2016). Therefore, the blended training for workers with FWD aimed to address these shortcomings, and enhance social exchange as well as participant motivation and commitment. Participants were invited to attend three group sessions, in addition to conducting the individual self-regulation online training. The 3-hour videoconference group sessions took place on Thursdays or Fridays. Session 1 was right before the start of the online training, Session 2 was after Module 3, and Session 3 was after Module 6 (see Figure 8).

Figure 8

Course of Training Sessions of the FlexAbility Blended Training



Professional trainers facilitated group sessions. A member of the project team co-facilitated about half of the groups to ensure consistency across groups. Sessions adhered to a standardized procedure. Groups ranged in size from nine to 17 participants. Group sessions

were designed to promote group interaction and social support. Group, small group, learning partnership interactions were encouraged using group-based methods (e.g., group discussions, self-reflection on experiences with training strategies, sharing challenges with FWD). Learning partnerships were randomly assigned and consisted of three or four participants. To further increase mutual support, they were encouraged to share experiences between group sessions (i.e., guided peer coaching). Participants consolidated learnings of the online training (e.g., review of definitions and theoretical background, shared practice of exercises), but only previously established content was repeated in the group sessions to ensure comparability of training formats. This involved practicing self-regulation strategies in the context of the group sessions, for instance, using questions based on mental contrasting with implementation intentions in the second group session or sharing ideas for self-rewards with the group in the third group session. Based on the idea of optimizing person-activity fit (Lyubomirsky & Layous, 2013), group interactions gave participants the opportunity to explore aspects that were important to them in more depth. We supported participants' resource activation by reflecting on resources in each session, using the FlexAbility tree as a means of structuring personal and contextual resources (see Figure 7). Below, I describe the content of the group sessions.

Overview of Blended Training Sessions

The first group session was designed to invite participants to get to know each other, particularly in terms of mutual challenges in the FWD context, to become aware of their own goals for participation, and to build excitement about the online training. The sessions introduced the adapted version (Michel et al., 2014) of the 3-minute breathing exercise (Segal et al., 2002; Weiss et al., 2010) as a shared ritual for the beginning of each group session. Participants introduced themselves with their name, occupation, an object symbolizing an aspect of their experience with FWD, and their reasons for participating. This initiated social interaction and a sense of being part of the group. Then, content and structure of online modules and group sessions was outlined while summarizing common challenges related to FWD. As a small-group task, participants were to share their experiences with and desires for the individual, self-directed online training and for group sessions. During a break, participants were to think about what a good handling of their autonomy in FWD would entail. After an introduction to central concepts of the online training (i.e., self-regulation, resources), participants were randomly assigned to groups of three. These so-called learning partnerships were designed to increase mutual guidance and support and to maintain motivation. Participants talked about their challenges related to FWD, their resources and strengths in coping with FWD, and their motivation for the training and goals for the following weeks. They were instructed to

listen carefully to each other to facilitate the process of becoming acquainted, and to strengthen mutual appreciation as a social resource. In a second round, they agreed on the next steps for their exchange (e.g., frequency of communication, communication channels), before the general closing of the session.

The second group session aimed to revisit the activities of the first three online modules, giving participants an opportunity to reflect on positive experiences and to support each other in dealing with difficulties in implementing them in their daily work. The sessions started with a short review of Modules 1 to 3 combined with a short quiz. Participants talked in small groups about their positive experiences in the previous three weeks (e.g., small successes, helpful strategies, or resources within the online training, the learning partnership, or the social environment). In learning partnerships, they talked about aspects that were not yet effective. Using questions based on mental contrasting with implementation intentions, they gave advice to each other on how to overcome obstacles they had encountered. After reviewing the concept of mindfulness, groups practiced the body scan as a mindfulness exercise (Kabat-Zinn, 2006; Michel et al., 2014; Segal et al., 2002; Siegel, 2010; Weiss et al., 2010) and reflected on the experience with mindfulness exercises. After a recap of the segmentation-integration continuum, participants shared where they would place themselves on the continuum and why. Then, favorite segmentation strategies were collected. In learning partnerships, participants made agreements for the second half of the training (e.g., how to support each other, how often to meet), before the general closing of the session.

The third group session aimed to review the activities of the online modules, give participants an opportunity to reflect on positive experiences, and prepare them to apply what they had learned in everyday life. The sessions included all elements of the self-regulation process, as participants were now familiar with the phases. It began with a short quiz and review of Modules 4 to 6. In small groups, participants shared experiences, successes and helpful strategies or resources from the previous three weeks (self-monitoring and self-evaluation). After a review of the entire online training, participants shared their goals for the future (primary goal, strategies and resources to use more, potential obstacles and how to overcome them, planned self-rewards) to further facilitate transfer. Then, they gave each other feedback on their strengths and aspects they appreciated about each other. Finally, everyone shared an object that symbolized a reward for completing the online training (self-reward).

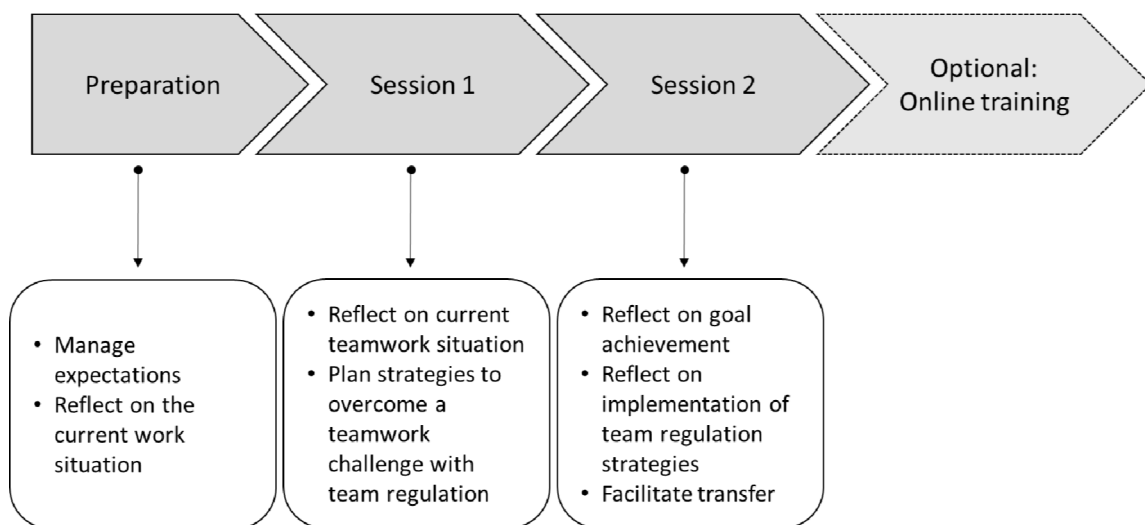
3.1.4 The FlexAbility-Team Workshop

We designed the workshop to promote team regulation strategies to help hybrid work teams improve their collaboration in the context of FWD. During the workshop, team members

and their supervisors agreed on one area of improvement regarding their collaboration in the context of FWD. To accomplish this change, they learned and practiced how to engage in team regulation strategies (team-goal setting, team-monitoring, team-evaluating, and team-rewarding) based on self-regulation process models (see Chapter 2.1) adapted to the team level. The team workshop comprised two sessions (see Figure 9): Session 1 was a 4-hour workshop in which teams were introduced to the concept of self- and team regulation, before teams gathered their views on current challenges for teamwork in the context of FWD and agreed on a team goal. Session 2 took place two to three weeks later as a booster session. That is, teams reviewed and evaluated their progress and room for improvement regarding their self-set team goal, and reflected on their team regulation strategies. Workshop sessions were standardized and facilitated by professional coaches. They communicated their role as facilitators to guide teams through the process. Eleven workshops were co-facilitated by a member of the project team to ensure consistency between both coaches and teams. Below, I describe the content of the workshop sessions.

Figure 9

Course of Workshop Sessions of the FlexAbility Team Workshop



Overview of Team Workshop Sessions

Prior to workshops, participants received a *preparatory document* aimed at familiarizing work teams with the challenges of FWD and encouraging them to reflect on how they, as individuals and as a team, have dealt with challenges of FWD. They were asked to reflect on individual and team strategies for addressing key challenges related to FWD (i.e., organizing work effectively, establishing boundaries between work and private life, detaching mentally from work, recovering during work breaks and leisure time). They were invited to reflect on

their individual and team situation regarding these challenges based on the previous working week, specifically, what went well, and what they would like to change. In addition, to manage expectations and get a first impression of the work teams' challenges in advance, coaches conducted semi-standardized *interviews with supervisors* prior to workshops, asking them about current working conditions in the organization and expectations for the intervention.

The *first workshop session* aimed to familiarize work teams with the team regulation process, to guide them to reflect on their current teamwork situation in the context of FWD, and to plan how they wanted to improve their collaboration with the help of regulation strategies in view of a selected challenge. The session began with a recap of opportunities and challenges of FWD and objectives of the workshop. Then, team members introduced themselves with their name, where they worked (i.e., at the office or remotely), what they appreciated about their work team, and what they expected from participating. In small groups, they listened to each other's positive experiences and challenges with FWD. This served as a starting point for identifying team issues later. Next, we introduced teams to the concept of self-regulation (Bandura, 1991; Kanfer & Karoly, 1972; Zimmerman, 2000), key self-regulation strategies, and how they can be adapted to the team level. Then, teams gathered aspects of teamwork that went well as well as challenges experienced by team members in the context of FWD. The first phase of goal setting then began with the identification of a key challenge, which we asked teams to consider as a challenge that was both realistic to work on until the booster session and also salient, that is, the behavior would be exhibited multiple times during that time. After teams selected the issue they wanted to work on, they set a SMART (Doran, 1981) team goal. To strengthen goal striving, they were introduced to mental using contrasting with implementation intentions (Gollwitzer & Oettingen, 2013). Afterwards, teams were divided into three groups to discuss how they would implement team regulation strategies. Team members discussed how the team would monitor (i.e., track and reflect on team behavior), evaluate (i.e., review progress), and reward (i.e., appreciate small steps, motivate and support each other) their progress toward their goal. Finally, team members presented their ideas to each other.

The *second workshop session* aimed to guide teams to reflect on the steps taken to achieve their goal, to reflect on the implementation of team regulation strategies, and to facilitate the use of the team-regulatory strategies for another goal. The session began with the adapted version of the 54321 exercise (Dolan, 1991) to focus on the beginning of the intervention. Team members reflected on and evaluated their progress toward the team goal since Session 1. We invited them to reward themselves with a virtual high five, whether they had achieved their goal or taken first steps toward it. They brainstormed additional measures to

achieve their goal, and reflected on whether any anticipated or unexpected obstacles had occurred. Then, team members reflected on their progress in team-monitoring, team-evaluating, and team-rewarding. Team members were divided into small groups in which they evaluated their implementation of the team regulation process (e.g., what was successful and helpful, what do we want to improve) and then gathered the results. Then, the importance of team-reward, that is, appreciating accomplishments for sustainable behavior change, was emphasized again. Participants were to think of ways to reward themselves as a team. Finally, before the session ended, teams chose a topic to find a new agreement for in the future.

3.2 RESEARCH DESIGN

To address the research questions (see Chapter 2.5), four randomized controlled trials were conducted. One randomized controlled trial was conducted in cooperation with Heidelberg University in fall 2013. Three randomized controlled trials were conducted as part of the research project “Intervention for health-promoting dealing with flexible forms of work regarding place and time of employees and teams in organizations” at the Federal Institute for Occupational Safety and Health (BAuA) between October 2020 and December 2022. **Study 1** was the basis for Paper 1, evaluating the effectiveness of the 3-week mindfulness-based online training teaching cognitive-emotional segmentation strategies. **Study 2** was the basis for Paper 2 and Paper 3, evaluating the effectiveness of the 6-week FlexAbility online training. **Study 3** was the basis for Paper 4, which evaluated differential effectiveness of the online and blended FlexAbility training. **Study 4** was the basis for Paper 5, evaluating the effectiveness of the FlexAbility team workshop. The ethics committee of the Federal Institute for Occupational Safety and Health (BAuA) granted ethical approval for intervention studies 2-4.

For **Study 1**, we recruited participants using snowball sampling, e-mail distribution lists, and flyers. For **Studies 2-4**, we additionally used newsletters, magazine articles, social media, and online professional networking sites, and approached networks of multipliers in companies, such as corporate health management. We promoted the studies as free self-trainings to use mindfulness as a strategy for disengaging from work and improving work–life balance (**Study 1**), to help workers cope with challenges of FWD (**Studies 2 and 3**), and as a free workshop for hybrid work teams (i.e., at least three people working together, some or all of whom have some spatial or temporal flexibility) to discuss their teamwork in the context of FWD and develop agreements for future teamwork (**Study 4**). To register for the study, participants were required

to sign an informed consent and data protection form after receiving information sheets on study participation and data protection.

In **Study 1** (Fall 2013), 379 participants were randomized into an intervention group and a waitlist control group. Participants completed a baseline questionnaire before the intervention group received the training. Participants in both groups were instructed to fill out daily questionnaires for three weeks. Subsequently, the control group received the intervention.

In **Study 2** (October 2020 to May 2021), 453 participants were randomized into an intervention group and a waitlist control group. In **Study 3** (January to December 2021), 575 participants were randomly allocated to a waitlist control group, an online training group, or a blended training group. Because of the resources required to deliver group sessions, one cohort (i.e., online training group, blended training group, control group) started in January 2021, and another cohort began in May 2021. In both studies, measurements were assessed before and after the intervention as well as four weeks and six months later. Participants completed a baseline questionnaire prior to random allocation. Intervention groups started training immediately after the baseline assessment. After six weeks, intervention groups had completed the training and participants in all groups received the post-intervention questionnaire. Four weeks later, they received the first follow-up questionnaire. Then, we gave the control group access to the training. We sent intervention participants a second follow-up questionnaire six months after they completed the intervention.

In **Study 4** (November 2021 to February 2023), 84 work teams were cluster-randomized into one of three groups of 28 teams each: two intervention groups and one control group. Participants in intervention groups received a baseline questionnaire three weeks prior to their team workshop. Teams received a preparation document one week before their workshop. Both intervention groups participated in the team workshop and then filled in the post-questionnaire. One intervention group received access to the online training immediately afterwards (IG1). They filled in follow-up-questionnaires when they completed the online training (i.e., six weeks later) and again six weeks later. The other intervention group first filled in one follow-up questionnaire (nine weeks later) and could then access the online training (IG2). The waitlist control group (CG) filled in the pre-, post-, and follow-up questionnaires, and then participated in the team workshop and received the online training. After completing the online training, IG2 and CG filled in a second follow-up-questionnaire.

For all studies, questionnaires were online and in German. We used a translation/back-translation procedure for items available only in other languages (Brislin, 1980; Graham & Naglieri, 2003). Unless otherwise stated, we asked participants to respond to items on a 5-point

Likert scale (1 = *strongly disagree*; 5 = *strongly agree*) referring to the previous two weeks. Participants in all studies were given two weeks to complete each questionnaire. Participants in all studies were unaware of their group assignment (i.e., single-blind). That is, they knew that groups would receive questionnaires and self-training instructions in different order (**Study 1**), that training would begin at different times (**Study 2**), that they would be randomly assigned to either online or blended training (**Study 3**), or that workshop and online training schedules might differ (**Study 4**). The methods sections of each article describe the measures and analysis strategies. All analyses were performed in R 4.1.0 (R Core Team, 2021).

3.3 PAPER 1: A MINDFULNESS INTERVENTION PROMOTING WORK–LIFE BALANCE: HOW SEGMENTATION PREFERENCE AFFECTS CHANGES IN DETACHMENT, WELL-BEING, AND WORK–LIFE BALANCE

Althammer, S. E., Reis, D., van der Beek, S., Beck, L., & Michel, A. (2021). A mindfulness intervention promoting work–life balance: How segmentation preference affects changes in detachment, well-being, and work–life balance. Journal of Occupational and Organizational Psychology, 94(2), 282-308. <https://doi.org/10.1111/joop.12346>

The aim of this paper was to evaluate daily effects of a 3-week online training teaching mindfulness as a cognitive-emotional segmentation strategy on psychological detachment, affective well-being, psychological and strain-based work–life conflict, and satisfaction with work–life balance. Integrating the positive-activity model with the boundary theory framework, we investigated how segmentation preference as an individual boundary condition influences change trajectories. In this paper, we demonstrate that the intervention improved psychological detachment, psychological work–family conflict, and work–life balance satisfaction, whereas it did not affect work–life conflict or affective well-being. Participants with low segmentation preference reported stronger intervention effects on psychological detachment.

3.3.1 Theoretical and Empirical Background

According to boundary theory, people create and maintain boundaries around their roles (Ashforth et al., 2000) and use segmentation strategies to manage their boundaries (Kreiner et

al., 2009). Behavioral segmentation strategies for separating life domains (Kreiner et al., 2009) may be insufficient for creating boundaries between work and private life. Thus, Michel et al. (2014) developed a mindfulness-based intervention and showed that it can help workers set cognitive-emotional boundaries, which can then help workers detach and improve aspects of the work–life interface (Michel et al., 2014; Rexroth et al., 2017).

Based on the two-component model of mindfulness (Bishop et al., 2004), the online training first brings participants' awareness back to the present when their attention turns to work-related worries, and second, teaches them to disengage from work-related thoughts (Bishop et al., 2004). That is, mindfulness facilitates self-regulation by increasing awareness of immediate experiences and allowing for conscious disengagement from work-related thoughts and emotions (Brown & Ryan, 2003; Good et al., 2016). Hence, training participation should increase psychological detachment, the "sense of being away from the work situation" (Etzion et al., 1998, p. 579):

Hypothesis 1: Psychological detachment will increase over time among the intervention group compared to the control group.

With mindfulness exercises, participants learn to focus on engagement in present roles and disengage from rumination after work. This should allow for the separation of work-related thoughts and emotions from private life, creating a more distinct boundary between these life domains (Ashforth et al., 2000). This should reduce psychological work–life conflict, describing mental distraction or preoccupation with one role while being physically present in another role (van Steenbergen et al., 2007, p. 280). It should facilitate the engagement in private life roles, and thus improve satisfaction with work–life balance. Participants also learn to shift perspectives regarding unpleasant thoughts and emotions. This should reduce strain-based conflict, that is, strain they experience in one role that then interferes with another role (Carlson et al., 2000, p. 250). The shift of perspectives should also help participants reduce negative thoughts and emotions. Hence, they should experience less negative affect.

Hypothesis 2: Psychological and strain-based work–life conflict will decrease over time among the intervention group compared to the control group.

Hypothesis 3: Satisfaction with work–life balance will increase over time among the intervention group compared to the control group.

Hypothesis 4: Negative affect will decrease over time among the intervention group compared to the control group.

The positive-activity model proposes that person characteristics influence the effectiveness of positive activities to improve well-being (Lyubomirsky & Layous, 2013).

Integrating this proposition with boundary theory (Ashforth et al., 2000), we assumed segmentation preference to affect changes trajectories. Based on assumptions derived from boundary theory and its person–environment fit perspective, segmenters might benefit more from the training because the segmentation strategies match their preference and, vice versa, integrators would learn strategies incongruent with their preference. Alternatively, integrators might benefit more from the training as they are likely to learn something new whereas segmenters might already practice the segmentation strategies. On the other hand, both segmenters and integrators might benefit from the training because it enforces segmentation of life domains, which has generally shown to have positive implications for detachment and well-being. Given these contradicting assumptions, we pose the following research question:

Research Question: Will intervention participants with low or high segmentation preference show stronger and more accelerated changes in (1) psychological detachment, (2) strain-based and psychological work–life conflict, (3) satisfaction with work–life balance, and (4) negative affect?

3.3.2 Methods

The intervention was evaluated with a randomized controlled trial (see Chapter 3.2). Daily questionnaires were administered to a final sample of 190 participants ($n_{IG} = 80$, $n_{CG} = 110$). *Segmentation preference* was assessed with three items from Kreiner (2006). *Mindfulness* was assessed with three items adapted from the German version (Michalak et al., 2008) of the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Participants rated all items on a 5-point frequency scale (1 = *rarely*; 5 = *almost always*). *Psychological detachment* from work was assessed with three items adapted from the respective subscale of the Recovery Experience Questionnaire (Sonnetag & Fritz, 2007). *Psychological work–life conflict* was assessed with three items adapted from van Steenbergen, Ellemers and Mooijaart (2007). *Strain-based work–life conflict* was measured with the 3-item subscale from the Work–Family Conflict Scale (Carlson et al., 2000), adapted to focus on private rather than family life. *Satisfaction with work–life balance* was measured with three items from the Satisfaction With Work–Family Balance Scale (Valcour, 2007), adapted to focus on private life, rated on a 5-point Likert scale (1 = *very dissatisfied*; 5 = *very satisfied*). *Negative affect* was assessed with three items adapted from the German version of the negative affect-scale (Krohne et al., 1996) taken from the Positive And Negative Affect Scale (PANAS; Watson et al., 1988).

Measurement occasions (Level 1) were nested within individuals (Level 2). First, we analyzed mindfulness changes across groups as a manipulation check. To test hypotheses, we computed growth curve models to analyze change trajectories. We first compared fits of a

linear, a quadratic, or a log-linear change trajectory. Then, we looked at the main effects of time and interaction effects of time and group variables. Last, we looked at the three-way interaction of group, time, and segmentation preference.

3.3.3 Results and Discussion

The intervention group reported significantly stronger increased mindfulness than the control group; hence, the intervention influenced daily mindfulness levels effectively. Growth curve analyses revealed that a log-linear trajectory fit best for all outcomes. This indicates that, rather than having continuous effects over time, the intervention affected detachment, work–life balance, and negative affect immediately after the intervention started, then having a slow but steady influence. Future research could detangle whether the content of the first module caused the strong acceleration, or whether other interventions, regardless of their content, would show similar effects.

As expected, change trajectories for the intervention group, compared to the control group, were steeper regarding psychological detachment, psychological work–life conflict, and satisfaction with work–life balance. That is, the training improved detachment from work, increased satisfaction with work–life balance, and decreased psychological conflict over time. This is in line with research showing that mindfulness training can help refrain from work-related thoughts and emotions (Haun et al., 2018; Hülshager et al., 2014; Michel et al., 2014; Querstret et al., 2017), which can improve satisfaction with work–life balance (Michel et al., 2014).

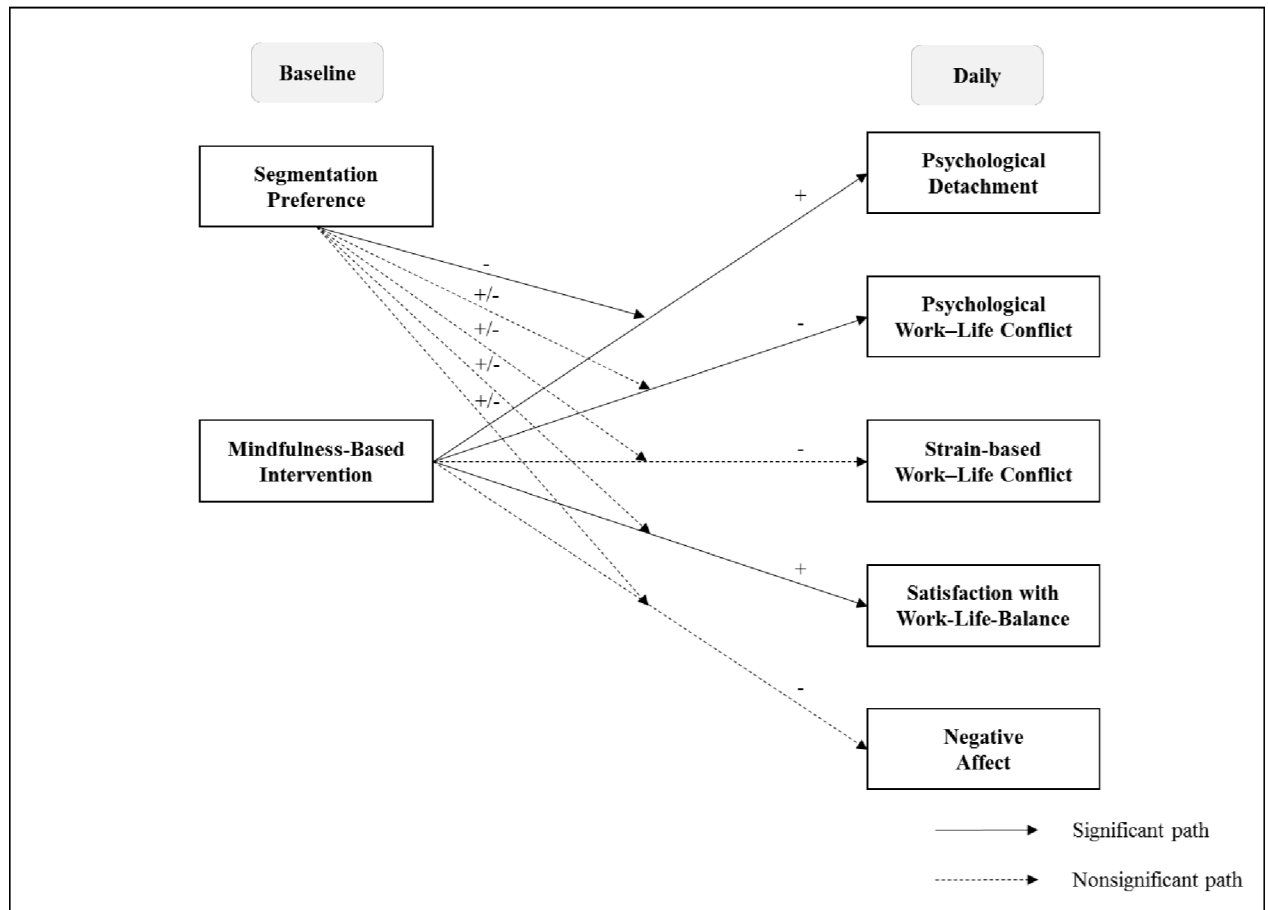
Unlike hypothesized, we found no training effects on strain-based work–life conflict or affective well-being. However, negative affect decreased over time in both groups. Potentially, study participation had a positive effect by itself because participants regularly answered questionnaires, thus, the control group was active. Reflection on and mental engagement with work–life and well-being issues may have been a mechanism for training effectiveness. This seems to be the case particularly for segmenters.

Segmentation preference moderated the intervention effect on psychological detachment such that participants with low segmentation preference reported stronger intervention effects. We found no support indicating a moderation effect of segmentation preference regarding changes in psychological or strain-based work–life conflict, satisfaction with work–life balance or negative affect. Both integrators and segmenters benefitted equally in psychological work–life conflict and satisfaction with work–life balance. Overall, the results demonstrate that the individual web-based intervention based on mindfulness is a helpful tool to facilitate cognitive and emotional segmentation between work and private life, which can

improve satisfaction with work–life balance, and can increase detachment from work, particularly for those with low segmentation preference. Figure 10 illustrates the proposed research model.

Figure 10

Proposed Research Model of Paper 1



3.4 PAPER 2: MEETING THE CHALLENGES OF FLEXIBLE WORK DESIGNS: EFFECTS OF AN INTERVENTION BASED ON SELF-REGULATION ON DETACHMENT, WELL-BEING, AND WORK–FAMILY CONFLICT

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). Meeting the Challenges of Flexible Work Designs: Effects of an Intervention Based on Self-Regulation on Detachment, Well-being, and Work–Family Conflict [Manuscript under review]. Journal of Organizational Behavior.

The aim of this paper was to evaluate a web-based training based on self-regulation to enable workers meet challenges of FWD. Self-regulation is essential to adapt to challenges of new working conditions in the context of FWD by shaping the workday. In this paper, we demonstrate that the intervention improved affective and work-related well-being (i.e., increased positive affect and work engagement) via changes in self-regulation. In addition, the intervention improved cognitive well-being (i.e., reduced stress) and reduced strain-based work–life conflict. Moreover, participants with low baseline levels of psychological detachment reported positive effects on psychological detachment. Effects persisted at the 4-week and 6-month follow-ups, with the exception of work engagement.

3.4.1 Theoretical and Empirical Background

FWD provide more opportunities but also requirements for self-regulation as people need to adapt to challenges of FWD by adjusting individual work routines (Allen et al., 2003; Kubicek et al., 2015; Mäkikangas et al., 2022; Müller & Niessen, 2019). Thus, self-regulation, the ability to steer thoughts, emotions, and actions toward a self-determined goal (Bandura, 1991), becomes an essential individual ability in the context of FWD as it is required to adjust and change behavior (Inzlicht et al., 2021; Michie et al., 2008).

To overcome specific challenges associated with recovery, work–life balance, and well-being that workers with FWD are likely to experience, workers may set goals to improve their recovery, work–life balance, or well-being (e.g., setting boundaries between work and private life more clearly, detaching mentally from work during rest periods, effectively organizing the workday to stay focused at work). People engage in goal-directed activities to attain these goals (Hirschi et al., 2019), such as boundary management strategies to achieve better work–life balance (Demerouti, 2023). To implement these goal-directed activities and facilitate behavior change, they need general self-regulation strategies (e.g., setting a goal when to implement a boundary management strategy). That is, applying general self-regulation strategies facilitates use of goal-directed activities that help participants cope with challenges of FWD.

Consequently, using self-regulation theory as the overarching theoretical framework to enable workers with FWD to attain their goals regarding their recovery, work–life balance, and well-being, we developed an intervention aimed at strengthening two aspects of self-regulation. It teaches general self-regulation strategies that facilitate the implementation of a goal-directed activity (i.e., goal setting, self-monitoring, self-evaluation, and self-reward) and goal-directed activities workers can engage in to attain their goals in the FWD context (e.g., segmentation strategies, respite exercises, mindfulness exercises). As these activities direct thoughts, emotions, and actions toward their goal, they are also a form of self-regulation. Combining

these aspects of self-regulation should enable workers with FWD to change their behavior toward their goals, and thus improve their recovery (i.e., increased psychological detachment), work–life balance (i.e., reduced work–life conflict), and affective, cognitive, and work-related well-being (i.e., increased positive affect, decreased stress, and increased work engagement). Self-regulation as a facilitator of behavior change should mediate intervention effects.

The training should help participants regulate their recovery periods by, first, teaching general self-regulation strategies. For example, setting goals for recovery helps adhere to work breaks and allows to redirect attention away from work-related goals during leisure time (Smit & Barber, 2016). Second, the intervention teaches different goal-directed activities that promote recovery experiences (Hahn et al., 2011), build up energy in self-conducted rest periods (Steidle et al., 2017), or help segmenting life domains (Kreiner et al., 2009). Hence, the training should help participants adhere to rest periods and focus on the present during leisure time, which should then promote psychological detachment, an essential recovery experience (i.e., a distinct off-job experience that is crucial for recovery) describing participants disengaging mentally from work and its stressors:

Hypothesis 1: After training, intervention participants report increased psychological detachment compared to control group participants.

Hypothesis 2: Self-regulation mediates intervention effects on psychological detachment.

The intervention teaches, first, general self-regulation strategies to regulate boundaries (e.g., self-monitoring segmentation behaviors). Second, the intervention teaches goal-directed activities to segment life domains (Kreiner et al., 2009; Michel et al., 2014). Training self-regulation should help participants manage their work–life boundaries in line with their preference for segmenting or integrating aspects of work and private life, which should reduce strain-based work–life conflict, that is, strain experienced in a work role intruding into and interfering with participation in a private role (Carlson et al., 2000; Greenhaus & Beutell, 1985):

Hypothesis 3: After training, intervention participants report decreased strain-based work–life conflict compared to control group participants.

Hypothesis 4: Self-regulation mediates intervention effects on strain-based work–life conflict.

The intervention teaches general self-regulation strategies to attain goals and goal-directed activities to cope with FWD challenges, which should improve well-being. Goal-directed activities for segmenting life domains and promoting recovery experiences can enhance well-being (Althammer et al., 2021; Hahn et al., 2011; Rexroth et al., 2017) and

prevent private life events from affecting energy levels at work (Bakker et al., 2019). Setting goals and progressing toward goals can improve affective and cognitive well-being (Carver & Scheier, 1990; MacLeod et al., 2008; Ouweneel et al., 2013; Welsh et al., 2020). Self-regulation is also related to work engagement (Weintraub et al., 2021; Wojdylo et al., 2017; Zeijen et al., 2018). As subjective well-being includes “emotional responses, domain satisfactions, and global judgments of life satisfaction” (Diener et al., 1999, p. 277), we focus on indicators of affective, cognitive, and work-related. Specifically, we evaluate effects on positive affect, an essential part of overall mental health (Bech et al., 2003), stress, occurring when the environment overtaxes resources (Larazus & Folkman, 1984), and work engagement a “positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli et al., 2002, p. 74):

Hypothesis 5: After training, intervention participants report a) increased positive affect, b) decreased stress, and c) increased work engagement compared to control group participants.

Hypothesis 6: Self-regulation mediates intervention effects on a) positive affect, b) stress, and c) work engagement.

3.4.2 Methods

The intervention was evaluated with a randomized controlled trial (see Chapter 3.2). The final sample after the training included 358 working adults ($n_{IG} = 147$; $n_{CG} = 211$). *Self-regulation* was assessed with 12 items of the German version (Andreßen & Konradt, 2007) of the revised self-leadership questionnaire (Houghton & Neck, 2002), adapted to focus on general work and private life goals. We used three items each from the subscales *Self-Goal Setting*, *Self-Observation*, *Self-Reward* and *Visualizing Successful Performance*. *Psychological detachment* was assessed with the 4-item subscale of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007). *Strain-based work–life conflict* was measured with the 3-item subscale from the Work–Family Conflict Scale (Carlson et al., 2000), adapted to focus on private rather than family life (Michel et al., 2014). *Positive affect* was measured with the WHO-5 Well-Being Index (WHO-5; Brähler et al., 2007). Participants rated all items on a 6-point frequency scale (1 = *at no time*; 6 = *all the time*). *Stress* was measured with four items from the Perceived Stress Scale (PSS-10; Cohen et al., 1983; Hahn et al., 2011), rated on a 5-point frequency scale (1 = *rarely or never*; 5 = *often or always*). *Work engagement* was assessed with the 9-item version of the Utrecht Work Engagement Scale (Schaufeli et al., 2006), rated on a 5-point frequency scale (1 = *rarely or never*; 5 = *often or always*).

To test hypotheses of intervention effectiveness, we conducted a multivariate analysis of covariance (ANCOVA) with the pre-post-sample, running additional robust ANCOVAs

when assumptions were violated. We conducted repeated measures analyses of variance (RM-ANOVA) with the intervention group of the pre-post follow-up sample to investigate stability of training effects. We used Bonferroni correction to account for Type I error (Field et al., 2012). We performed a mediation analysis with the pre-post follow-up sample to test mediation hypotheses, with baseline scores as covariates when predicting post-training scores of mediators and 4-week follow-up scores of outcomes. We used bootstrap confidence intervals for indirect effects (Hayes, 2017), with 10,000 resamples and 95% confidence intervals.

3.4.3 Results and Discussion

As a manipulation check, an ANCOVA revealed that after controlling for the respective baseline values, the intervention had significant main effects at post-training on self-regulation, confirming the successful training of self-regulation. Effects persisted over four weeks and six months. This indicates that teaching general self-regulation strategies based on self-regulation process models was effective (Bandura, 1991; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000).

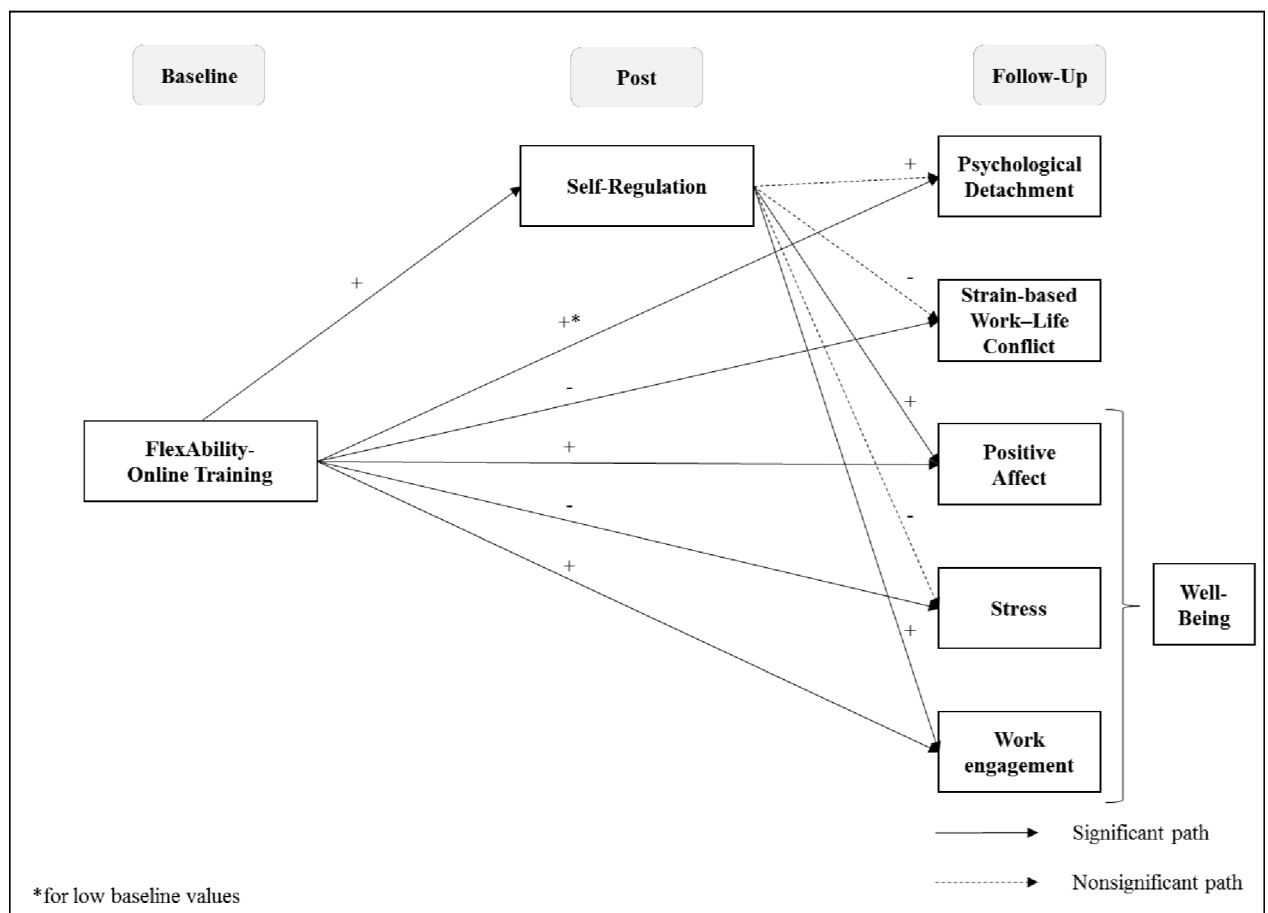
Testing intervention effectiveness, group had a significant multivariate main effect on all outcome variables. Separate ANCOVAs showed that after controlling for the respective baseline values, the intervention had significant main effects on post-training strain-based work–life conflict, positive affect, stress, and work engagement, with small effect sizes. As expected, the self-regulation intervention improved positive affect and work engagement, and reduced stress and strain-based work–life conflict. This indicates that combining training specific behaviors (i.e., goal-directed activities) and a determinant of behavior change (i.e., general self-regulation strategies) enabled participants to address FWD challenges related to work–life balance and well-being.

A robust ANCOVA revealed that, adjusted for the baseline values, groups significantly differed in post-training psychological detachment for low baseline scores of psychological detachment. Thus partially confirming our expectation, those with difficulties to detach from work and thus higher need to detach were more likely to derive training benefits regarding detachment, which confirms propositions regarding intervention effectiveness (Briner & Walshe, 2015). Consistent with expectations, the positive effects of the training persisted over four weeks and six months, however, there was no significant main effect for work engagement. Possibly, stable personal resources such as self-efficacy or resilience have a stronger influence on work engagement than self-regulation in the long term (Bakker & van Wingerden, 2021; Knight et al., 2017).

As hypothesized, the indirect effects of the intervention on positive affect and work engagement via self-regulation were significant. Self-regulation mediated intervention effects on affective (positive affect) and work-related (work engagement) well-being. However, we did not find significant indirect effects on psychological detachment, stress, and strain-based work–life conflict via self-regulation. Possibly, goal-directed activities had a direct effect on detachment, strain-based work–life conflict, and stress. Overall, the results demonstrate that the individual web-based intervention for workers with FWD based on self-regulation (i.e., goal-directed activities and general self-regulation strategies) is a helpful tool to address risks to recovery, well-being, and work–life balance. Figure 11 illustrates the proposed research model.

Figure 11

Proposed Research Model of Paper 2



3.5 PAPER 3: HOW POSITIVE ACTIVITIES SHAPE EMOTIONAL EXHAUSTION AND WORK–LIFE BALANCE: EFFECTS OF AN INTERVENTION VIA POSITIVE EMOTIONS AND BOUNDARY MANAGEMENT STRATEGIES

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). How Positive Activities Shape Emotional Exhaustion and Work–Life Balance: Effects of an Intervention via Positive Emotions and Boundary Management Strategies [Manuscript under review]. Occupational Health Science.

The aim of this paper was to evaluate a web-based self-regulation training that encourages participants to engage in positive activities applying the positive-activity model. The positive-activity model proposes how and for whom positive activity interventions work best. In this paper, we demonstrate that the intervention improved well-being, specifically, reduced emotional exhaustion and increased satisfaction with work–life balance, via changes in positive emotions and boundary management. The intervention appears to be effective regardless of participants' baseline levels of depressive symptoms.

3.5.1 Theoretical and Empirical Background

Positive activities are simple, intentional, and regular practices modeling thoughts and behaviors of happy people (Lyubomirsky & Layous, 2013) which require self-regulation (Lyubomirsky et al., 2005). The positive-activity model (Lyubomirsky & Layous, 2013) provides a framework explaining how positive activity interventions work: people can enhance their well-being through positive activities. Increases in positive emotions, thoughts, and behaviors, and need satisfaction mediate this relationship. Moreover, features of positive activities (e.g., variety, sequence, dose), person characteristics (e.g., efficacy beliefs), and person-activity fit (fit between person and activity characteristics) moderate this relationship.

Well-being includes affective and cognitive aspects (Diener et al., 1999). In this paper, we examined emotional exhaustion indicating the absence of affective well-being, and satisfaction with work–life balance as an aspect of cognitive well-being. Emotional exhaustion develops from persistent and intense cognitive, affective, or physical strain and is a dimension of burnout (Demerouti et al., 2002). Cognitive well-being comprises global judgements of life or domain satisfactions (Diener et al., 1999). In this paper, we focused on satisfaction with

work–life balance because this life domain is highly relevant in the context of FWD. People are satisfied with their work–life balance when they meet multiple demands of work and private life roles (Valcour, 2007).

Based on the positive-activity model’s assumption that people can enhance their well-being through positive activities, we expect positive activities in our intervention to help participants reduce their emotional exhaustion. In line with this, previous research has shown strategies of boundary management (Rexroth et al., 2017), recovery (Hahn et al., 2011), and self-regulation (Mrazek et al., 2021) to improve well-being (i.e., enhanced life satisfaction and reduced emotional exhaustion, negative affect, and stress). Because these strategies also help set boundaries between work and private life and experience less work–life conflicts, we expect satisfaction with work–life balance to improve (Binnewies et al., 2020; Michel et al., 2014).

Hypothesis 1: After training, intervention group participants will report a) reduced emotional exhaustion and b) increased satisfaction with their work–life balance, compared to control group participants.

Based on the positive-activity model’s assumption that positive activities stimulate increases in positive emotions, we expected participants to experience positive emotions when they implemented positive activities (e.g., organize their workday and boundaries in line with their own needs). Recovery (Througakos et al., 2008) and self-organization (e.g., task accomplishment or self-leadership; Sonnentag et al., 2018; Unsworth & Mason, 2012) can increase positive emotions, and boundary management interventions can reduce negative affect (Althammer et al., 2021; Rexroth et al., 2017).

Hypothesis 2: After training, intervention group participants will report increased positive emotions compared to control group participants.

Based on the positive-activity model’s assumption that positive activities also stimulate increases in positive behaviors, we expected participants to engage in more positive behaviors. Integrating boundary theory and the positive-activity model, we propose boundary management to be a positive behavior. We hypothesized that training strategies of boundary management, self-organization, and recovery would help participants manage their boundaries according to their segmentation preference.

Hypothesis 3: After training, intervention group participants will report increased boundary management compared to control group participants.

Based on the positive-activity model’s assumption that, amongst others, positive emotions and behaviors mediate the effect of positive activity interventions on well-being, we expected positive emotions and boundary management as a positive behavior to mediate

intervention effects on emotional exhaustion and satisfaction with work–life balance. The broaden-and-build theory (Fredrickson, 1998) can explain effects of positive emotions on well-being, stating that experiencing positive emotions broadens the array of thoughts and actions, helping people build personal resources. Over time, effects accumulate and trigger an upward spiral resulting in enhanced well-being (Fredrickson, 2001). The mediating role of positive emotions on well-being in positive activity interventions has been shown empirically (Meyers & van Woerkom, 2017). Moreover, training boundary management can improve well-being and work–life balance (Althammer et al., 2021; Binnewies et al., 2020; Michel et al., 2014).

Hypothesis 4: The intervention will affect a) emotional exhaustion and b) satisfaction with work–life balance through I) positive emotions and II) boundary management.

Based on the positive-activity model's assumption that, amongst others, person characteristics moderate the proposed relationship between positive activities and well-being, we investigated how depressive symptoms as baseline affective state would affect intervention effectiveness. There are two contrary theoretical arguments how baseline levels of depressive symptoms could affect intervention effectiveness: They might limit the energy or motivation people have to commit to an intervention, and people with depressive symptoms might feel discouraged of no immediate effects (Layous & Lyubomirsky, 2014), limiting or reversing intervention effectiveness. On the other hand, participants with higher levels of depressive symptoms might benefit more because they have more room to improve (Briner & Walshe, 2015; Lyubomirsky & Layous, 2013). Empirical evidence regarding this question is also mixed, showing positive activities to diminish well-being (Sin et al., 2011) or to be particularly helpful (Seligman et al., 2005; Sin & Lyubomirsky, 2009) for those with depressive symptoms.

Research Question: Will depressive symptoms moderate the indirect effect of the intervention on emotional exhaustion and satisfaction with work–life balance via positive emotions and boundary management?

3.5.2 Methods

The intervention was evaluated with a randomized controlled trial (see Chapter 3.2). The final sample four weeks after the training included 288 working adults ($n_{IG} = 105$; $n_{CG} = 183$). *Emotional exhaustion* was measured with four items from the exhaustion subscale of the Oldenburg Burnout Inventory (Demerouti et al., 2002). *Satisfaction with work–life balance* was assessed with four items from the Satisfaction with Work–Family Balance Scale (Valcour, 2007) that Michel et al. (2014) adapted to focus on private rather than family life. Participants answered on a 5-point scale (1 = *very dissatisfied*; 5 = *very satisfied*). *Positive emotions* were assessed with the German version (Rahm et al., 2017) of the SPANE (Scale of Positive and

Negative Experiences; Diener et al., 2010) to measure the frequency of positive emotions, rated on a 5-point frequency scale (1 = *rarely or never*; 5 = *often or always*) how often they had experienced positive emotions in the past two weeks. *Boundary management* was assessed with three items (Rexroth et al., 2017). *Depressive symptoms* were assessed with the German version (Löwe et al., 2005) of the Patient Health Questionnaire (PHQ-2; Kroenke et al., 2003). The PHQ-2 inquires about frequency of depressed mood and anhedonia over the past two weeks and can be a depression screening. Participant rated the items on a 4-point frequency scale (0 = *not at all*, 3 = *nearly every day*).

We conducted univariate mixed ANOVAs with time as the within-subjects factor and group membership as the between-subjects factor, using Bonferroni correction to account for Type I error (Field et al., 2012). We performed a mediation analysis to examine the indirect effect via post-training positive emotions and boundary management on emotional exhaustion and satisfaction with work–life balance at 4-week follow-up. For the mediation and moderated mediation analyses, we estimated conditional indirect effects (Hayes, 2017) and bias-corrected 95% confidence intervals from 10,000 bootstrapped samples, standardized all variables, and included baseline scores of the respective variables as covariates (i.e., ANCOVA model; Valente & MacKinnon, 2017). We examined how the conditional indirect effects changed under the condition of low and high (i.e., one standard deviation below and above the variable’s mean score) moderator levels (Preacher et al., 2007).

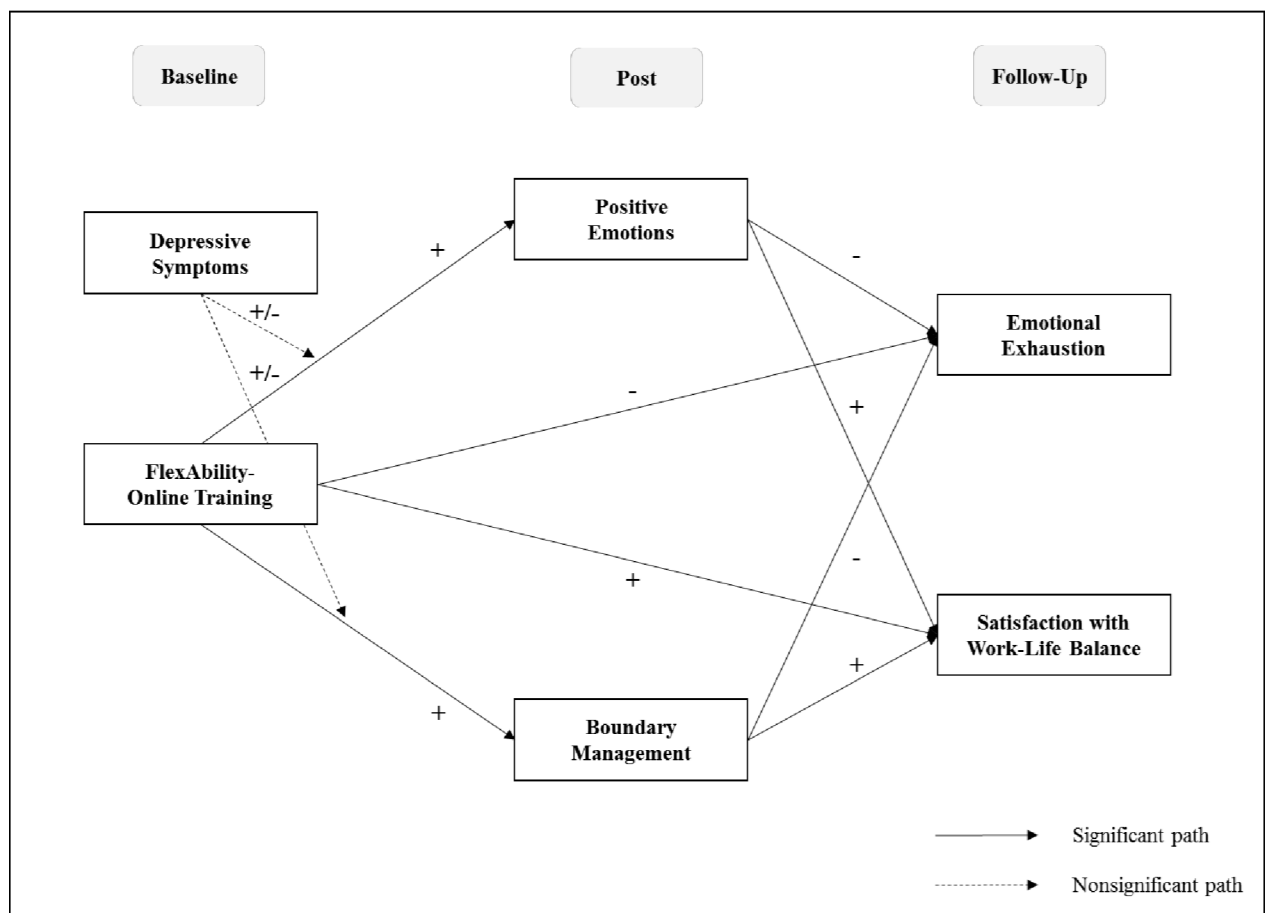
3.5.3 Results and Discussion

Mixed ANOVAs revealed a significant group x time interaction for emotional exhaustion and satisfaction with work–life balance, as well as for positive emotions and boundary management. That is, conducting the training and its positive activities stimulated positive emotions and fostered boundary management as a positive behavior. Moreover, training participation reduced emotional exhaustion and increased satisfaction with work–life balance. The stimulation of positive emotions should be transferable to any positive activity intervention, whereas we would only expect interventions such as ours that focus on strategies of segmentation to increase boundary management. The mediation analysis demonstrated significant indirect effects of the intervention on emotional exhaustion and satisfaction with work–life balance through positive emotions and boundary management. Thus, beneficial changes in positive emotions and boundary management as a positive behavior can explain intervention effects on well-being, specifically, reduced emotional exhaustion and increased satisfaction with work–life balance.

The moderated mediation analysis revealed no interaction between intervention group and baseline level of depressive symptoms, neither for emotional exhaustion nor for satisfaction with work–life balance. Conditional indirect effects were significantly different from zero when baseline levels of depressive symptoms were moderate or high but not when they were low. However, moderated mediation indexes were not significant. Thus, baseline levels of depressive symptoms did not moderate intervention effectiveness. Participants can benefit from the intervention regardless of their baseline level of depressive symptoms. We cautiously interpret the significant conditional indirect effects as a tendency that the intervention may have been particularly beneficial for those with more depressive symptoms at baseline. As the mean score for the depressive symptoms measure was below the cut-off score for depression screening purposes, our sample mainly included participants who would not screen positive for depression. A sample with more variance in baseline depression screening scores could yield different results. Overall, the results confirm that the individual web-based intervention for workers with FWD is effective in reducing exhaustion and increasing satisfaction with work–life balance. Figure 12 illustrates the proposed research model.

Figure 12

Proposed Research Model of Paper 3



3.6 PAPER 4: ONLINE AND BLENDED TRAINING: SAME SAME BUT DIFFERENT? A RANDOMIZED CONTROLLED TRIAL COMPARING TRAINING FORMATS TO MEET THE CHALLENGES OF FLEXIBLE WORK DESIGNS

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). Online and Blended Training: Same Same but Different? A Randomized Controlled Trial Comparing Training Formats to Meet the Challenges of Flexible Work Designs [Manuscript under review]. Journal of Medical Internet Research.

The aim of this paper was, first, to replicate findings regarding the effectiveness of an online self-regulation training for workers with FWD. Second, it compared the effectiveness of the online training format with a blended training format, combining online self-training and face-to-face elements (Graham, 2006; Lehr et al., 2016), by offering videoconferencing group sessions in addition to the online modules. In this paper, we demonstrate that both training formats improved psychological detachment, satisfaction with work–life balance, and well-being after training and four weeks later. The intervention appears to be effective regardless of the training format, as group sessions did not further increase training effectiveness. However, group sessions in addition to the online modules increased social exchange, 4-week post-training adherence, and training compliance.

3.6.1 Theoretical and Empirical Background

Similar to the argumentation in Paper 4, engaging in goal-directed activities and general self-regulation strategies should allow workers to experience psychological detachment, an essential recovery experience (i.e., an off-job experience that is crucial for recovery) in which participants mentally disengage from work and its stressors (Sonnentag & Fritz, 2007). The intervention strategies should also facilitate management of boundaries, which should increase satisfaction with work–life balance. Workers are satisfied with their work–life balance when they can meet the multiple demands of work and private life roles (Valcour, 2007). This should also improve their well-being, a broad category including “emotional responses, domain satisfactions, and global judgments of life satisfaction” (Diener et al., 1999, p. 277).

Hypothesis 1: After training, participants of both intervention groups report increased a) psychological detachment, b) satisfaction with work–life balance, and c) well-being, compared to control group participants.

We expected group sessions to increase motivation to engage in the training, thus improving training effectiveness. Self-determination theory (Ryan & Deci, 2000) proposes that people are more or less intrinsically motivated (i.e., self-determined) to engage in particular behaviors (e.g., training exercises). The satisfaction of basic psychological needs (i.e., competence, autonomy and relatedness) facilitates intrinsic motivation (Ryan & Deci, 2017). As the additional group sessions satisfy the need for relatedness, whereas the online training can only satisfy needs for competence and autonomy, intrinsic motivation to conduct training exercises should be higher among blended training participants, resulting in higher compliance.

Hypothesis 2: Adherence and compliance rates will be higher for blended training participants compared to online training participants.

Moreover, we expected strengthened social support as a contextual resource (ten Brummelhuis & Bakker, 2012) to improve training effectiveness because social support can improve training transfer and immediate and long-term benefits of training (Grossman & Salas, 2011; Lehr et al., 2016). Based on social identity theory, the sense of belonging to a group, that is, a shared social identity, can strengthen social support, resulting in improved health and well-being (Haslam et al., 2019; Nielsen, 2013). Empirical evidence for these theoretical assumptions is scarce because the majority of previous research has compared blended or online versus face-to-face conditions or has focused on specific workplace settings (e.g., Dunleavy et al., 2019; Nortvig et al., 2018; Vallée et al., 2020). A meta-analysis has shown blended training for health professions to be more effective than non-blended training alone (Liu et al., 2016). Shared team participation in an intervention can improve occupational self-efficacy (Füllemann et al., 2015), and occupational online interventions with guidance can improve mental health (Phillips et al., 2019). In educational research, learning in small groups can increase students' motivation and achievements (Keramati & Gillies, 2022). Sharing of mutual support and experiential knowledge in self-help support groups can help people change their behavior (Brown et al., 2014). Thus, we expected the blended training to be more effective than the online training:

Hypothesis 3: After training, blended training participants will report a higher increase in a) psychological detachment, b) satisfaction with work–life balance, and c) well-being than online training participants.

3.6.2 Methods

The intervention was evaluated with a randomized controlled trial (see Chapter 3.2). Because group sessions were scheduled, complete randomization was not feasible. It would likely have resulted in higher attrition, as participants assigned to specific group sessions may not have had time to attend. Therefore, participants indicated their time preferences during registration. Participants who could not attend any available group sessions date were randomized between the online training group and the waitlist control group.

The final sample included 373 participants ($n_{IG\ Online} = 107$; $n_{IG\ Blended} = 129$; $n_{CG} = 137$). *Psychological detachment* from work was assessed with the 4-item subscale of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007). *Satisfaction with work–life balance* was assessed with four items from the Satisfaction with Work–Family Balance Scale (Valcour, 2007) that Michel et al. (2014) adapted to focus on private rather than family life. *Positive affective well-being* was measured with the WHO-5 Well-Being Index (WHO-5; Brähler et al., 2007). Participants rated items on a 6-point frequency scale (1 = *at no time*; 6 = *all the time*). *Learning about strategies*. As a manipulation check for the intervention, we developed a 5-item scale to assess learning about strategies to cope with FWD². We asked participants whether they had learned anything about strategies to cope with challenges of FWD during the previous six weeks. *Social exchange*. As a manipulation check for the blended training, we assessed *Experiential Knowledge Provided* and *Emotional Support Received* with the respective 3-item subscales of the Self-Help Support Group Social Exchange Scales (Brown et al., 2014), adapted to focus on the context of FWD. Items were rated on a 5-point frequency scale (1 = *rarely or never*; 5 = *often or always*). We performed logistic regressions to analyze effects of group membership on the likelihood that participants would drop out and be compliant, and performed multilevel regression analyses with measurement occasions (Level 1) nested within participants (Level 2) to evaluate intervention effectiveness.

3.6.3 Results and Discussion

Both intervention groups had learned strategies to cope with challenges of FWD, confirming the successful manipulation of the intervention: ANOVAs showed that intervention groups differed from the control group, and online and blended training groups were similar. As expected, multilevel analyses confirmed the overall effectiveness of the training approach. There was a significant intervention effect (i.e., group_{interventions vs control} x time interaction) at

² Following the argument of Hahn et al. (2011), participants are not to adopt specific behaviors in this training, but rather encouraged to identify and choose strategies that they find helpful. Hence, general questions seem appropriate as participants could show a wide range of different behaviors after training.

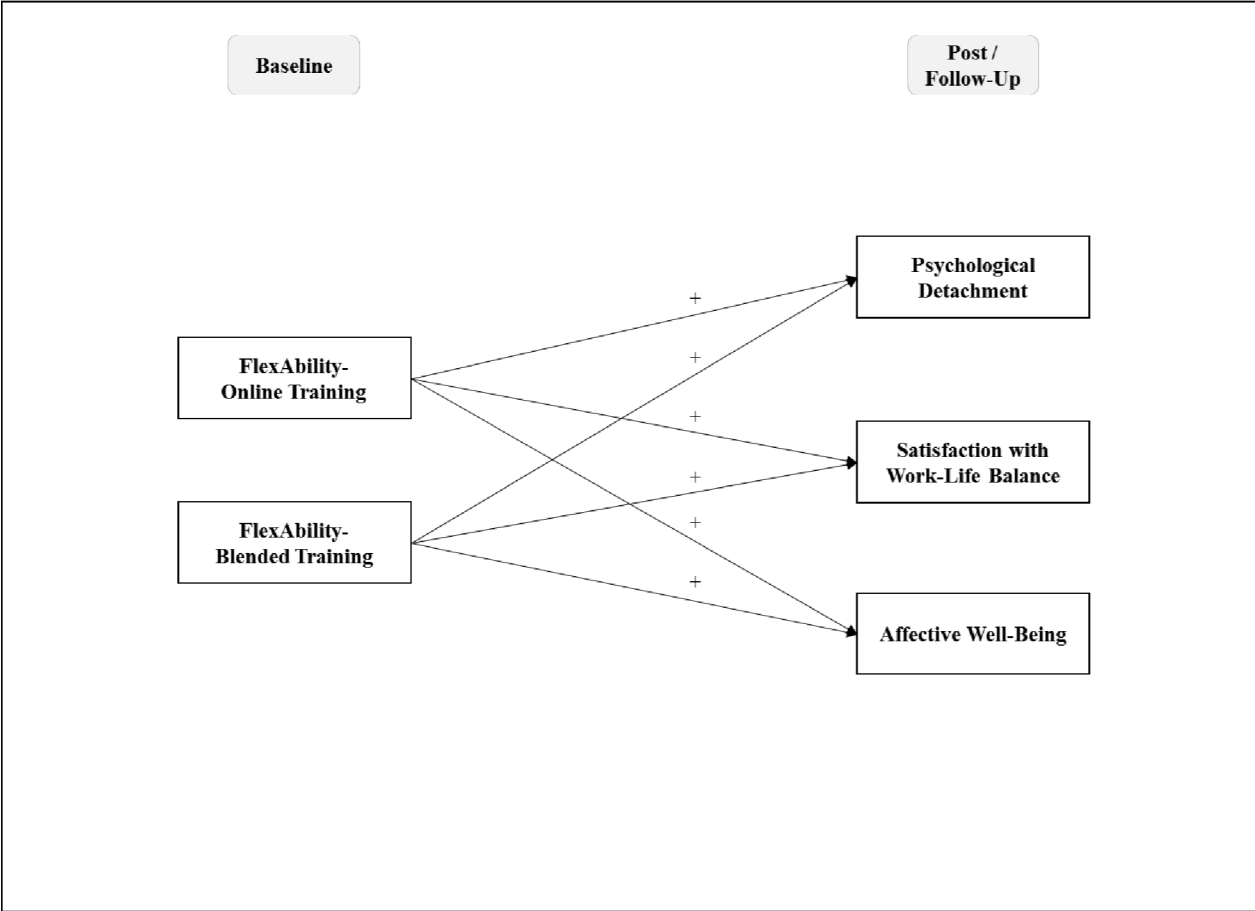
post-training and at the 4-week-follow-up for psychological detachment, satisfaction with work–life balance, and well-being. Thus, both training formats improved said outcomes compared to a control group. This confirms that the training approach in general offers strategies that help workers cope with challenges of FWD.

Dropout of participants was similar between intervention groups post-training and at the 6-month-follow-up. At the 4-week-follow-up, online training participants were twice as likely as blended training participants to drop out. Moreover, blended training participants were 17 times more likely to be compliant than online training participants. This implies that interacting with peers during group sessions in addition to the online modules strengthened motivation and commitment of participants. This is consistent with the assumption based on self-determination theory that satisfying relatedness as a basic need can increase intrinsic motivation. In line with the theorizing that social influence of a group can affect commitment and motivation (Salancik & Pfeffer, 1978), participants may have felt social pressure to continue training because they anticipated to discuss exercises with their group. Moreover, those with a sense of belonging are more likely to coordinate with others' goal pursuit (Fishbach et al., 2016). Blended training participants reported more social exchange (i.e., sharing of experiential knowledge and emotional support), affirming the manipulation of training formats. ANOVAs showed that blended training participants differed significantly from both control group and online training participants regarding social exchange. This is also in line with the assumption based on social identity theory that group interactions would increase social exchange.

Unlike expected, multilevel analyses revealed that intervention effects did not differ between intervention groups at post-training and at the 4-week-follow-up (i.e., group *blended vs online* X time interaction). Blended training participants did not profit more from the intervention than online training participants regarding psychological detachment, satisfaction with work–life balance, and well-being. These findings are inconsistent with assumptions based on social identity theory that increased social exchange should improve training effectiveness. One explanation for these unexpected results is a selection effect: In the blended training, participants may have felt committed to continuing training even if they did not find it suitable for them; online training participants who did not find the training helpful may have been more likely to drop out if they did not find the training helpful. Hence, intervention effects could be biased. Some studies have found similar results, with no differences between online and blended training formats (Martin et al., 2018) or between distance education and face-to-face instruction compared to distance education (Bernard et al., 2009). Nevertheless, as there is limited and inconclusive evidence on this matter, this is an area in need of research attention.

An analysis of the main effect of time at the 6-month-follow-up revealed long-term intervention effects for both interventions groups regarding psychological detachment, but not regarding satisfaction with work–life balance and well-being. Psychological detachment and well-being did not differ between intervention groups. Blended training participants were more satisfied with their work–life balance at the 6-month-follow-up. However, these long-term effects vanished when we excluded those from analyses who reported only rudimentary or no compliance to training modules or practiced daily tasks fewer than two days per week as a robustness check. We also explored whether social support at baseline would moderate training effectiveness, which was not the case. Overall, the online self-regulation intervention can help workers cope with the specific challenges of FWD, and group sessions that accompany the online training can increase social exchange and training compliance. Figure 13 illustrates the proposed research model.

Figure 13
Proposed Research Model of Paper 4



3.7 PAPER 5: THE EFFECTIVENESS OF A TEAM COACHING TO ENHANCE TEAM REGULATION IN HYBRID TEAMS: A RANDOMIZED CONTROLLED TRIAL

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). The Effectiveness of a Team Coaching to Enhance Team Regulation in Hybrid Teams: A Randomized Controlled Trial [Manuscript under review]. Journal of Occupational and Organizational Psychology.

The aim of this paper was to evaluate a team regulation intervention consisting of a two-session workshop for hybrid work teams that instructed teams to engage in team regulation strategies (e.g., team-goal setting) regarding hybrid team collaboration. Team regulation is an important resource for coping with demands of FWD because it helps work teams invest and manage their resources effectively, thereby facilitating the attainment of collective goals. In this paper, we demonstrate that the intervention improved team regulation, which increased team resources such as social support and psychological safety, and improved how teams perceived their collaboration in terms of psychosocial management of FWD.

3.7.1 Theoretical and Empirical Background

As FWD proliferate, many work teams are working together both virtually and face-to-face. These hybrid work teams need to adapt to changing demands of FWD by finding new ways to organize their work and communication to achieve team collaboration goals (e.g., ways to conduct hybrid or virtual meetings, coordinating each other's availability, dealing with social isolation). Thus team regulation, the ability of teams to steer team-level actions to achieve collective team goals (Chen & Kanfer, 2006; van Hooft & van Mierlo, 2018), becomes an important resource for teams because it enables them to successfully adapt to changes (Inzlicht et al., 2021) and shape how they aim to work together. That is, work teams generate and attain collective goals by coordinated activities of team members. Processes of individual and team-level regulation have been proposed to be related (DeShon et al., 2004; Dierdorff & Ellington, 2012; Panadero et al., 2015) and to be functionally similar (Chen & Kanfer, 2006). Corresponding to process models of self-regulation (see 2.1), we propose that teams engage in team-regulatory strategies of team-goal setting, team-monitoring, team-evaluating, and team-rewarding to achieve collective goals. Analogous to interventions that aim to train individual self-regulation with self-regulation strategies (Ebner et al., 2018; Marques-Quinteiro et al.,

2019; Mrazek et al., 2021), we expect the team intervention, that promotes team regulation strategies, to enhance team regulation:

Hypothesis 1: Participants of the team coaching will report more team regulation compared to participants in the control group.

We investigated whether team regulation is conceptually distinct from the aggregated self-regulation of team members (i.e., averaged individual-level self-regulation within a team). In other words (cf. van Hooft & van Mierlo, 2018), whether team regulation refers to self-regulation of teams (i.e., team-level regulation) rather than aggregated self-regulation in teams:

Research Question: Will the evaluation yield similar results for aggregated self-regulation as for team regulation?

The implementation of team regulation strategies (e.g., communicating expectations for collaboration in the context of FWD and setting goals for improving collaborative working practices, tracking and reviewing progress toward goals, acknowledging goal attainment) should improve FWD-specific social support, psychological safety, and psychosocial management of FWD. This would also be consistent with conservation of resources theory (see Chapter 2.3). As team regulation facilitates teams' goal attainment and helps them invest and manage their resources efficiently, we propose that it is a resource, defined as anything perceived as helpful in achieving resources and goals (Halbesleben et al., 2014; Hobfoll, 1989). Based on conservation of resources theory's upward spiral, training team regulation as a resource should foster the building of additional resources such as FWD-specific social support and psychological safety, and thus facilitate how work teams organize their work and collaborate. That is, as teams agree on collective goals and strategies to work toward them (i.e., enhanced team regulation), it may foster an environment in which team members support each other and feel psychologically safe to share their experiences, which will improve collaboration (indicated by awareness and ability to manage issues related to psychosocial aspects of FWD).

Work social support describes the extent to which workers perceive through social interactions or provision of resources that supervisors and colleagues care about their well-being, and is experienced in general or in a specific context (French et al., 2018; Kossek et al., 2011; ten Brummelhuis & Bakker, 2012). It can help workers cope with FWD challenges such as social isolation (Wang et al., 2021). We examine FWD-specific support, the perception that supervisors and colleagues care about whether collaboration in the FWD context is experienced positively. This includes whether workers feel they receive help from colleagues and supervisors in working together in the FWD context (*social support*), whether they share personal FWD challenges with others (*experiential knowledge provided*), and whether they feel

that others listen to them about how to manage work in the FWD context (*emotional support received*). Based on social identity theory, a shared identity and the sense of belonging to a group can strengthen social support (Haslam et al., 2019). As team members participate in the intervention together and strive toward a collective goal, mutual social support should increase (Haslam et al., 2019; Nielsen, 2013):

Hypothesis 2: Participants of the team intervention will report more FWD-specific social support compared to participants in the control group.

Psychological safety describes the shared belief that a work team is safe for interpersonal risk taking (Edmondson, 1999). Clear communication of expectations and goals can increase understanding what team members should be doing, thus leading to increased psychological safety (Frazier et al., 2017). In the team intervention, team members discuss their expectations for teamwork in the context of FWD and areas for improvement, the roles everyone has in the process, set a goal for improvement, and discuss and how they will monitor, evaluate, and recognize goal attainment (i.e., team regulation strategies). As team members then clearly know what is expected of them, psychological safety should increase:

Hypothesis 3: Participants of the team intervention will report higher psychological safety compared to participants in the control group.

In the team intervention, team members discuss and set goals for changing and improving their collaborative working practices in the FWD context, and learn to implement these changes by monitoring and evaluating their progress and rewarding their achievements (i.e., team regulation strategies). Hence, we expect the team intervention to increase the teams' awareness of the psychosocial work environment regarding collaboration in the FWD context, as well as the teams' ability to target and manage the psychosocial aspects of collaboration in the FWD context (e.g., team members' work organization, well-being, recovery, and work–life balance). We refer to this construct as psychosocial management of FWD (cf. Abildgaard et al., 2020; von Thiele Schwarz et al., 2017):

Hypothesis 4: Participants of the team intervention will report higher psychosocial management of FWD compared to participants in the control group.

Because teams learn to practice team regulation strategies to achieve their collective goals, we expect enhanced team regulation to be the key mechanism explaining the relationship between intervention participation and proposed effects on outcomes:

Hypothesis 5: Team regulation mediates positive effects of coaching participation on (a) FWD-specific social support, (b) psychological safety, and (c) psychosocial management.

3.7.2 Methods

We compared two intervention groups with a waitlist control group in a cluster-randomized waitlist control group design (see Chapter 3.2). The final sample included 750 working adults ($n_{IG1} = 272$; $n_{IG2} = 229$; $n_{CG} = 249$) across 84 work teams. We used the team as referent (i.e., referent-shift composition model; Chan, 1998) to measure team-level constructs of team regulation, psychological safety, FWD-specific social support and psychosocial management of FWD in terms of a shared perception (cf. DeShon et al., 2004; Dierdorff & Ellington, 2012; Gevers et al., 2009; van Hooft & van Mierlo, 2018). We averaged these individual-level responses across teams.

Team regulation was measured with a self-developed scale based on individual-level self-regulation measures, namely subscales of the German version (Andreßen & Konradt, 2007) of the Revised Self-Leadership Questionnaire (Houghton & Neck, 2002), adapted to focus on collective goals in general rather than task-based goals. Items referred to the individual's perception of regulatory behavior of the team (reference-shift approach) to measure *Team-Goal Setting*, *Team-Observation*, *Team-Reward*, and *Team-Visualizing Successful Performance* with three items each. Three measures were used to operationalize FWD-specific social support. *Social support* from colleagues and supervisors was measured with the German version of the 4-item Social Support subscale of the Copenhagen Psychosocial Questionnaire (Lincke et al., 2021), adapted to focus on the context of FWD. *Experiential Knowledge Provided* and *Emotional Support Received* were measured with the respective 3-item subscales of the Self-Help Support Group Social Exchange Scales (Brown et al., 2014), also adapted to focus on the context of FWD. *Psychological safety* was assessed with the respective 7-item scale (Edmondson, 1999). *Psychosocial management of FWD* was assessed with a tailored, 5-item scale, following previous studies that assessed psychosocial risk management (Abildgaard et al., 2020; von Thiele Schwarz et al., 2017). This scale measures generic changes in working conditions and the team's ability to manage issues in the FWD context successfully, an increased focus on issues related to the area of FWD, and team member's well-being in the FWD context. Last, we assessed *individual self-regulation* with three subscales of the German version (Andreßen & Konradt, 2007) of the Revised Self-Leadership Questionnaire (Houghton & Neck, 2002), adapted to focus on goals in general. We aggregated individual-level responses to a team-level average score. We conducted multilevel regression analyses with measurement occasions (Level 1) nested within participants (Level 2), who are nested in work teams (Level 3). Substantial percentages of outcome variance depended on belonging to a certain work team, justifying the use of multilevel analyses.

3.7.3 Results and Discussion

Overall, multilevel analyses supported intervention effectiveness. Regarding team regulation, the group $IG_{vs} CG \times time_{Pre\ vs\ Post}$ interaction was significant, as well as the group $IG_{2\ vs\ CG} \times time_{Pre\ vs\ Follow-Up}$ interaction. Hence, the intervention effectively improved team regulation compared to a control group, and this effect sustained over nine weeks. This shows that team regulation is malleable and practicing team regulatory strategies based on the self-regulation process enhances team regulation. This extends the understanding of team regulation (e.g., DeShon et al., 2004; Chen et al., 2005; Kozlowski and Ilgen, 2006; Rapp et al., 2014; van Hooft & van Mierlow, 2018) by showing that models of individual self-regulation processes (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000) can be adapted to the team-level. In doing so, we provided evidence for the proposition that self-regulatory processes are functionally similar to team regulatory processes (Chen & Kanfer, 2006) and extend research traditionally focused on individual self-regulation (Zacher & Frese, 2018) to focus on team regulation. Intervention participants did not report increased aggregated individual self-regulation than the control group. These results show that a team-level aggregation of individual self-regulation does not yield similar results to the team-referent regulation scale. This supports research (van Hooft & van Mierlo, 2018) showing that team regulation (i.e., a consensus across teams about the extent to which they perceive that they regulate their team actions) is conceptually different from team-level aggregated self-regulation (i.e., an average indicating whether some people self-regulate a lot and other do not). That is, team regulatory processes do not equal the sum of individual regulatory processes.

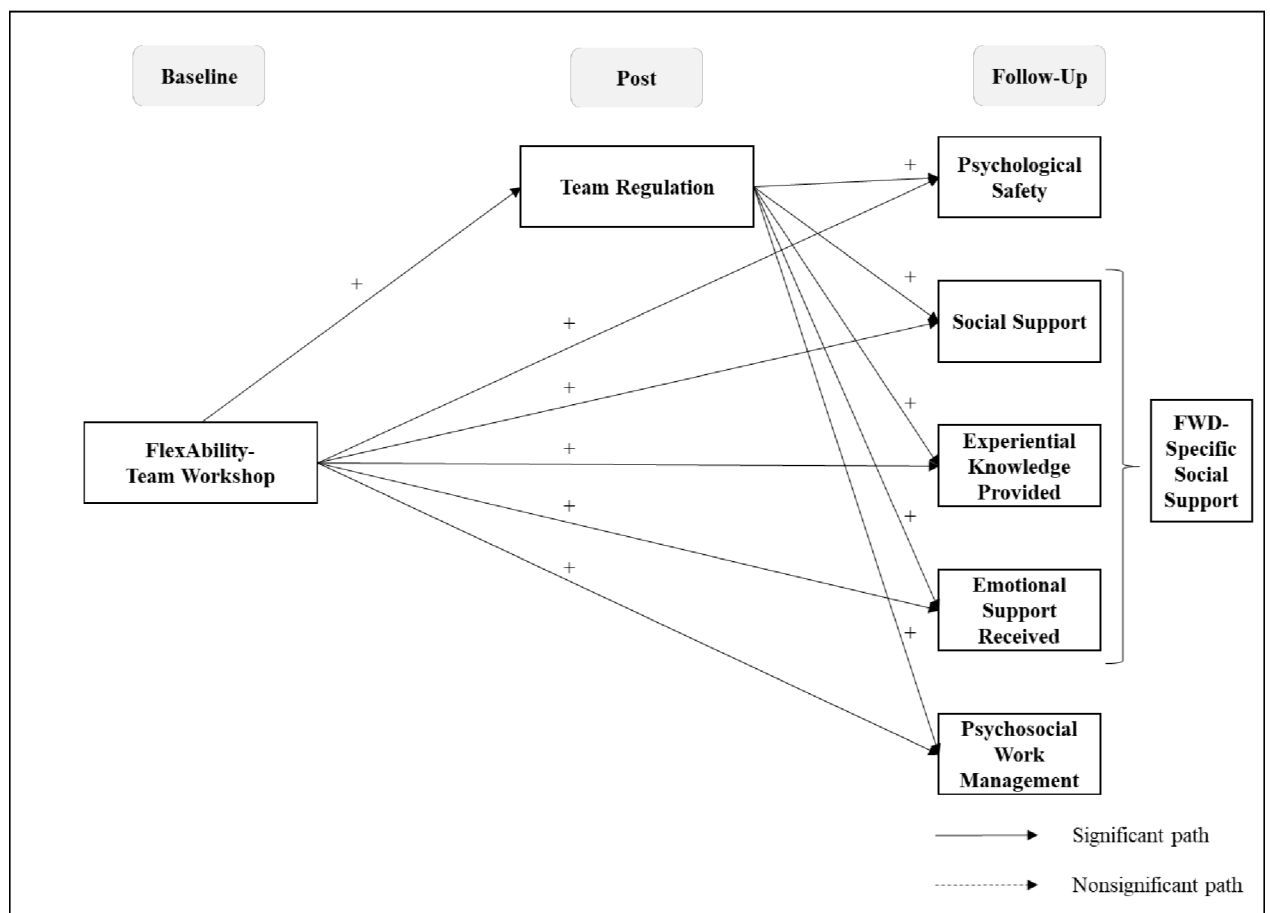
As expected, results of multilevel analyses revealed that the intervention reported increased FWD-specific social support (i.e., perceived social support, experiential knowledge provided, and emotional support received), psychological safety, and improved collaboration, (i.e., psychosocial management of FWD) compared to a control group. The effects on collaboration and psychological safety did sustain over nine weeks. This extends research on team regulation, which has mainly focused on performance-related outcomes (Gevers et al., 2009; Gurtner et al., 2007; Konradt et al., 2009; Schlaegel et al., 2023). Intervention effects on FWD-specific social support are in line with social identity theory, proposing that a sense of shared identity can strengthen social support (Haslam et al., 2019; Nielsen, 2013). When team members interact less from face-to-face at the workplace because they work in different locations, this can be an important resource (Hobfoll et al., 2018; ten Brummelhuis & Bakker, 2012). Increased perceptions of psychological safety are in line with research proposing that clear communication of mutual expectations and commonly set collaboration goals foster

perceptions of safety (Frazier et al., 2017). Moreover, it underlines that a supportive work context can positively affect psychological safety (Frazier et al., 2017; Newman et al., 2017). Last, the intervention effects on psychosocial management of FWD show that team members were more aware of and more capable to change the psychosocial work environment regarding FWD (i.e., working practices in the FWD context) after workshop participation.

Intervention effects were mediated by increases in team regulation, indicating that enhanced team regulation (e.g., discussing expectations for collaboration and setting a goal for improving collaborative work practices, tracking and reviewing progress toward this common goal, rewarding each other for achieving the goal) elicited effects. These findings are in line with conservation of resources theory’s proposition of upward spirals, showing that training team regulation as a resource can foster the building of resources such as FWD-specific social support, psychological safety, and team collaboration. Overall, this highlights the relevance of team regulation for hybrid work teams, and shows that the team workshop can be an effective tool for promoting team regulation within work teams with FWD, which can enhance team resources and improve team collaboration. Figure 14 illustrates the proposed research model.

Figure 14

Proposed Research Model of Paper 5



4 OVERARCHING DISCUSSION

The aim of this dissertation is to make a contribution of theoretical and practical relevance to self-regulation intervention research in the context of FWD. Specifically, it aims to provide a more nuanced understanding of mechanisms and individual boundary conditions, as well as role of training format and training level, on short- and long-term effectiveness of interventions that help workers self-regulate in the context of FWD. To this end, four intervention studies were conducted, resulting in five articles presented as part of this dissertation. Paper 1 evaluated a web-based intervention based on mindfulness to facilitate self-regulation in terms of disengaging from work-related thoughts and emotions, which may be particularly helpful for workers with FWD. Paper 2 and Paper 3 evaluated a web-based intervention based on self-regulation that provided several goal-directed activities and general self-regulation strategies to enable workers to cope with specific challenges of FWD. Paper 4 evaluated a blended training that included group sessions in addition to the web-based training for workers with FWD. Paper 5 evaluated a team workshop to promote team regulation strategies in hybrid work teams. In this chapter, I summarize and integrate the findings of these articles and describe research contributions. These consist of the theoretical application, testing, and integration of theories to develop interventions for workers with FWD, the evaluation with randomized controlled trial designs, and the high practical relevance as working conditions are currently changing at a rapid pace and are expected to continue to do so. I also discuss limitations of the dissertation studies and their implications for future research. Finally, I consider practical implications for individuals, teams, and organizations.

4.1 INTEGRATION OF RESULTS

The studies conducted as part of this dissertation addressed five research questions. In the following, I will summarize the findings of the five dissertation studies and place them in context of the research questions introduced in Chapter 2.5 (see p. 25 for an illustration of the research questions).

4.1.1 Research Question 1: Are interventions that promote self-regulation to cope with challenges of flexible work designs effective in improving well-being, work–life balance, and recovery?

Self-regulation plays an essential role in the context of FWD, as it helps workers shape their workday according to their needs (see Chapter 1). Therefore, we developed interventions based on theory and empirical evidence to enable participants to self-regulate and cope with specific challenges associated with FWD.

To address the question of whether these interventions are effective in improving well-being, work–life balance, and recovery, with a focus on changes during and after the intervention, Paper 1 examined trajectories of daily effects of a 3-week online training that teaches mindfulness as a cognitive-emotional segmentation strategy. In a randomized controlled design with an experimental group and a waitlist control group, results from growth curve analyses showed that the intervention affected mindfulness, psychological detachment, psychological work–life conflict, and satisfaction with work–life balance immediately after the intervention started, and then had a slow but steady influence on the outcomes. This is in line with research showing that brief mindfulness-based interventions can help workers refrain from work-related thoughts and emotions, which facilitates engagement in private life roles and improves satisfaction with work–life balance (Michel et al., 2014), and adds to previous research by showing how effects unfold. No training effects were found compared to the control group for strain-based work–life conflict or well-being. The results indicate that the mindfulness-based training is effective in directing work-related thoughts and emotions (i.e., self-regulation) in a way that helps mentally and emotionally segment boundaries between work and private life. Segmenting boundaries and increasing psychological detachment is particularly important for workers with FWD who are dealing with blurring boundaries (see Chapter 1), and thus, although not originally designed for workers with FWD, they may benefit from implementing the training activities (i.e., mindfulness exercises).

Paper 2 investigated immediate and long-term effects of a 6-week online training to promote self-regulation to enable workers to cope with specific challenges of FWD. The online training combined two aspects of promoting self-regulation; participants learned several goal-directed activities and how to manage the implementation of goal-directed activities with general self-regulation strategies. Building on the effectiveness of mindfulness as a cognitive-emotional segmentation strategy, we integrated the mindfulness activities and adapted them for workers with FWD. In a randomized controlled design with an experimental group and a waitlist control group, results of covariance analyses revealed a significant effect on self-

regulation, confirming the successful training of self-regulation. Moreover, results indicated that the intervention improved well-being and work engagement, and reduced stress and strain-based work–life conflict. The training increased psychological detachment in participants with difficulties to detach from work at baseline. This supports the proposition that those with a high need for training may particularly benefit from it (Briner & Walshe, 2015). Analyses of follow-up questionnaires confirmed sustainability of effects over four weeks and six months for all outcomes except work engagement, which may be more affected by other resources.

Expanding the results of Paper 2, Paper 3 examined immediate and long-term effects of the online training for workers with FWD testing the propositions of the positive-activity model. Results of mixed variance analyses showed that the online training reduced emotional exhaustion and increased satisfaction with work–life balance immediately after the training and four weeks later. While any positive activity intervention should stimulate positive emotions, we expect the increase in boundary management as a positive behavior to be unique to our intervention because it focuses, among others, on segmentation strategies.

Paper 1, Paper 2, and Paper 3 demonstrate that individual web-based trainings to promote self-regulation sustainably improve a wide range of personal resources as well as outcomes of well-being, work–life balance, and recovery, which are particularly at risk in FWD (see Chapter 1). Specifically, mindfulness is a useful practice to facilitate disengagement from work-related thoughts and emotions, and the combination of positive, goal-directed activities with general self-regulation is an effective approach to enable workers cope with challenges of FWD and thus improve their well-being, work–life balance, and recovery.

4.1.2 Research Question 2: What are underlying mechanisms of self-regulation intervention effectiveness?

Evaluating underlying mechanisms of intervention effects is important to know not only whether, but also how interventions work (Michel et al., 2015). This allows for the development of interventions that specifically address aspects that cause behavior change. In Paper 1, we observed a decrease in negative affect over time in both groups that participated in the study evaluating the mindfulness-based training. Although mechanisms were not measured, these results suggest that participation in the study and regular responding to questionnaires may have a positive effect in themselves. Thus, reflection on and mental engagement with work–life and well-being issues may have been active ingredients of the intervention. This is consistent with research showing that self-monitoring alone can have a positive effect on well-being (Bakker & Rickard, 2018; Goldstein et al., 2019; Yan et al., 2020). These findings

informed the development of the intervention for workers with FWD by including self-reflection prompts in all online modules.

To address the question of what mechanisms underlie intervention effects of the self-regulation online training, two main mechanisms were examined that, based on different theoretical frameworks, were expected to explain intervention effects. In Paper 2, based on assumptions of self-regulation theories (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000), self-regulation was investigated as the mechanism. A mediation analysis revealed significant indirect effects of the intervention on well-being and work engagement via self-regulation, but not on psychological detachment, stress, and strain-based work–life conflict. Thus, the increase in self-regulation was confirmed as the intervention's mechanism of change for well-being and work engagement. In Paper 3, based on the positive-activity model (Lyubomirsky & Layous, 2013), positive emotions and boundary management as a positive behavior were investigated as mechanisms. A mediation analysis demonstrated indirect effects of the intervention on emotional exhaustion and satisfaction with work–life balance via positive emotions and boundary management. Thus, beneficial changes in positive emotions and boundary management as a positive behavior explained intervention effects on reduced emotional exhaustion and increased satisfaction with work–life balance. Thus, the results of Paper 2 and Paper 3 show that conducting the online training and its positive activities strengthened self-regulation, stimulated positive emotions, and fostered boundary management as a positive behavior. These changes improved work–life balance and well-being outcomes.

4.1.3 Research Question 3: Do participants with specific characteristics particularly benefit from self-regulation interventions?

As person characteristics (Lyubomirsky & Layous, 2013) and a high need for training (Briner & Walshe, 2015) have been proposed to affect training effectiveness, identifying which person characteristics increase training effectiveness allows for an efficient implementation of interventions, that is, offering them to specific target groups that can benefit the most. To address the question of whether workers with certain characteristics relevant in the context of FWD may particularly benefit from the developed interventions, the role of two potential moderators of intervention effectiveness, based on different theoretical frameworks, was investigated in Paper 1 and Paper 3.

Paper 1 examined the role of segmentation preference, a person characteristic introduced in boundary theory (Ashforth et al., 2000) and its person–environment fit perspective (Kreiner, 2006; Kreiner et al., 2009), for outcome trajectories during

implementation of the mindfulness-based training. Moderation analyses showed that integrators (i.e., participants with low segmentation preference) reported stronger intervention effects on psychological detachment. No moderation effect was found for psychological or strain-based work–life conflict, satisfaction with work–life balance, or negative affect. Segmenters benefited from study participation (both training participation and questionnaire completion) regarding psychological detachment and satisfaction with work–life balance, indicating that self-reflection may have positive effects particularly for segmenters.

Paper 3 examined the role of depressive symptoms at baseline as a potential moderator of the effectiveness of the self-regulation online training for workers with FWD, as baseline affective state has been proposed to potentially affect intervention effectiveness (Lyubomirsky & Layous, 2013). A moderated mediation analysis revealed no moderation effect for either emotional exhaustion or satisfaction with work–life balance. However, conditional indirect effects were significantly different from zero when baseline levels of depressive symptoms were moderate or high but not when they were low, suggesting a tendency toward beneficial effects for those with more depressive symptoms at baseline.

In terms of an efficient implementation of the interventions, both the mindfulness-based and self-regulation online training can support workers regardless of their baseline characteristics examined in the present studies. Participants may benefit regarding their work–life balance from employing cognitive-emotional segmentation strategies regardless of their segmentation preference (Paper 1). This is likely to apply for workers with FWD, as they often have difficulties detaching from work (see Chapter 1). Those who prefer to integrate work and private life are likely to find this training particularly helpful for their psychological detachment. Workers with FWD can generally benefit from the self-regulation online training, regardless of their baseline level of depressive symptoms (Paper 3).

4.1.4 Research Question 4: Do additional group sessions increase effectiveness of an online self-regulation intervention?

Intervention characteristics have been proposed to moderate training effectiveness (Lyubomirsky & Layous, 2013). Based on self-determination theory (Ryan & Deci, 2000) and social identity theory (Haslam et al., 2019; Nielsen, 2013), beneficial effects of social interaction on social exchange and motivation can be assumed, and group sessions have been shown to have beneficial characteristics such as a supportive environment and peer interaction (Salas & Cannon-Bowers, 2001; Vuori et al., 2005). Thus, building on the effectiveness of the online training for workers with FWD, this dissertation aimed to address the question of

whether participants would benefit more from training that combined online self-training with face-to-face elements (i.e., blended training), thereby fostering social interactions. Paper 4 explored whether the blended training, which expands the online training with additional group sessions, would be more effective than the online training.

In a randomized controlled design with two experimental groups and a waitlist control group, results of multilevel analyses showed that both the online and the blended training improved psychological detachment, satisfaction with work–life balance, and well-being compared to a control group. These effects were stable over four weeks and, for psychological detachment, over six months. In line with the assumption based on social identity theory that group interactions would increase social exchange, blended training participants reported more social exchange. Consistent with the assumption based on self-determination theory that satisfaction of relatedness as a basic need can increase intrinsic motivation, blended training participants were more adherent four weeks after training and more compliant in conducting online modules and practicing exercises, compared to online training participants. Multilevel analyses revealed that intervention effects did not differ between intervention groups at post-training and at the 4-week-follow-up.

Extending the findings on the web-based training for workers with FWD, these results indicate that the training approach is effective regardless of training format, as the blended intervention shows similar immediate and long-term effectiveness. The online self-regulation intervention can help workers cope with the specific challenges of FWD, and group sessions that accompany the online training can increase social exchange and training compliance. Although online trainings have numerous advantages, such as flexible use, high availability and accessibility, and low running costs, they also have critical shortcomings, such as high and easy dropout and feelings of isolation (Eysenbach, 2005; Lehr et al., 2016). The findings of this study may be helpful in addressing these shortcomings, particularly in the context of FWD, when the risk of social isolation increases (Mann et al., 2000).

4.1.5 Research Question 5: Can self-regulation process models serve as a framework for a team intervention?

Extending the focus from individuals to work teams, this dissertation aimed to address the question of whether individual self-regulation process models can be adapted to the team level as an adequate basis for a team intervention. Although team regulation is becoming increasingly important as a means for hybrid work teams (i.e., working both virtually and face-to-face) to achieve their collective goals, research on regulation has traditionally focused on

individual self-regulation rather than team regulation (Zacher & Frese, 2018). Therefore, Paper 5 examined the immediate and long-term effectiveness of a team regulation intervention to promote team regulation in hybrid work teams.

In a cluster-randomized controlled design with two experimental groups and a waitlist control group, results from multilevel analyses showed that the intervention was effective in improving team regulation. This provides evidence for the proposition that self-regulatory processes are functionally similar to team regulatory processes (Chen & Kanfer, 2006). Team-level aggregation of individual self-regulation did not yield significant results, indicating that team regulation is conceptually distinct from averaged self-regulation at the team-level (van Hooft & van Mierlo, 2018).

Compared to a control group, the intervention increased FWD-specific social support (i.e., perceived social support from colleagues and supervisors, provided experiential knowledge, and received emotional support), psychological safety, and improved collaboration (as indicated by psychosocial management of FWD, the increased awareness and ability to change the psychosocial work environment regarding FWD). The effects on team regulation, psychological safety, and collaboration persisted over nine weeks. These findings are in line with social identity theory, proposing that the sense of belonging to a group can strengthen social support (Haslam et al., 2019; Nielsen, 2013), which can be an important resource when team members work in different locations and thus interact less face-to-face (Bentley et al., 2016; Hobfoll et al., 2018; ten Brummelhuis & Bakker, 2012). They also underline that clear communication of mutual expectations and jointly set collaboration goals can promote safety perceptions (Frazier et al., 2017). Last, they are consistent with conservation of resources theory's proposition of upward spirals, demonstrating that enhanced team regulation as a resource improves FWD-specific social support, psychological safety, and collaboration. This extends research on team regulation, which has mainly focused on performance-related outcomes (Gevers et al., 2009; Gurtner et al., 2007; Konradt et al., 2009; Schlaegel et al., 2023). As intervention effects were mediated by increases in team regulation, the implementation of team regulation strategies (e.g., discussing expectations for collaboration in the context of FWD and setting a goal for improving collaborative work practices, tracking and reviewing progress toward this common goal, rewarding each other for achieving the goal) appeared to elicit coaching effects.

Overall, the findings show that team regulation is malleable. A team workshop that teaches team regulation strategies, based on self-regulation strategies adapted to the team level, is an effective tool for improving team regulation. Thus, self-regulation process models can

serve as a theoretical framework for designing an effective team intervention. Moreover, enhancing team regulation can foster FWD-specific social support and psychological safety, and improve team collaboration. These findings are particularly important in the context of FWD, as hybrid work teams need to adapt to rapidly changing working conditions. This highlights the important role of team regulation for hybrid work teams.

4.2 RESEARCH CONTRIBUTIONS OF THE DISSERTATION

Overall, the studies conducted in the context of this dissertation demonstrate that individual theory- and evidence-based online interventions that promote self-regulation to cope with challenges of FWD can sustainably improve outcomes of well-being, work–life balance, and recovery. That is, training that teaches mindfulness as a self-regulatory practice to facilitate disengagement from work-related thoughts and emotions, as well as training that combines positive, goal-directed activities with general self-regulation, are effective approaches enabling workers to cope with challenges of FWD. The nature of these effects, their mechanisms, and individual boundary conditions are presented. Building on these findings, a blended intervention format with additional group sessions shows similar immediate and long-term effectiveness and can increase social exchange and training compliance. Extending the focus to the team level, self-regulation process models can serve as a theoretical framework for designing an effective team intervention. Enhancing team regulation strategies improves social support, psychological safety, and team collaboration in the context of FWD. In the following, I illustrate the major overarching research contributions of this dissertation.

4.2.1 Testing the Applicability of Psychological Theories

The aim of this dissertation was to develop theoretically based interventions, and to test whether the theories can be applied to practice by evaluating the interventions. In doing so, this dissertation not only provided empirical evidence for psychological theories, but also advanced their integration and development.

Contributions to Self-Regulation Theories. This dissertation investigated the applicability of self-regulation process models to the development of individual and team-oriented interventions. Paper 2 demonstrates that self-regulation process models can provide the foundation for individual web-based interventions, teaching goal setting, self-monitoring, self-evaluation, and self-reward (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000). Building on research showing that training self-regulation strategies

improves individual self-regulation capacity (Ebner et al., 2018; Marques-Quinteiro et al., 2019; Mrazek et al., 2021), it reveals that teaching self-regulation strategies based on these models increases self-regulation.

In addition, this dissertation provides a new perspective on how to train self-regulation, based on self-regulation process models, to facilitate behavior change. Adaptation and behavior change require self-regulation, thus interventions that intend to change behavior should address its causal determinants (e.g., self-regulation) to facilitate behavior change (Inzlicht et al., 2021; Michie et al., 2008). However, few interventions target self-regulation in addition to teaching goal-directed activities. Therefore, the online training for workers with FWD addresses two aspects of self-regulation: goal-directed activities that help steer thoughts, emotions, and actions toward a goal to overcome challenges of FWD, and general self-regulation strategies that help implement these goal-directed activities. This addresses the call for interventions to be based on specific problem areas and a self-regulatory theoretical model (Vancouver & Day, 2005). Moreover, it responds to the call to link determinants of behavior change (self-regulation) to theories of behavior change (self-regulation models) for both the design and evaluation of theory-based interventions (Michie et al., 2013).

This research integrates perspectives on self-regulation and positive activities (Lyubomirsky et al., 2005) by linking these concepts. Specifically, Paper 3 proposes that goal-directed activities taught in the self-regulation intervention are positive activities. Specifically, behavioral and cognitive-emotional boundary management (Grawitch et al., 2010; Hirschi et al., 2019; Koole et al., 2013), recovery (Zijlstra et al., 2014) and work organization (Aspinwall & Taylor, 1997; Oettingen et al., 2015) involve engaging in positive activities. For instance, performing a ritual at the end of the workday (behavioral segmentation), practicing mindfulness (cognitive-emotional segmentation), taking breaks (recovery), or rewarding oneself for task completion (work organization). Framing self-regulatory activities as positive activities can help further research examine effectiveness of interventions based on self-regulation and to explore the positive effects of self-regulation as an important resource in the context of changing working conditions more thoroughly.

This research provides evidence that self-regulation process models can be adapted to the team level, and can be applied as a theoretical basis for designing an effective team intervention. Research has focused on self-regulation (Zacher & Frese, 2018) and has evaluated several self-regulation interventions (e.g., Ebner et al., 2018; Marques-Quinteiro et al., 2019; Unsworth & Mason, 2016; Yeow & Martin, 2013), thus there is a theoretical and empirical paucity in understanding whether and how interventions can enhance regulation at the team

level. Paper 5 demonstrates the effectiveness of teaching hybrid work teams to engage in team-regulatory strategies (i.e., team-goal setting, team-monitoring, team-evaluating, and team-rewarding) to regulate their actions to achieve their collective goals in the context of FWD. This illustrates that when developing theory-based interventions, in addition to a strong theory and reasonable evidence that strengthening a particular resource can have considerable effects (Briner & Walshe, 2015), theory can be used as a rationale for designing the intervention itself. These findings suggest that self-regulation processes are functionally similar to team regulation processes (Chen & Kanfer, 2006). This research adds to the clarity of the construct by demonstrating that team regulation is conceptually distinct from aggregated self-regulation.

Contributions to the Positive-Activity Model. This dissertation provides empirical evidence that the theoretical assumptions of the positive-activity model (Lyubomirsky & Layous, 2013) are well applicable to examine mechanisms via which self-regulation interventions unfold their effectiveness and whether they are more beneficial for certain target groups. The proposition that person characteristics affect training effectiveness was tested in Paper 1 and Paper 3, with segmentation preference and depressive symptoms as person characteristics, respectively. Examining the influence of segmentation preference as a person characteristic is important as it is a key characteristic affecting boundary management in boundary theory (Ashforth et al., 2000) and its person–environment fit perspective (Kreiner, 2006; Kreiner et al., 2009). Those with a low segmentation preference reported enhanced effects on psychological detachment. This suggests that it may be useful to target those with a higher preference for integrating life domains with an intervention that teaches cognitive-emotional segmentation strategies. Depressive symptoms are among the most prevalent workplace mental health issues. In response to the call to investigate the role of affective state as a potential moderator of the effectiveness of positive activities (Lyubomirsky & Layous, 2013), Paper 3 demonstrates that baseline depressive symptoms did not affect intervention effectiveness, however, limiting this conclusion, our sample had low depressive symptoms.

The proposition that engaging in positive activities stimulates increases in, among others, positive emotions and positive behaviors, which then enhance well-being, was tested in Paper 3. Results support this proposition as increases in positive emotions and boundary management as a positive behavior mediated effects on reduced emotional exhaustion and increased satisfaction with work–life balance. This responds to calls to identify processes of intervention effectiveness that are affected by engagement in an intervention (Michel et al., 2015). Proposing boundary management as a positive behavior stimulated by the intervention also combines the positive-activity model with elements of boundary theory, which advances

the way positive behaviors are represented. That is, specifying behaviors that are of interest in a particular context, such as the context of FWD in the present research, rather than general positive behaviors, can help investigate intervention effectiveness.

4.2.2 Research Design

This dissertation contributes to intervention research through several methodological strengths. The studies in this dissertation are based on four randomized controlled trials, answering the research call for more sophisticated and rigorous high quality randomized controlled trials of work-specific interventions (O'Shea et al., 2016). A diary approach with daily measurements was adopted in Paper 1. Maintenance of effects was assessed with multiple measurement points over a substantial period of time: 4 weeks (Paper 2, Paper 3, and Paper 4), 9 weeks (Paper 5), and 6 months (Paper 2 and Paper 4). The samples consisted entirely of the working population, with participants working in a variety of sectors. Several analytical approaches were applied, including variance and covariance analyses, mixed variance analyses, and multilevel analyses. In response to calls for theory- and evidence-based intervention designs (Briner & Walshe, 2015; Michel et al., 2015) and for addressing determinants of behavior change (Michie et al., 2008), the interventions developed in this dissertation were based on psychological theories and empirically validated exercises, and specifically addressed self-regulation as a facilitator of behavior change. With the presented studies, we shed further light on behavior change mechanisms and processes of intervention effectiveness, following pertinent research calls (Michel et al., 2015). In Paper 2, we identified self-regulation as the behavior change mechanism that generates positive training effects regarding positive affect and work engagement. In Paper 3, we identified positive emotions and boundary management as mechanisms for intervention effects on reduced emotional exhaustion and increased satisfaction with work–life balance. This serves as initial evidence that self-regulation, positive emotions, and boundary management may be central personal resources to cope with FWD demands, and that can be fostered in interventions to improve work–life balance and well-being. Moreover, we tested person characteristics as individual boundary conditions of intervention effectiveness, showing that segmentation preference can reinforce effects of training cognitive-emotional segmentation strategies on psychological detachment (Paper 1), and indicating that depressive symptoms below a clinical cut-off value do not affect intervention effectiveness (Paper 3). Last, by extending the individual web-based training with small group sessions and developing team workshops, we addressed different organization

levels, responding to the research call to design multilevel interventions that are aimed at building resources at multiple levels (Nielsen et al., 2017).

4.2.3 Practical Relevance

Workers with FWD face specific challenges; blurred boundaries between work and private life impede detaching from work and recovery periods are shortened or interrupted, thus more self-regulation is required to organize the workday. The present research was mostly conducted during the COVID-19 pandemic, when many were working remotely more than before or for the first time. Thus, knowing how to adapt to new working conditions by shaping their workday according to their needs was highly relevant for participants. The developed interventions can be useful tools to promote self-regulation and thus cope with challenges workers with FWD are likely to face. They can help set cognitive-emotional boundaries (Paper 1), acquire additional activities for coping with FWD such as behavioral boundary management, recovery, and work organization, and strengthen their ability to steer thoughts, emotions and action toward their goals (Papers 2-4), and train regulation as a team (Paper 5). This dissertation responds to the call to develop interventions tailored to workers with FWD that provide strategies for managing challenges associated with FWD (Allen et al., 2021). The evaluation studies show that the interventions can help participants improve their psychological detachment (Paper 1, Paper 2, and Paper 4), satisfaction with work–life balance (Paper 1, Paper 2, and Paper 4), and well-being (Paper 2, Paper 3, and Paper 4), as well as strengthen team resources and collaboration (Paper 5). Thus, the interventions empower workers to cope with challenges of FWD and improve their recovery, well-being, and work–life balance (see Chapter 4.5 for specific practical implications). Insights gained into mechanisms and influencing factors can inform practitioners on how to design and further develop effective interventions.

The online intervention for workers with FWD provides, in addition to general self-regulation strategies, a variety of goal-directed activities to address different challenges associated with FWD. This comprehensive, holistic intervention approach is of high practical relevance because challenges people face in the context of FWD are often not limited to one aspect. Moreover, people may prioritize challenges differently (e.g., when working with spatial flexibility, for some people the most disturbing aspect may be the blurring of work and private life and the constant thought of work, while for others the more challenging aspect may be the adherence to break times). Learning a range of activities makes it more likely to identify helpful activities. Further, participants also improved their general ability to self-regulate their behavior, which may be due to the constant repetition in each module and the application to a

variety of situations in the FWD context. Thus, this dissertation provides practical guidance for strengthening self-regulation, both in terms of general self-regulation and specific goal-directed activities that are required in the context of FWD. In addition, by teaching general self-regulation strategies, we consider that interventions often inherently require self-regulation to perform exercises, but this ability is rarely specifically trained.

This dissertation may help practitioners deciding whether to offer online self-learning training or blended training (i.e., additional group sessions) when there is less social interaction in the workplace, as they are associated with higher costs but, as demonstrated in Paper 4, may enhance social exchange processes. Furthermore, this dissertation contributes to nascent efforts to design interventions that increase work engagement (e.g., Bakker & van Wingerden, 2021; Knight et al., 2017) and improve work–life balance (e.g., Michel et al., 2014). In addition, the dissertation contributes to the discussion on how to reduce attrition in online interventions (Paper 4), following research calls to investigate whether social support can influence treatment adherence (Zarski et al., 2018). Our findings confirm that providing small groups in addition to online modules can increase training adherence and compliance.

Last, this dissertation provides evidence for an intervention that promotes team regulation, an ability that has received little attention in intervention research. Enhancing team regulation is particularly important for practitioners who wish to improve team resources and collaboration in hybrid work teams, especially as people increasingly work in different locations and there is less social interaction in the workplace.

4.3 LIMITATIONS

The studies conducted as part of this dissertation have limitations. In the following, I will critically reflect on key limitations of the dissertation studies, which can be summarized under the term of methodological bias. Limitations specific to each paper are discussed in detail in the original papers (see Appendix).

Multicomponent Intervention. A major limitation is the multicomponent nature of the online self-regulation intervention for workers with FWD, which was evaluated in Paper 2 and Paper 3. We combined several goal-directed activities that address different challenges in the context of FWD (i.e., cognitive-emotional and behavioral boundary management, establishment of recovery periods, work organization) with general self-regulation strategies (i.e., goal setting, self-monitoring, self-evaluation, and self-reward). Focusing on two aspects

of self-regulation provides a new perspective on how to effectively increase self-regulation in a specific context and is of high practical value (see also Chapter 4.2.1 and 4.2.3). However, this impedes a precise investigation of which training element elicits which effects. Because the effectiveness of each intervention element cannot be disentangled, the present research does not allow conclusions to be drawn about whether one element was more effective than another.

Research Design. A waitlist control group design yields evidence about the general effectiveness of interventions compared to a waitlist control group that fills out questionnaires. However, it does not allow conclusions to be drawn about the causality of effects on the elements of the intervention (O'Shea et al., 2016). That is, the research design does not allow the conclusion that the proposed active ingredients (mindfulness practice in Paper 1, both goal-directed activities and general self-regulation strategies in Paper 2 and Paper 3, social interaction in group sessions in Paper 4, and team regulation strategies in Paper 5) were in fact the aspects that caused changes in outcomes. Moreover, this design cannot preclude the possibility that expectations about participation served as a demand characteristic, that is, the expectation that the intervention would improve outcomes induced hypothesis-conforming behavior (Nichols & Maner, 2008). Further, the waitlist control group design does not provide evidence of the equivalence or superiority to alternative interventions (O'Shea et al., 2016).

High Dropout. Another limitation is the high dropout observed in all of the dissertation studies. High dropout rates are common in web-based interventions (e.g., Heskiau & McCarthy, 2021; Phillips et al., 2019). However, across all dissertation studies, dropout was consistently higher in intervention groups than in control groups. Control groups may have been more committed in filling out surveys because they were waiting to gain access to the training in exchange for doing so, as opposed to the intervention groups who had already completed their training.

Sample Characteristics. Study participants were of different ages and came from a variety of professions, but they were self-selected, and across all studies, women and highly educated participants were overrepresented. Moreover, a substantial proportion of our sample worked in the public sector, and almost all participants were knowledge workers. Thus, they did not adequately represent the working population. However, interventions are most effective when participants self-select, that is, want to participate and enroll in a study, perhaps because they are motivated and have a high outcome expectancy (Sin & Lyubomirsky, 2009). Moreover, the rate of FWD is generally higher among knowledge workers.

Measures. We relied on self-reports, which was in general appropriate given the interest in internal states and subjective perceptions of recovery, work–life balance, well-being, and

social resources (Spector, 2006). However, studies lacked objective measures of actual compliance, such as module completion status or time stamps. Moreover, manipulation checks were not measured at all time points. Although questionnaires were carefully based on validated measures and showed good internal consistencies, we did not validate measures that we adapted to fit the context of FWD. Moreover, the measure of self-regulation was adapted from a validated questionnaire. To our knowledge, this measure captures the process phases of self-regulation most accurately (with the subscales we used being self-goal setting, self-observation, self-reward, visualizing successful performance). However, it does not differentiate between observing behavior and evaluating behavior (summarized in the observation subscale). Moreover, it emphasizes the goal setting phase by explicitly assessing the visualization of successful performance (although this is encouraged in the interventions for workers with FWD, as the exercise of mental contrasting with implementation intention is included in the online training, group sessions, and team workshop). Last, this measure operationalizes self-regulation as the implementation of general self-regulation strategies; thus, studies have not assessed self-regulation as the general ability to direct thoughts, feelings, and actions toward a goal.

Extent of Flexibility. In the evaluation of the mindfulness-based intervention, participants' temporal and spatial flexibility was not assessed as the intervention did not target this particular group of workers. Thus, we could not analyze effectiveness of this intervention for this particular subgroup. Participation in the interventions for workers with FWD was not limited to a specific type of FWD or a minimum level of flexibility in choosing when and where to work, because people work on a broad continuum of low to complete temporal and/or spatial flexibility. The studies addressed people who were facing FWD-related challenges, not limited to those who were new to the situation due to pandemic regulations or who were familiar with having temporal and spatial flexibility from pre-pandemic times. In the evaluation studies of the individual interventions for workers with FWD, we assessed the extent of temporal and spatial flexibility (i.e., on how many days participants had the opportunity to work from home or other locations, on how many days participants worked flexible hours). In the team intervention study, we further refined the assessment of flexibility. For spatial flexibility, we asked on how many days participants had the opportunity to decide where to work, and on how many days participants actually worked from home or other locations. For temporal flexibility, we assessed the degree of control over when to start and end each workday, when to take a break, and when to take a few hours off. In all intervention studies for workers with FWD, we assessed how often participants had worked from home compared to before the pandemic.

However, we did not assess the specific type of FWD (e.g., working in an office with flexible hours, part-time telecommuting, or working completely remotely). This would have further increased the meaningfulness of the results and allowed for additional subgroup analyses.

Process Evaluation. To evaluate the process during interventions, we asked how thoroughly participants had worked through the modules and how often participants had practiced the exercises, and we asked about critical life events that occurred during the time of study participation. However, we could have evaluated the process and in particular the implementation more systematically. This could have included a more detailed assessment of training motivation (Paper 4), for example using the expanded framework of contemporary theories of training motivation (Chung et al., 2022).

4.4 PROPOSITIONS FOR FUTURE RESEARCH

In this chapter, I discuss promising directions for future research based on the empirical and theoretical findings of the dissertation studies.

4.4.1 Deepening the Understanding of Processes and Boundary Conditions of Intervention Effectiveness

This dissertation contributes to the investigation of the effectiveness of interventions that promote self-regulation to help workers cope with challenges of FWD by evaluating outcomes (i.e., whether the interventions work regarding outcomes of recovery, work–life balance, well-being), mechanisms (i.e., what makes the interventions work, e.g., self- or team regulation, or positive emotions and behaviors), and contextual factors that provoke these mechanisms (for whom does the intervention work; Nielsen & Shepherd, 2022). That is, the studies have evaluated context, mechanisms, and outcome (CMO) configurations (Pawson & Tilley, 1997). However, more research is needed to understand context factors that influence and underlying processes that explain intervention effectiveness. Moreover, future research may extend the focus on additional outcomes and the facilitation of transfer.

Boundary Conditions. Future research could expand the present studies by focusing on the question of under what circumstances and for whom the interventions are most effective. The positive-activity model may be useful for generating further research questions (Lyubomirsky & Layous, 2013). Additional *person characteristics* (e.g., values, attitudes, and norms) that might influence intervention effectiveness could be examined. Researchers could re-examine the extent to which depressive symptoms affect intervention effectiveness in a

sample with higher variance in baseline depressive symptoms. Further, *activity characteristics* (e.g., dosage, variety) could be examined, for instance, by varying the length of online modules (mindfulness-based training and online intervention for workers with FWD) or the number of group/team sessions (blended training and team workshop). Moreover, *workplace characteristics and organizational context* (e.g., peer support, culture, and climate) could be analyzed as potential boundary conditions. A further prospective research area is the role of *person-activity fit*, for instance, whether participants with a high segmentation preference benefit more from boundary management exercises.

Furthermore, future research could assess the *specific type of FWD* (e.g., working in an office with flexible hours, part-time telecommuting, or working completely remotely) to advance the understanding of whether interventions work best in specific working conditions. Future research could test whether promoting regulation processes (i.e., combined general self-regulation and goal-directed activities in an individual online training, team regulation strategies in a team intervention) yields similar effects in contexts other than FWD. Related, more research is needed to answer the question of which factors contribute to whether FWD are perceived more as a resource or a demand. The present studies fortify research proposing self-regulation to be a crucial ability in times of increased spatial and temporal flexibility (Allen et al., 2013; Kubicek et al., 2015; Mäkikangas et al., 2022; Mellner et al., 2015; Müller & Niessen, 2019). However, the question remains open as to which additional individual characteristics or behaviors and which organizational and legal conditions are required to make the most of the opportunities offered by spatial and temporal flexibility while at the same time reducing negative influences. These novel insights can then be used as the basis for more tailored interventions.

Mechanisms. Future research could further explore alternative mechanisms to explain training effects. Building on the applicability of the positive-activity model, future research could examine personal resources such as recovery-related self-efficacy, positive thoughts, or need satisfaction as potential process mechanisms.

Outcomes of Self-Regulation. Self-regulation has been studied extensively, and there are many different definitions and models describing processes and mechanisms of self-regulation, resulting in many different ways to operationalize it (Inzlicht et al., 2021; Matthews et al., 2000). Future research focusing on general self-regulation strategies could further develop existing scales (Andreßen & Konradt, 2007) to capture the four process phases of self-regulation (i.e., goal setting, self-monitoring, self-evaluation, and self-reward). This should include their implementation for goal attainment across all life domains (i.e., not only in terms

of achieving work-related tasks, but also for achieving private life goals, such as practicing more mindfulness exercises to disengage from work-related thoughts). In addition, future research should include scales that capture the general (i.e., across all life domains, not only task-related) ability to direct thoughts, feelings, and actions toward a goal. Existing measures of self-regulation (e.g., Schwarzer & Jerusalem, 1999) often assess task-related self-regulation, which is of limited relevance if the research topic is primarily concerned with the organization of work and private life and, in particular, their interface.

Outcomes of Work–Life Balance. This thesis focused on satisfaction with work–life balance and work–life conflicts. To better capture effects at the work–life interface, future research could include work–life enrichment processes and their interaction with conflict and satisfaction (Wayne et al., 2017). Future research could also distinguish between balance in terms of satisfaction, involvement, effectiveness, as well as fit, that is, whether role-based affect, involvement, and effectiveness matches the value workers place on the respective roles (Casper et al., 2018).

Outcomes of Performance. The present research focused on outcomes related to personal and social resources, recovery, work–life balance, well-being. Future research could extend this by investigating whether promoting self-regulation or team regulation in interventions also improves performance-related team outcomes, such as meeting deadlines and coordinating actions, self-rated performance and motivation, or peer-rated performance evaluations (Gevers et al., 2009; Konradt et al., 2009; Schlaegel et al., 2023).

Training Transfer and Process Evaluation. Building on results on boundary conditions, identifying who can particularly benefit from an intervention (person characteristics) or what aspects of an intervention are particularly effective (activity characteristics) may advance understanding of how to optimize training transfer. This dissertation assessed pre-training person characteristics such as baseline segmentation preference (Paper 1) or baseline affective state (Paper 3) to evaluate individual boundary conditions of training effectiveness. Based on the Integrated Training Transfer and Effectiveness Model, future research could additionally consider aspects during and after training to determine why and how trainings succeed or fail (Nielsen & Shepherd, 2022). This could be combined with a stronger focus on process evaluation (Nielsen & Abildgaard, 2013). That is, to shed more light on how participants implemented the activities presented in the interventions, future research could systematically assess quantitative and qualitative process measures. This could be based on the Integrative Process Evaluation Framework, which provides guidance on what data to collect, when, and how (Nielsen et al., 2022).

4.4.2 Evaluation of Specific Intervention Elements, Short Versions, and Superiority to Alternative Trainings

Future research could expand on this research by further developing the interventions evaluated in the dissertation studies and evaluating them in different research designs.

Effectiveness of Specific Intervention Elements. As discussed previously (see Chapter 3.1.2), the self-regulation online intervention has a multicomponent character, providing a toolset of different exercises. Future research could test effects of separate goal-directed activities in combination with general self-regulation against the complete training to examine whether all activities are necessary to obtain training effects or whether some goal-directed activities are more potent than others. Related, future research could investigate specific effects of goal-directed activities and general self-regulation to test whether training effects may result from implementing the goal-directed activities alone. Further, weekly diaries and growth curve models would allow an evaluation of effectiveness of specific modules. In the interest of an extended comparison of the different activities and building on Paper 1, web-based trainings teaching cognitive-emotional segmentation strategies could be compared with behavioral boundary management training.

Short Versions. The training could be shortened and compared to the original training, should one or a combination of several goal-directed activities prove to be as effective as the full training, because the training is relatively long with a duration of 6 weeks. However, researchers should not vary the length of training in the first place, as the constant training over 6 weeks may have contributed to behavior change and improvement in self-regulation.

Demand Characteristics. To address the concern that participants' expectations about the success of their participation (i.e., expectations of positive effects) served as a demand characteristic that elicited hypothesis-confirming behavior and thus induced change (Nichols & Maner, 2008), future research could include an additional inactive or placebo control group that receives exercises that are plausible to or have been shown to be inert.

Alternative Interventions and Causality. To test the equivalence or superiority of existing interventions, future research could add an active control group that receives the alternative intervention (O'Shea et al., 2016). To infer causality of effects to intervention elements (O'Shea et al., 2016), future research could add active control groups that receive an alternative intervention with activities unrelated to proposed active ingredients and thus neutral components of the intended manipulation.

Extended Focus. The intervention activities focused on challenges that can be addressed individually and through self-regulation (e.g., mental detachment from work, segmentation of

work and personal life, work organization) or as a team through team regulation. Extending the focus of interventions for workers with FWD, future interventions could include non-psychological aspects such as ergonomics or non-individual aspects such as good leadership.

4.4.3 Evaluation of Methods to Reduce Attrition and Dropout

This dissertation once again illustrates that attrition is an issue when conducting web-based interventions (Eysenbach, 2005; Lehr et al., 2016), as we particularly noticed difficulties in encouraging participation in follow-up questionnaires. Paper 4 shows favorable effects of exchanging in small groups, in addition to conducting online modules, on study participation and training compliance. Future research could build on these findings and systematically investigate which factors can help increase training motivation, commitment, and adherence to web-based training. In the dissertation studies, several measures were taken to increase commitment. For example, we sent short messages to participants of the individual interventions to increase involvement and as reminders for exercises. In the studies evaluating the training for workers with FWD, we included videos and photos of a host to increase engagement. Moreover, participants had to confirm their willingness to complete the training and all questionnaires. We offered participation certificates and information about project results as an incentive for active participation, and emphasized that they were contributing to the advancement of the program by participating. Although we had stated that there was no cost to participate, but in return, participants had to complete questionnaires, it could be more clearly communicated when training is offered as part of a study that evaluation is an essential part of the project and, thus, the questionnaires are of high importance. In addition, future research could provide intervention groups with rewards in addition to participation certificates and project results. Furthermore, the long-term time lags may have been too far apart. Future research should develop general recommendations for follow-up time lags, as there are no general rules of thumb or empirically validated suggestions for appropriate time lags between measurements (Taris & Kompier, 2014). Moreover, since dropout was particularly pronounced in intervention groups, researchers may choose to assign more participants to the intervention group than to the control group, especially if research resources are limited.

4.5 PRACTICAL IMPLICATIONS

A large proportion of workers have at least some degree of spatial and temporal flexibility. Such flexibility is associated with certain challenges and a high need for self-

regulation. Thus, web-based interventions that promote self-regulation can be a helpful tool to support workers in coping with challenges of FWD. Group sessions concurrent with online modules can increase social exchange and training compliance. Hybrid work teams can promote their team regulation by adopting team regulation strategies, which promotes team resources and improves collaboration in the context of FWD. The interventions evaluated in this dissertation provide insight into activities to pursue and resources to promote to help individuals and teams cope with FWD more effectively. In this chapter, I will discuss practical implications of the dissertation studies for individuals, teams, and organizations.

4.5.1 Individual Level

Based on the effectiveness of the individual interventions evaluated in this dissertation (the mindfulness-based intervention and the online intervention for workers with FWD), there recommendations can be derived on how individuals can shape their workday in specific ways when working with FWD to ensure their recovery, well-being, and work–life balance.

First, based on the first module in both individual interventions, individuals should reflect on their satisfaction with the current situation (e.g., regarding cognitive and emotional detachment from work during leisure time, boundary management, recovery, work organization) to identify which aspects they want to change. Based on this self-reflection, they should then formulate a specific, realistic goal toward which they want to change their working life (e.g., separating work and private life more clearly, mentally detaching from work during rest periods, effectively organizing work to stay focused and engaged, establishing rest periods during and after the working day). To enhance commitment to their goal, they may imagine positive outcomes they associate with these goal and how to overcome potential obstacles they may face (mental contrasting with implementation intentions; Gollwitzer & Oettingen, 2013).

They should then engage in specific activities that are directed toward their goal (i.e., goal-directed activities). For instance, to detach from work more easily, they may practice mindfulness exercises such as short breathing exercises (Michel et al., 2014) at the beginning of their leisure time to detach from work mentally (see mindfulness-based intervention and Module 3 of the online intervention for workers with FWD). Based on Module 2 of the online intervention for workers with FWD, they may set boundaries between work and private life by employing physical (e.g., setting up a separate workspace), temporal (e.g., scheduling and structuring working time and leisure time), communicative (e.g., communicating expectations about availability), or technological (e.g., using different devices for work and private life) boundary management tactics (Kreiner et al., 2009) or by establishing transition rituals such as

changing clothes (Ashforth et al., 2000). To feel more rested (Module 5), they may engage more consciously in leisure time activities during which they experience detachment, relaxation, mastery and/or control (Hahn et al., 2011). Moreover, they may schedule their breaks and spend them in recreative ways, for example, by practicing respite exercises that guide them to savor an imagined nature experience (Steidle et al., 2017). To activate their resources when they find themselves in stressful situations, they may reflect on resources that would help them and then think about previous situations in which they have used that particular resource (Module 6).

The results of Paper 2 suggest that engaging in self-regulation strategies can help in the implementation of a goal-directed activity. That is, once people have chosen a particular activity, they should set a specific goal for when they will practice it (goal setting), plan how they will track their behavior (self-monitoring), plan how they will determine their progress (self-evaluating), and plan how they will appreciate their efforts (self-rewarding). These self-regulation strategies can also help organize work more efficiently (Module 4). For example, one could set a goal of writing two hours on a scientific paper every morning between 8 and 10 a.m. (goal setting). Then, one could keep track of these writing slots in a spreadsheet (self-monitoring) and regularly review if the goal of daily writing has been achieved (self-evaluating). Finally, one could appreciate the efforts with a tangible reward, such as putting a smiley face in the spreadsheet or taking a walk in the park, or by enjoying the natural reward of joy or pride for having been productive and having achieved the self-set goal.

4.5.2 Team Level

Based on the concept of the team intervention (Paper 5), recommendations can be derived on how hybrid work teams, in which at least some members have FWD, can strengthen their team regulation to attain their collective goals. Teams should first discuss their common challenges regarding teamwork in the context of FWD. Having identified a key challenge they want to work on to improve their teamwork, they should set a specific, realistic, collective goal for how to change their collaborative working practices to achieve their goal (team-goal setting). To increase their commitment to this goal, they may collectively think about positive outcomes they associate with these goals and discuss how to overcome potential obstacles they may face as they work toward their goal (mental contrasting with implementation intentions; Gollwitzer & Oettingen, 2013). Then, they may plan how they will track (team-monitoring) and review their progress toward this goal (team-evaluating), and appreciate the team's success when the goal is achieved (team-rewarding). After practicing these strategies for a while, teams

may then reflect on whether their collective actions were effective in achieving their goal, and can start the process again to address another teamwork challenge (similar to the second session of the team intervention). Should teams decide to engage a professional coach to assist them in the process of implementing team regulation strategies, they could conduct coaching sessions online, as it was the case in the evaluation study.

4.5.3 Organizational Level

A large proportion of participants in the dissertation studies were employed and only a minority were self-employed, thus the organizational level should not be excluded from these implications. There are several ways that organizations can support their employees' recovery, well-being, and work–life balance, starting with shaping cultural norms and designing appropriate working conditions. With the right organizational conditions, individuals and teams can be empowered to shape their work to achieve their goals. Each of these aspects can be assessed in a needs analysis and accordingly addressed by designing appropriate interventions. It is important to note that employees cannot be held accountable for managing challenges of FWD on their own, as it is the responsibility of organizations to ensure occupational health and safety. Thus, individual and team interventions can complement, but never replace, appropriate working conditions.

Consider the Organizational Context and Leadership. Organizational supplies and cultural norms shape and encourage employee behavior. This can amplify potentially unhealthy behaviors, even if critical behaviors such as constant availability and working overtime are not demanded explicitly. For example, organizational norms determine the extent to which employees can manage their boundaries, thus having the possibility to segment work and private life may be as important as matching preferences and supplies to reduce work–life conflict (Kreiner, 2006). In line with this, segmentation opportunities provided by the workplace seem to be an important prerequisite for satisfaction with work–life balance (Brauner et al., 2020). A supportive organizational culture creates an environment that allows employees to create or maintain boundaries between work and private life (Thörel et al., 2022). Supervisors are gatekeepers to implementing an encouraging organizational culture because they serve as role models for employees. That is, when they show segmentation behavior to separate work and private life, their employees are more likely to segment between work and private life, which positively affects their well-being (Koch & Binnewies, 2015). Therefore, leadership training would be useful to strengthen positive trickle-down effects.

Offering Appropriate Working Conditions. To ensure that FWD promote work–life balance, organizations can, for example, provide clear guidelines and policies to minimize excessive job demands (e.g., availability expectations, overtime, adequate workload), increase psychosocial resources (social support, relationship-oriented leadership), support boundary management, and increase perceived flexibility (i.e., control over when, where, and how to work; Bjärntoft et al., 2020). It further involves the provision of sufficient job resources. Particularly organizational and coworker support can contribute to the development of optimal working conditions (Oakman et al., 2020), as well as clear role expectations, a workplace climate that encourages FWD, or corporate telework agreements (Kossek & Lautsch, 2012; Oakman et al., 2020; Wöhrmann et al., 2020). The relationship between extended availability (e.g., off-job use of information and communication technologies) and work–life conflict may be attenuated (Cho et al., 2020) if employees perceive autonomy to separate and create boundaries between work and nonwork domains (i.e., boundary control). These findings can help guide a needs analysis in organizations, which can then be followed by the development and implementation of organizational interventions.

Offering Interventions. When employees work remotely, traditional instruments of occupational health and safety cannot always be fully implemented. *Individual interventions* can then be a valuable addition to human resource practices and policies. Based on the promising results of effectiveness of the developed interventions presented in this dissertation, we advise supervisors and occupational health managers to offer such self-regulation toolkit interventions to workers with FWD and especially to those who are struggling with challenges of FWD. Web-based interventions can help large numbers of workers and are cost-effective because they have low running costs. Promoting self-regulation can help address challenges of FWD and improve psychological detachment, well-being, and work–life balance (Papers 1-4). Based on the findings in Paper 2, it seems effective to combine general self-regulation strategies (i.e., self-goal setting, self-monitoring, self-evaluation, and self-reward) with goal-directed activities to cope with demands of FWD in a toolkit of behavioral (Kreiner et al., 2009) and cognitive-emotional segmentation activities (Michel et al., 2014), and recovery activities (Hahn et al., 2011; Steidle et al., 2017). Interventions should be resource-oriented, that is, they should aim to strengthen resources, and incorporate elements to strengthen positive emotions and positive behaviors such as boundary management (Paper 3). Providing such an intervention can help employees and employers take advantage of the potential benefits of FWD while minimizing its potential risks. Extending the focus on teams, organizations could offer *team regulation interventions* to support hybrid work teams in achieving their collective teamwork

goals (see implications for the team level for more detailed recommendations). Moreover, combining individual self-regulation interventions with a team regulation intervention as a multilevel approach could overcome the dichotomy of individual versus organizational interventions (Nielsen et al., 2022).

Establishing Social Support Systems. There is a high risk of social isolation when people work in different locations because they have fewer social interactions and perceive less social support (Mann et al., 2000). Moreover, there is a high risk of dropout when offering web-based interventions. Therefore, based on the findings of the blended training evaluation (Paper 4), we recommend that organizations facilitate or encourage additional group meetings at regular intervals where workers participating in online interventions can share their experiences. This may help build peer support and increase commitment to finish such interventions. Based on the blended training, we recommend that in these sessions, people share their goals for participation and their experiences with online modules, share what they found useful, and support each other.

4.6 CONCLUSION

The working world is changing rapidly, with an increasing proportion of workers with spatial and temporal flexibility. Driven not least by the COVID-19 pandemic, the last two years have changed the world of work drastically and at an unprecedented pace. The share of workers with FWD is expected to remain high in the future, and thus adapting to these new working conditions will become even more important. The aim of this dissertation was to deepen the understanding of effects, mechanisms, and individual boundary conditions of interventions that help workers self-regulate in the context of FWD. To this end, individual web-based interventions to promote self-regulation were developed, implemented, and evaluated over the long term with randomized controlled research designs. The interventions focused on enabling workers to cope with challenges of FWD and thus improve their recovery, well-being, and work–life balance. The online training for workers with FWD was expanded by group sessions offered in addition to the online training to examine the role of social exchange processes, and by an intervention addressing team-level regulation processes. Interventions were based on theory and empirically validated exercises and addressed resources at the individual and team level. The five articles addressed questions of whether the interventions are effective, which mechanisms underlie intervention effectiveness, whether they are more beneficial for people

with certain characteristics, whether a training format that promotes social exchange can increase compliance and training effectiveness, and whether individual-level processes can be adapted to the team level to design an effective team intervention.

Results of the five dissertation studies reveal that web-based individual interventions that promote self-regulation to cope with challenges of FWD can lastingly improve outcomes of recovery, well-being, and work–life balance. That is, training that teaches mindfulness as a self-regulatory practice to facilitate disengagement from work-related thoughts and emotions can help workers meet the challenge of detaching from work, which is particularly important when boundaries are blurring. Training that teaches positive, goal-directed activities combined with general self-regulation can help workers manage the risks of FWD to recovery, well-being, and work–life balance. For this intervention, the role of self-regulation, positive emotions, and positive behaviors such as boundary management as mechanisms of intervention effectiveness are revealed. Depressive symptoms below clinical significance do not influence effectiveness of this intervention. Segmentation preference can reinforce effectiveness of the mindfulness-based training. Group sessions alongside the online training for workers with FWD can increase social exchange and training compliance. Extending the focus to the team level, a team regulation intervention for hybrid work teams can boost team resources and improve collaboration in the context of FWD.

This dissertation makes both practical and theoretical contributions to research. Findings provide empirical tests of the applicability of numerous theories, in particular self-regulation process models and the positive-activity model. Insights gained from the dissertation studies can benefit researchers and practitioners alike by expanding knowledge on how to design and implement interventions for individuals and teams to improve their ability to regulate in the context of FWD. The interventions presented as part of this dissertation can be valuable tools in practice as they can help individuals engage in specific goal-directed activities (e.g., setting cognitive-emotional boundaries) as well as general self-regulation strategies (e.g., goal setting) that help them cope with challenges of FWD. They inform practitioners about which resources to foster in interventions and how to increase compliance with a web-based training. The team intervention helps hybrid work teams attain their collective goals to improve their teamwork. Overall, the studies highlight the usefulness of interventions that promote self-regulation in different ways to adapt to changes associated with FWD.

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APPENDIX: MANUSCRIPTS

Paper 1:

Althammer, S. E., Reis, D., van der Beek, S., Beck, L., & Michel, A. (2021). A mindfulness intervention promoting work–life balance: How segmentation preference affects changes in detachment, well-being, and work–life balance. *Journal of Occupational and Organizational Psychology*, 94(2), 282-308. <https://doi.org/10.1111/joop.12346>

Paper 2:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). Meeting the Challenges of Flexible Work Designs: Effects of an Intervention Based on Self-Regulation on Detachment, Well-being, and Work–Family Conflict [Manuscript under review]. *Journal of Organizational Behavior*.

Paper 3:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). How Positive Activities Shape Emotional Exhaustion and Work-Life Balance: Effects of an Intervention via Positive Emotions and Boundary Management Strategies [Manuscript under review]. *Occupational Health Science*.

Paper 4:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). Online and Blended Training: Same Same but Different? A Randomized Controlled Trial Comparing Training Formats to Meet the Challenges of Flexible Work Designs [Manuscript under review]. *Journal of Medical Internet Research*.

Paper 5:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). The Effectiveness of a Team Coaching to Enhance Team Regulation in Hybrid Teams: A Randomized Controlled Trial [Manuscript under review]. *Journal of Occupational and Organizational Psychology*.

Paper 1:

Althammer, S. E., Reis, D., van der Beek, S., Beck, L., & Michel, A. (2021). A mindfulness intervention promoting work–life balance: How segmentation preference affects changes in detachment, well-being, and work–life balance. *Journal of Occupational and Organizational Psychology*, *94*(2), 282-308. <https://doi.org/10.1111/joop.12346>



Special Issue Paper

A mindfulness intervention promoting work–life balance: How segmentation preference affects changes in detachment, well-being, and work–life balance

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This study evaluates a three-week online self-training intervention teaching mindfulness as a cognitive–emotional segmentation strategy. Daily effects on psychological detachment, affective well-being, psychological and strain-based work–family conflict, and satisfaction with work–life balance were assessed, with a particular focus on whether segmentation preferences moderate training responsiveness. A randomized wait-list control group design was used for administering daily questionnaires to 190 participants. Psychological detachment, affective well-being, and work–life interface measures were assessed daily. As expected, growth curve analyses revealed positive effects on psychological detachment, psychological work–family conflict, and work–life balance satisfaction. No effects were found for strain-based work–family conflict. Additionally, segmentation preferences moderated the intervention effect on psychological detachment, such that participants with low segmentation preference reported stronger intervention effects. Unexpectedly, affective well-being increased in both groups.

Practitioner points

- Practicing mindfulness as a cognitive–emotional segmentation strategy enables detachment from work.
- Mindfulness training reduces psychological work–life conflict and enhances work–life balance satisfaction, irrespective of preferences for segmentation or integration.
- Mindfulness training increases detachment from work most successfully for integrators.
- Organizational practices and policies are advised to include brief mindfulness interventions in work–life balance programmes.

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For years, scientists and practitioners have shown that employees must balance between work and home demands. Now that information and communications technology allow employees to choose their working schedules and locations, flexible working designs increasingly blur the work–home boundaries, making it difficult for employees to switch off from work. As flexible working designs have ambiguous impacts on employees (Demerouti, Derks, ten Brummelhuis, & Bakker, 2014), employees must find new ways to balance life domains, through segmentation or integration (Ashforth, Kreiner, & Fugate, 2000; Kreiner, Hollensbe, & Sheep, 2009).

However, tactics that focus on spatial, temporal, or behavioural strategies for separating life domains (Kreiner et al., 2009) may be insufficient for creating boundaries, for integrating work and private domains, or for mental distancing from work-related thoughts and emotions. Mindfulness-based interventions (MBI), which cultivate mindfulness practice to enhance state mindfulness (Jamieson & Tuckey, 2017), have been shown to help workers detach, to cognitively and emotionally separate life domains, and to thus improve work–life balance (Hülshager et al., 2014; Michel, Bosch, & Rexroth, 2014). We tested an online self-training MBI developed by Michel et al. (2014) to help workers better achieve work–life balance and improve well-being. The MBI teaches mindfulness as a cognitive–emotional segmentation strategy for detaching from work. We build on research showing that the MBI is effective for encouraging work–life balance (Michel et al., 2014) and improve well-being (Rexroth, Michel, & Bosch, 2017). However, we extend that research by investigating how intervention effects unfold over time and whether segmentation preferences moderate the effects.

First, we combine a randomized controlled design with daily measurements to study how variables change throughout the intervention, as was done in previous studies comparing changes in recovery and well-being variables (Hülshager, Alberts, Feinholdt, & Lang, 2013; Hülshager, Feinholdt, & Nübold, 2015; Smit & Barber, 2016). This design has a major advantage over pre- and post-intervention measurement designs in indicating how outcome variables change over time.

Second, rather than focus only on the effectiveness of the MBI, we investigate whether different segmentation preferences will alter the trajectories of changes. The positive-activity model proposes that individual features should influence how extensively positive activities improve well-being (Lyubomirsky & Layous, 2013). By studying segmentation preference as a moderator, we extend previous research on individual moderators for MBI effectiveness (Hülshager et al., 2015).

Our study makes several contributions to the literature. We extend research on the use of mindfulness as a cognitive–emotional boundary management strategy, the effectiveness of MBIs over time, and boundary conditions. Our daily measurement design answers calls for analysing how and why MBIs work (Good et al., 2016) by showing how outcomes change over time, when changes occur, and which training aspects are most beneficial.

To integrate the positive-activity model with boundary frameworks (Lyubomirsky & Layous, 2013), we test whether segmentation preferences determine the effectiveness of cognitive–emotional boundary management interventions. By deepening understanding about segmentation preferences as moderators, we contribute to boundary theory (Kreiner, 2006) and answer calls for intervention-based research that reveals who benefits most from mindfulness training (Allen et al., 2015; Eby et al., 2019; Michel et al., 2014).

Last, our controlled intervention design with daily measurements answers calls for more rigorous designs and high-quality randomized controlled trials in work-specific health interventions (O’Shea, O’Connell, & Gallagher, 2016) and MBI research (Good et al., 2016; Lomas, Medina, Ivztan, Rupperecht, & Eiroa-Orosa, 2019; Lomas et al., 2017).

By designing an evidence-based MBI, we fulfil calls for better resource-oriented intervention designs (Briner & Walshe, 2015; Michel, O'Shea, & Hoppe, 2015). Moreover, by investigating work–life balance and well-being indicators for mindfulness as a boundary management strategy, we answer calls to focus on positive non-clinical outcomes when studying MBIs created for the workplace (Lomas et al., 2017, 2019).

Boundary theory and boundary management skills

Boundary theory (Ashforth et al., 2000) explains that individuals create and maintain boundaries separating life domains, such as work and home. However, some individuals may prefer *segmentation* in which life domains are highly differentiated, while others favour *integration*, in which domains overlap. Boundary theory's person–environment fit perspective (Kreiner et al., 2009) explains that incongruence between segmentation preference and possibilities to segment or integrate leads to conflicts between life domains. Individuals then use behavioural, temporal, physical, or communicative strategies to manage boundaries (Kreiner et al., 2009), which can be malleable (Rexroth, Feldmann, Peters, & Sonntag, 2016). However, cognitive–emotional boundary work might be necessary to detach mentally from work (Michel et al., 2014; Rexroth et al., 2017).

Mindfulness and mindfulness-based interventions

The two-component model of mindfulness (Bishop et al., 2004) explains that mindfulness requires (1) self-regulation of attention, awareness, and presence in moment-to-moment observations of immediate thoughts, feelings, and sensations and (2) curiosity, openness, and acceptance of momentary experiences without elaboration or rumination about thoughts, feelings, and sensations. Mindfulness practice enhances state mindfulness, that is, the extent to which individuals regulate their attention as described, and subsequently increases trait mindfulness (Bishop et al., 2004; Jamieson & Tuckey, 2017). Positive psychology interventions are 'treatment methods or intentional activities that aim to cultivate positive feelings, behaviours, or cognitions' (Sin & Lyubomirsky, 2009, p. 468). MBIs align with those principles by cultivating mindfulness practice (Jamieson & Tuckey, 2017) to improve mental and physical health, enhance cognition and affect (Creswell, 2017), and ensure positive well-being, relationships, and work performance (Good et al., 2016). Several meta-analyses (Bartlett et al., 2019; Lomas et al., 2019; Virgili, 2015) and reviews (Allen et al., 2015; Eby et al., 2019; Lomas et al., 2017) have shown that MBIs specifically designed for workplaces reduce employee stress and improve well-being and mental health, which accounts for growing interest in MBIs for workers (Eby et al., 2019).

Mindfulness as a cognitive–emotional segmentation strategy

Mindfulness practice is used to show employees how to set cognitive–emotional boundaries (Michel et al., 2014; Rexroth et al., 2017), first by bringing their awareness back to the present when their attention turns to work-related worries (Bishop et al., 2004), for example by using breathing techniques to stay anchored in the moment. Second, they learn to notice when they begin elaborating on work events and then to disengage from work-related thoughts (Bishop et al., 2004). Indeed, mindfulness a cognitive–emotional segmentation strategy has been shown to increase detachment and satisfaction with work–life balance, and reduce work–family conflict (WFC) (Michel et al., 2014). Our MBI was designed to encourage detachment, reduce WFC, increase

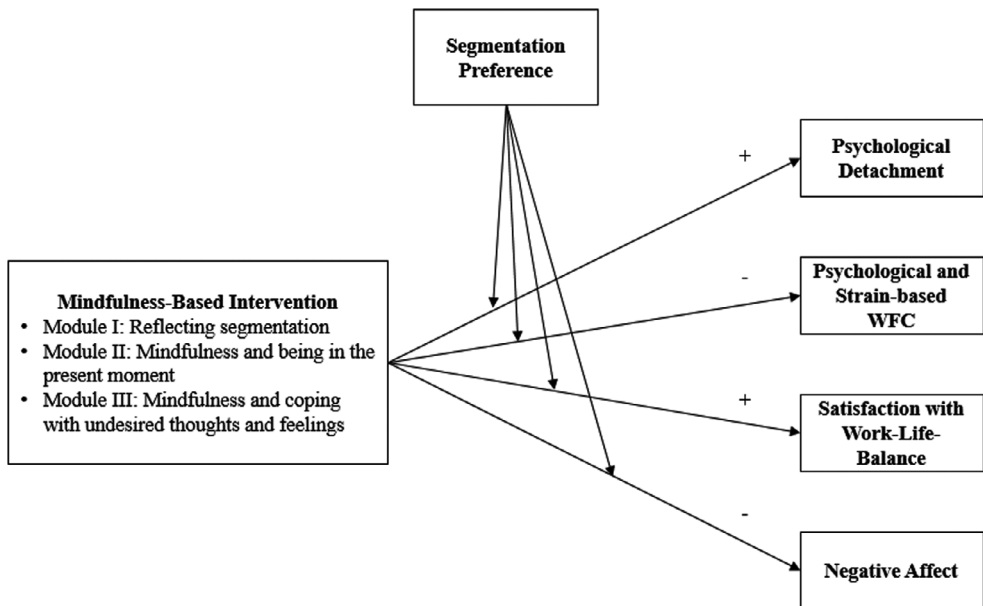


Figure 1. Hypothesized model of intervention effects.

satisfaction with work–life balance, and enhance affective well-being, with segmentation preference as a moderator (Figure 1).

Intervention effects on psychological detachment

MBI participation is expected to increase psychological detachment, that is, the ‘sense of being away from the work situation’ (Etzion, Eden, & Lapidot, 1998, p. 579). Mental disengagement goes beyond physical absence and is essential for recovery from work and stressors (Sonnetag & Fritz, 2007). State mindfulness can attenuate the impact of job stressors on psychological detachment (Sonnetag & Fritz, 2015).

Being present is the first component of the two-component model of mindfulness (Bishop et al., 2004). That is, when employees focus on the present after work, they can avoid thinking about past or future-related work issues. The second component is noticing but not ruminating about thoughts and feelings (Bishop et al., 2004). Mindfulness practitioners learn to notice and then detach from their work-related thoughts. Supporting diary studies have indicated that attention redirection prevents workload concerns from negatively affecting detachment (Smit & Barber, 2016) and that state mindfulness facilitates psychological detachment (Haun, Nübold, & Bauer, 2018; Hülshager et al., 2014), which leads to our first hypothesis.

Hypothesis 1. Psychological detachment will increase over time among the MBI group compared to the control group.

Intervention effects on work–life balance

To conceptualize different aspects of the work–life interface (Casper, Vaziri, Wayne, DeHauw, & Greenhaus, 2018; Wayne, Butts, Casper, & Allen, 2017), we evaluate how well

the intervention reduces the spillover between work and private roles and whether it positively affects satisfaction with work–life balance.

Employees undergo *psychological conflict* when they are ‘mentally distracted or pre-occupied with one role while physically present in another role’ (van Steenbergen, Ellemers, & Mooijaart, 2007, p. 280). When employees ruminate about work at home, they experience psychological WFC (Carlson & Frone, 2003). To reiterate, mindfulness implies self-regulation of attention for maintaining presence in the moment and non-elaborative experience of thoughts and feelings (Bishop et al., 2004). Mindfulness practitioners should be less pre-occupied with work roles because they can focus on present roles and disengage from rumination after work. Consequently, mindfulness training should reduce psychological WFC.

When ‘strain experienced in one role intrudes into and interferes with participation in another role’ (Carlson, Kacmar, & Williams, 2000, p. 250), the result is *strain-based conflict*. Thus, when work roles cause stress and emotional depletion that then interferes with family life, employees experience strain-based WFC. Mindfulness practitioners learn to fundamentally shift their perspectives, a process called *reperceiving* (Shapiro, Carlson, Astin, & Freedman, 2006) or *decentred perspective* (Bishop et al., 2004), which allows them to change subjective meanings about unpleasant thoughts and emotions and instead perceive thoughts and emotions as being transient (Bishop et al., 2004). By shifting perspectives, they objectively witness thoughts and emotions (Shapiro et al., 2006). Emotional distress then becomes less unpleasant (Bishop et al., 2004). Moreover, mindfulness practice energizes (Allen & Kiburz, 2012; Brown & Ryan, 2003) and renews energies needed to fulfil family roles. Consequently, mindfulness training should reduce strain-based WFC, as shown in studies indicating that MBIs alleviate WFC (Kiburz, Allen, & French, 2017).

Hypothesis 2. Psychological and strain-based WFC will decrease over time among the MBI group compared to the control group.

If employees feel that they meet the multiple demands of work and family roles, they have *satisfaction with work–life balance* (Valcour, 2007). Mindfulness practitioners learn to be present in the moment (Bishop et al., 2004). Thus, they should be fully present in family life without being distracted by work. An accepting orientation – the second component of mindfulness (Bishop et al., 2004) – should further enhance refrainment from work-related distress and engagement in family roles. Consequently, they will positively evaluate their ability to combine work and family roles and will feel satisfied with their work–life balance, as supported in studies showing that trait mindfulness is positively connected to work–family balance (Allen & Kiburz, 2012).

Hypothesis 3. Satisfaction with work–life balance will increase over time among the MBI group compared to the control group.

Intervention effects on affective well-being

To study affective well-being, we observe *negative affect*, a state of ‘subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states’ (Watson, Clark, & Tellegen, 1988, p. 1063). Negative affect has been shown to have stronger

impacts than positive affect (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), especially in spilling over from work to home (Montgomery, Panagopoulou, Peeters, & Schaufeli, 2005; Williams & Alliger, 1994). Mindfulness practitioners learn to shift perspectives to reduce negative thinking (Good et al., 2016) and thus decrease emotional distress (Bishop et al., 2004; Shapiro et al., 2006). Hence, practicing mindfulness should reduce negative affect. Moreover, mindfulness training has been shown empirically to enhance well-being in work contexts (Bartlett et al., 2019; Lomas et al., 2019), decrease perceived stress and negative affect when used daily (Lacaille et al., 2018), and increase segmentation of life domains (Rexroth et al., 2017) which is associated with well-being (Rexroth, Sonntag, & Michel, 2014).

Hypothesis 4. Negative affect will decrease over time among the MBI group compared to the control group.

Segmentation preference as a moderator

The positive-activity model (Lyubomirsky & Layous, 2013) proposes that certain person features may influence intervention effectiveness. We integrate this proposition into the boundary framework to assume that segmentation preferences as a person feature are likely to moderate how much MBI participants profit from employing mindfulness as a cognitive–emotional segmentation strategy and, thus, from the MBI. According to boundary theory, people vary in preferences for segmenting or integrating aspects of work and home and will employ boundary tactics accordingly (Ashforth et al., 2000; Kreiner, 2006). In the work–family context, segmenters prefer to separate work from family and vice versa; integrators prefer to combine work and family roles.

To achieve their preferences, people with high segmentation preference employ boundary work tactics to separate life domains (Kreiner et al., 2009). For example, they avoid work-related technology at home, which in turn improves psychological detachment and reduces WFC (Park, Fritz, & Jex, 2011; Yang, Zhang, Shen, Liu, & Zhang, 2019). Other studies confirmed that high segmentation preference is associated with psychological detachment (Hahn & Dormann, 2013) and also with less emotional exhaustion (Foucreault, Ollier-Malaterre, & Ménard, 2018). While segmentation preferences have to be distinguished from segmentation behaviours (Foucreault et al., 2018), Powell and Greenhaus (2010) showed that high segmentation preferences are positively related to actual segmentation of life domains, and actual segmentation is negatively related to WFC. Moreover, integration increases blurring of boundaries between life domains and thus the chance of spillover between life domains (Ashforth et al., 2000). Although spillover can be positive, for example when positive work experiences enrich employees' home lives, negative spillover can lead to more experienced WFC (Powell & Greenhaus, 2010).

Boundary theory's person–environment fit perspective (Kreiner, 2006; Kreiner et al., 2009) proposes that employees can establish and manage boundaries in congruence with their preferences when they perceive that given segmentation possibilities match their preferences. The congruence between segmentation preferences and the environment positively affects WFC, stress, and job satisfaction (Kossek & Lautsch, 2012; Kreiner, 2006). As the MBI facilitates separation of life domains, segmenters might benefit more from the MBI because segmentation matches their preferences. Moreover, the MBI might even negatively affect integrators, as it would encourage boundary tactics that are incongruent with their preferences.

However, in line with boundary theory, both segmenters and integrators may benefit from the MBI because it enforces segmentation of life domains. Moreover, MBI participants learn to appropriately strengthen and control their cognitive–emotional boundaries between life domains, and feelings of being in control are very important (Kossek, Ruderman, Braddy, & Hannum, 2012). Still, segmentation preference might moderate MBI effectiveness. As stated above, segmentation can reduce WFC. People with low segmentation preferences generally employ less tactics to segment life domains (Kreiner et al., 2009). Yet, they might wish to segment life domains and avoid experiencing WFC in certain situations, for instance, when they spend time with their family and want to focus on the moment. Hence, they might profit from the MBI, as they are likely to learn a new segmentation strategy. Segmenters, on the contrary, might profit less from the MBI because they are more likely to employ boundary work tactics to segment life domains (Kreiner et al., 2009) and thus might already practice cognitive–emotional segmentation.

Given the contradicting assumptions derived from boundary theory and the person–environment fit perspective, we cannot deduce a clear expectation how segmentation preferences will affect MBI effectiveness. We, thus, pose the following research question.

Research Question 1: Will MBI participants with low or high segmentation preference show stronger and more accelerated changes in (1) psychological detachment, (2) strain-based and psychological WFC, (3) satisfaction with work–life balance, and (4) negative affect?

Method

Study design and participants

For our experimental diary study, we compared an experimental group with a waitlist control group. First, we performed a pre-intervention assessment followed with daily intervention assessments. Participants were aware that they were randomly assigned to one of the two groups and that each group would receive questionnaires and self-training instructions in different orders. Self-reported data were collected at Time 1, directly before the experimental group took part in the intervention. Participants of both groups were instructed to fill out a daily survey each day over three weeks (Monday to Friday, 15 working days). Subsequently, the control group received the intervention. We considered the wait-list control group to be active because they filled in daily questionnaires and would be subject to the behaviour changes that accompany self-monitoring (Michie, Johnston, Francis, Hardeman, & Eccles, 2008; Michie et al., 2013).

In fall 2013, we advertised the study via flyers, professional e-mail list servers, and a snowball sampling approach (Vine, 2011) through our professional and social contacts. The study was promoted as a scientific project offering a free three-week online self-training intervention for using mindfulness as a strategy for detaching from work and enhancing work–life balance. The internet signup yielded 379 participants who were randomly assigned to either the intervention group ($n = 192$) or the control group ($n = 187$). The time 1 questionnaire was completed by 164 participants of the intervention group and 168 participants of the control group. Four from the control group created the same personal code, which prevented us from assigning daily questionnaires correctly, and thus, they were excluded. A total of 72 did not complete any daily questionnaires: 45 (27.44%) in the intervention group and 27 (16.46%) in the control group, $\chi^2(1, 328) = 5.14, p < .05$. Analyses revealed that dropouts (those who did not fill

in the daily questionnaires) were younger than those who filled in at least one diary, $t(116.21) = -3.46, p < .01, d = -0.46, 95\% \text{ CI} [-0.72, -0.19]$. There were no differences regarding gender, $\chi^2(1, 328) = 0, p = 1$, or segmentation preferences, $t(115.37) = -0.02, p = .98, d = -0.00, 95\% \text{ CI} [-0.27, 0.26]$.

Of the remaining 256, we excluded 66 who completed fewer than three daily questionnaires: 39 (23.78%) in the intervention group and 27 (16.46%) in the control group, $\chi^2(1, 256) = 5.02, p < .05$. Analyses revealed no differences between participants in the final sample and participants who only completed one or two daily questionnaires (i.e., who were not retained in the final sample) regarding segmentation preferences, $t(107.72) = -0.58, p = .57, d = -0.08, 95\% \text{ CI} [-0.37, 0.20]$, and demographic variables, gender: $\chi^2(1, 256) = 0.24, p = .63$; age: $t(131.96) = -0.32, p = .75, d = -0.04, 95\% \text{ CI} [-0.32, 0.24]$.

The final sample comprised 190 participants, 80 in the intervention group and 110 in the control group; mean age 42.23 ($SD = 10.72$), mostly women (75.3%), mostly fulltime workers (71.6%), with university degrees (74.2%), and living with partners (76.8%). Almost one third had children living in their household (30.0%). Our recruiting strategy drew participants from various occupations such as health and social services, processing and manufacturing, finance and insurance, and science and education. Groups indicated similar segmentation preferences, $t(177.25) = -0.63, p = .53, d = -0.09, 95\% \text{ CI} [-0.38, 0.20]$, and demographic variables, gender: $\chi^2(1, 190) = 0.06, p = .81$; age: $t(173.55) = -0.28, p = .78, d = -0.04, 95\% \text{ CI} [-0.33, 0.25]$, at Time 1. Participants completed questionnaires for an average of 9.46 days ($SD = 3.88$).

Mindfulness-based intervention to promote work–life balance

Our intervention is an adapted version of the effective training developed by Michel et al. (2014). Building on boundary theory (Ashforth et al., 2000) and the two-component model of mindfulness (Bishop et al., 2004), the three-week training teaches mindfulness practice as a cognitive–emotional segmentation strategy (Michel et al., 2014). The intervention builds on exercises related to mindfulness-based cognitive therapy (MBCT, Segal, Williams, & Teasdale, 2002), mindfulness-based stress reduction (MBSR, Kabat-Zinn, 1982, 2006), and self-education mindfulness guidebooks (Siegel, 2010; Weiss, Harrer, & Dietz, 2010). Although originally employed in therapeutic contexts, guided mindfulness meditation and daily exercise training programmes can increase mindfulness in the work context and are easily integrated into daily life (e.g., Hülshager et al., 2013, 2015; Michel et al., 2014; Rexroth et al., 2017).

Altogether, the intervention included three online modules, each emphasizing strategies for detaching from work. Each module had a daily task, while Parts A and B were completed during the weekend. In Part A, participants received basic information combined with practical exercises that took approximately 20 min. Part B was a practical exercise taking approximately 3–5 min. The daily task was similar to Part B and conducted for the following five working days. Michel et al. (2014) provide a detailed description of all modules. Participants received information and instructions in a written, downloadable format. They could access audio files for the mindfulness exercises on the project homepage. To remind all participants to fill out daily questionnaires and to remind the intervention group to carry out daily tasks, we sent up to three text messages on Mondays, Wednesdays, and/or Fridays. Additionally, we sent reminder e-mails at the beginning of each week.

Measures

We collected data through a general questionnaire and brief daily surveys. The general questionnaire assessed demographic information and segmentation preferences. The daily surveys, answered for 15 working days, assessed mindfulness, detachment, work–life balance, and affective well-being. All questionnaires were in German. A translation/back-translation procedure was used for items unavailable in German (Brislin, 1980; Graham & Naglieri, 2003). Unless indicated otherwise, participants responded on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). For the between-person construct (segmentation preference), we computed McDonald's omegas; to estimate within-person reliability, we applied the method proposed by Geldhof, Preacher, and Zyphur (2014) (Table 1).

Segmentation preference was assessed with three items from Kreiner (2006). For example, 'I don't like to have to think about work while I'm at home'.

Mindfulness was assessed with three items adapted from the German version (Michalak, Heidenreich, Ströhle, & Nachtigall, 2008) of the mindfulness attention awareness scale (MAAS; Brown & Ryan, 2003). Participants rated all items on a 5-point frequency scale (1 = *rarely*; 5 = *almost always*). For example, 'Today, I find myself doing things without paying attention'.

Psychological detachment from work during time off was assessed with three items adapted from the respective subscale of the recovery experience questionnaire (Sonnentag & Fritz, 2007). For example, 'Today, after workhours I distanced myself from my work'.

Psychological WFC was assessed with three items adapted from van Steenbergen et al. (2007). For example, 'Today, when I was at home, I thought about work-related problems'.

Strain-based WFC was measured with the 3-item subscale for strain-based WFC from the WFC scale (Carlson et al., 2000), adapted to daily measurement and focused on private rather than family life. For example, 'Due to all the pressures at work, I was too stressed to do the things I enjoy when I came home today'.

Satisfaction with work–life balance was measured with three items from the satisfaction with work–family balance scale (Valcour, 2007), adapted to focus on private life, rated on a 5-point Likert scale (1 = *very dissatisfied*; 5 = *very satisfied*). For example, 'How satisfied are you today with your ability to balance the needs of your job with those of your personal or family life?'

Negative affect was assessed with three items adapted from the German version of the negative affect scale (Krohne, Egloff, Kohlmann, & Tausch, 1996) taken from the positive and negative affect scale (PANAS; Watson et al., 1988) for measuring negative affect such as nervous, irritated, or depressed.

Data analysis

Data were longitudinally nested with measurement occasions (Level 1) within individuals (Level 2). For data analyses, we applied the R package lme4 (Bates, Mächler, Bolker, & Walker, 2015). Level 1 data consisted of 3–15 measurement points ($M = 9.46$, $SD = 3.88$; overall response rate 63%). The Level 2 variable, segmentation preference, was measured only once at baseline.

In a first step, we analysed state mindfulness changes across intervention and control groups as a manipulation check. Being unable to track whether participants actually completed their weekly modules and daily exercises, we used changes in mindfulness

Table 1. Means and variances, bivariate correlations, intraclass correlation coefficients, and reliability estimates of study measures at the within-person and between-person level

	1	2	3	4	5	6	7	ω	ρ
1 Mindfulness									.39
2 Detachment	.36							.66	.33
3 Psychological Work–Family Conflict	-.41	-.92						.92	.36
4 Strain-based Work–Family Conflict	-.59	-.53	.57					.84	.37
5 Satisfaction with Work–Life Balance	.52	.58	-.40	.49				.88	.38
6 Negative Affect	-.68	-.47	.32	-.23	-.02			.62	.44
7 Segmentation Preference	-.10	.25	-.25	-.01	-.05	.05		–	–
M	3.43	3.42	2.20	2.02	3.32	1.92	3.42		
Var	0.88	1.48	1.22	1.10	1.16	0.92	0.79		
ω	.86	.99	.95	.98	.99	.90	.88		

Note. Between-person ($N = 190$) statistics below the diagonal, within-person ($N = 1,798$) statistics above the diagonal.

levels as a manipulation check, expecting that intervention group participants would perform the intervention and be more likely to show stronger increased mindfulness than control group participants.

To test the hypotheses, we computed a series of growth curve models to analyse patterns of change over time and to observe how change trajectories differed between groups. To investigate which model would best fit the data for each outcome, we first compared the fits of a linear or a quadratic change trajectory, using the simple number of daily measurement occasions for the linear trajectory and the squared number of diary entries for the quadratic trajectory. Models assuming a linear versus a quadratic trajectory are nested. To compare them, the deviance test can be applied as a log-likelihood-based goodness-of-fit statistic. In addition, we tested a log-linear change trajectory as proposed by the dose-effect model in psychotherapy research (e.g., Falkenström, Josefsson, Berggren, & Holmqvist, 2016). The log-linear model is based on the natural log of number of diary entries and is not nested within models assuming a linear or a quadratic trajectory. To evaluate which model fits best, we compared the log-linear model with either the linear model or the quadratic model (depending on which one fit better), using the Akaike information criterion (AIC) and the Bayesian information criterion (BIC).

After identifying the most fitting model, we looked at (1) main effects of time indicating that the relevant outcome changed during the intervention and (2) interaction effects of time and group variables indicating that changes in outcome depended on group membership. Hence, the interaction term provides the most relevant information for testing the intervention effectiveness, aligned with our objective to find a stronger reduction of negative outcomes and a stronger increase in positive outcomes in the intervention rather than in the control group. For the moderation research question, we used the grand-mean centred segmentation preference scale assessed at baseline to compute cross-level interactions. Moderation effects would be supported if group membership had a significant three-way interaction with time and segmentation preference.

Results

Table 1 shows means, variances, zero-order correlations, and consistencies at both between-person and within-person levels.

Manipulation check

In a first step, we examined whether state mindfulness trajectories differed across groups, a particularly important concern because our active control group completed diaries as often as the intervention group. When participants rated items on daily mindfulness and detachment, the repetition could increase self-awareness and induce intervention effects. The intervention group showed significantly stronger increased mindfulness than the control group (group \times time interaction: $b = 0.02$, $t = 2.10$, 95% CI [0.00, 0.04]),¹ although time had a main effect as well ($b = 0.01$, $t = 2.34$, 95% CI [0.00, 0.02]). The significant positive interaction between time and group indicated that the two groups showed significantly differing change patterns in mindfulness. Although the results

¹ As long as the lower bound and upper bound of the confidence interval have the same sign, null is not included in the reported confidence intervals. In these confidence intervals, numbers not equal to null would appear if more decimal places were reported.

indicate that both groups experienced increased mindfulness, the intervention group showed a stronger increase. Hence, our intervention effectively influenced daily mindfulness levels.

Psychological detachment

Hypothesis 1 predicted that intervention participants would become more competent in detaching from work. First, we compared the linear with the quadratic trajectory and found a better fit for the quadratic model than for the linear model ($\Delta\chi^2 = 9.85$, $df = 2$, $p = .007$). Second, we compared the quadratic with the log-linear model. AIC and BIC criteria indicated that the log-linear model fit best (log-linear: AIC 5379.9, BIC 5412.9; quadratic: AIC 5381.3, BIC 5425.3). The model indicated that the intervention group showed a steeper positive change trajectory in psychological detachment than the control group, $b = 0.25$, $t = 3.82$, 95% CI [0.12; 0.38], supporting hypothesis 1 (Table 2 summarizes all coefficients for the models in hypotheses 1–4).

Table 2. Results of the Multilevel Models for all outcomes

Outcome Predictor	B	SE B	t	95% CI
PD				
Intercept	3.25	.10	32.77	[3.05; 3.44]
Group	−0.39	.16	−2.49	[−0.70; −0.08]
Log(Day)	0.07	.04	1.91	[−0.00; 0.15]
Group x Log(Day)	0.25	.07	3.82	[0.12; 0.38]
PWFC				
Intercept	2.44	.09	26.59	[2.26; 2.61]
Group	0.21	.15	1.43	[−0.08; 0.49]
Log(Day)	−0.11	.03	−3.31	[−0.18; −0.05]
Group x Log(Day)	−0.12	.06	−2.03	[−0.23; −0.00]
SBWFC				
Intercept	2.10	.09	24.06	[1.93; 2.27]
Group	0.19	.14	1.36	[−0.08; 0.46]
Log(Day)	−0.05	.03	−1.49	[−0.11; 0.02]
Group x Log(Day)	−0.04	.06	−0.77	[−0.15; 0.07]
SWLB				
Intercept	3.23	.09	36.42	[3.05; 3.40]
Group	−0.25	.14	−1.75	[−0.52; 0.03]
Log(Day)	0.04	.03	1.30	[−0.02; 0.11]
Group x Log(Day)	0.13	.06	2.38	[0.02; 0.24]
NA				
Intercept	2.06	.08	25.53	[1.90; 2.21]
Group	0.17	.13	1.30	[−0.08; 0.42]
Log(Day)	−0.08	.03	−2.86	[−0.14; −0.03]
Group x Log(Day)	−0.06	.05	−1.30	[−0.16; 0.03]

Notes. NA = negative affect; PD = psychological detachment; PWFC = psychological work–family conflict; SBWFC = strain-based work–family conflict; SWLB = satisfaction with work–life balance. $N = 1798$. All predictors are centred around the person mean.

Psychological and strain-based WFC

In hypothesis 2, we expected that mindfulness training would decrease psychological and strain-based WFC. Again, we first compared the linear with the quadratic trajectory. For psychological WFC, adding the quadratic predictor to the model did not improve model fit, $\Delta\chi^2 = 5.65$, $df = 2$, $p = .06$. Comparing the linear with the log-linear trajectory, the log-linear trajectory corresponded with data better than the linear trajectory (log-linear: AIC 4992.7, BIC 5025.7; linear: AIC 4999.4, BIC 5032.3). The log-linear model revealed that psychological conflict had a significant negative trajectory over time for both groups, but again, the intervention group showed the steeper trajectory ($b = -0.12$, $t = -2.03$, 95% CI [-0.23; -0.00]), indicating that the intervention group had stronger reduced psychological conflict over time. Similarly, for strain-based WFC, adding the quadratic predictor to the model did not improve model fit ($\Delta\chi^2 = 1.23$, $df = 2$, $p = .54$), and the log-linear model fit data better than the linear trajectory, but with very small differences (log-linear: AIC 4801.3, BIC 4834.3; linear: AIC 4802.0, BIC 4834.9). However, evidence failed to indicate that the intervention affected strain-based WFC. Therefore, hypothesis 2 was supported only partially.

Satisfaction with work–life balance

Hypothesis 3 predicted that intervention participants would report increased satisfaction with work–life balance. Again, we first computed a linear and a quadratic trajectory and compared models with the deviance test. Adding the quadratic predictor to the model did not improve model fit ($\Delta\chi^2 = 3.14$, $df = 2$, $p = .21$). Then comparing the linear with the quadratic trajectory, information criteria indicated that the log-linear model was a slightly better fit than the linear model (log-linear: AIC 4820.3, BIC 4853.3; linear: AIC 4822.5, BIC 4855.5). Again, the differences were small, but both models are equally parsimonious and yield similar results, so we report the slightly more adequate log-linear model, showing a steeper positive trajectory in improved satisfaction with work–life balance over time for the intervention group than for the control group ($b = 0.13$, $t = 2.38$, 95% CI [0.02; 0.24]), supporting hypothesis 3.

Negative affect

To test the hypothesis regarding changes in negative affect, we conducted the same comparisons. When we compared the linear and quadratic models, adding the quadratic predictor to the model did not improve model fit ($\Delta\chi^2 = 5.54$, $df = 2$, $p = .06$). When we compared the linear and log-linear models, the log-linear model yielded the best results (log-linear: AIC 4297.4, BIC 4330.4; linear: AIC 4303.2, BIC 4336.2). Unlike predicted, we found no evidence for different trajectories of negative affect over time between groups. Rather, both groups reported significantly decreased negative affect ($b = -0.08$, $t = -2.86$, 95% CI [-0.14; -0.03]) as indicated by the estimated coefficient for log of time.

Moderation analyses

We asked how segmentation preference would moderate MBI effects on psychological detachment, work–life balance, and affective well-being. Moderation effects would be supported if group membership had a significant three-way interaction with time and segmentation preference. The log-linear trajectory fit best in all models, so we used them to examine whether segmentation preference (Level 2 variable) would modulate responsiveness to mindfulness training. Table 3 displays coefficients for the models.

Table 3. Results of the moderation analyses

Outcome Predictor	B	SE B	t	95% CI
PD				
Intercept	3.25	.10	33.24	[3.06; 3.44]
Group	−0.39	.16	−2.53	[−0.70; −0.09]
Log(Day)	0.07	.04	1.76	[−0.01; 0.14]
SP	−0.04	.11	−0.40	[−0.26; 0.17]
Group × Log(Day)	0.26	.07	3.90	[0.13; 0.38]
Group × SP	0.35	.17	2.05	[0.02; 0.68]
Log(Day) × SP	0.11	.04	2.48	[0.02; 0.19]
Group × Log(Day) × SP	−0.14	.07	−1.96	[−0.27; −0.00]
PWFC				
Intercept	2.43	.09	26.98	[2.26, 2.61]
Group	0.20	.14	1.42	[−0.08, 0.48]
Log(Day)	−0.11	.03	−3.24	[−0.18, −0.04]
SP	−0.02	.10	−0.24	[−0.22, 0.17]
Group × Log(Day)	−0.12	.06	−2.05	[−0.24, −0.01]
Group × SP	−0.27	.16	−1.75	[−0.58, 0.03]
Log(Day) × SP	−0.05	.04	−1.32	[−0.13, 0.02]
Group × Log(Day) × SP	0.06	.06	0.92	[−0.06, 0.18]
SBWFC				
Intercept	2.09	.09	24.20	[1.92, 2.26]
Group	0.19	.14	1.42	[−0.07, 0.46]
Log(Day)	−0.05	.03	−1.39	[−0.11, 0.02]
SP	0.23	.10	2.41	[0.04, 0.42]
Group × Log(Day)	−0.05	.06	−0.82	[−0.15, 0.06]
Group × SP	−0.38	.15	−2.56	[−0.68, −0.09]
Log(Day) × SP	−0.05	.04	−1.49	[−0.12, 0.02]
Group × Log(Day) × SP	0.02	.06	0.31	[−0.10, 0.13]
SWLB				
Intercept	3.24	.09	36.97	[3.07, 3.41]
Group	−0.25	.14	−1.83	[−0.53, 0.02]
Log(Day)	0.04	.03	1.13	[−0.03, 0.10]
SP	−0.27	.10	−2.75	[−0.46, −0.08]
Group × Log(Day)	0.14	.06	2.45	[0.03, 0.25]
Group × SP	0.34	.15	2.22	[0.04, 0.63]
Log(Day) × SP	0.09	.04	2.62	[0.02, 0.17]
Group × Log(Day) × SP	0.00	.06	0.05	[−0.11, 0.12]
NA				
Intercept	2.05	.08	25.52	[1.89, 2.20]
Group	0.17	.13	1.36	[−0.08, 0.42]
Log(Day)	−0.08	.03	−2.75	[−0.13, −0.02]
SP	0.23	.09	2.51	[0.05, 0.40]
Group × Log(Day)	−0.07	.05	−1.37	[−0.16, 0.03]
Group × SP	−0.40	.14	−2.88	[−0.67, −0.13]
Log(Day) × SP	−0.05	.03	−1.56	[−0.11, 0.01]
Group × Log(Day) × SP	0.09	.05	1.74	[−0.01, 0.19]

Notes. $N_{\text{Level}2} = 190$, $N_{\text{Level}1} = 1798$. All predictors are centred around the person mean.

NA = negative affect; PD = psychological detachment; PWFC = psychological work–family conflict; SBWFC = strain-based work–family conflict; SP = segmentation preference; SWLB = satisfaction with work–life balance.

Psychological detachment

Research question 1a asked how segmentation preference would moderate the trajectory of psychological detachment. Again, the intervention strongly affected psychological detachment. When we included segmentation preference as a moderator, a significant three-way interaction was found; thus, segmentation preference determined the increase of psychological detachment over time in both groups ($b = -0.14$, $t = -1.96$, 95% CI $[-0.27; -0.00]$, Figure 2). In addition, all two-way interactions yielded significant results (group \times log of time, log of time \times segmentation preference, group \times segmentation preference). The group \times log of time interaction indicated that intervention and control group participants reported different trajectories, as proposed in hypothesis 1. The log of time \times segmentation preference interaction indicated that segmentation preference affected detachment trajectories. The group \times segmentation preference interaction implied that segmentation preferences affected detachment trajectories more strongly in the intervention group, such that intervention effects on psychological detachment were stronger when participants had low segmentation preference.

Psychological and strain-based WFC

Research question 1b asked how segmentation preference would moderate the trajectory of WFC. Although hypothesis 2 indicated that group and log of time would have a significant two-way interaction, the two other two-way interactions (log of time \times segmentation preference, group \times segmentation preference) and the three-way interaction yielded non-significant results for psychological WFC. A non-significant three-way interaction was also found for strain-based WFC. Of the two-way interactions, only the group \times segmentation preference interaction was significant. To summarize, we found no support indicating that segmentation preference modulates responsiveness to the intervention in terms of pronounced changes in psychological or strain-based WFC.

Satisfaction with work–life balance

Research question 1c asked how segmentation preference would moderate the trajectory of satisfaction with work–life balance. However, all two-way interactions yielded

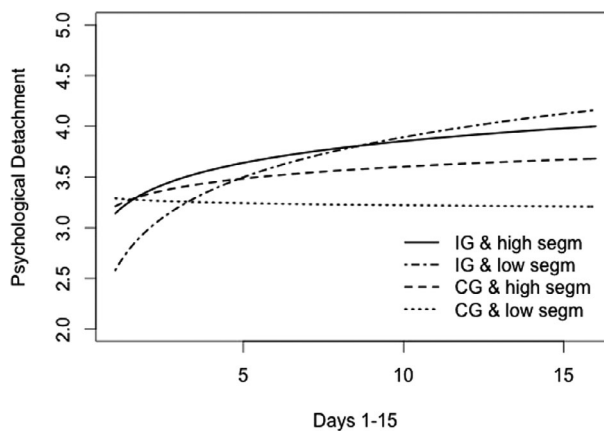


Figure 2. Growth trajectories of psychological detachment over the course of the study. CG = control group; IG = intervention group; high segm = high segmentation preference; low segm = low segmentation preference.

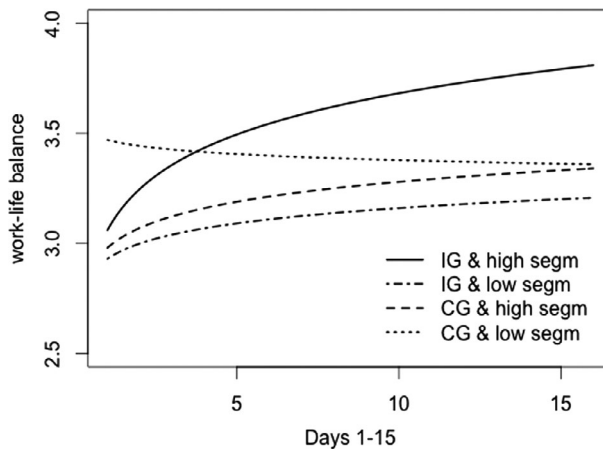


Figure 3. Growth trajectories of satisfaction with work–life balance over the course of the study. CG = control group; IG = intervention group; high segm = high segmentation preference; low segm = low segmentation preference.

significant results (group \times log of time, log of time \times segmentation preference, group \times segmentation preference). Similar to research question 1a, in the group \times log of time interaction, the groups reported different trajectories, indicating an effective intervention, as in hypothesis 3. In the log of time \times segmentation preference interaction, segmentation preferences caused the groups to show different trajectories for work–life balance. In the group \times segmentation preference interaction, segmentation preference had a stronger effect for work–life balance among the intervention group. However, the three-way interaction was non-significant, so segmentation preferences had the same effects on work–life balance in both groups (Figure 3).

Negative affect

Research question 1d asked how segmentation preference would moderate the trajectory of negative affect. Again, we failed to find that the intervention specifically impacted negative affect (group \times log of time), but both groups experienced significantly reduced negative affect (log of time). Moreover, the group \times segmentation preference interaction was significant. The log of time \times segmentation preference interaction and the three-way interaction yielded non-significant results. Over the period of our study, segmenters reported lower levels of negative affect (segmentation preference). When the study ended, intervention group segmenters reported the lowest levels of negative affect (Figure 4).

Discussion

Given the importance of individual segmentation skills in increasingly flexible workplaces, we tested an online self-training MBI for its effects on daily levels of detachment, work–life balance, and affective well-being over 3 weeks. Integrating boundary theory and the positive-activity model, we compared an intervention group practicing mindfulness with a non-practicing control group to test whether segmentation

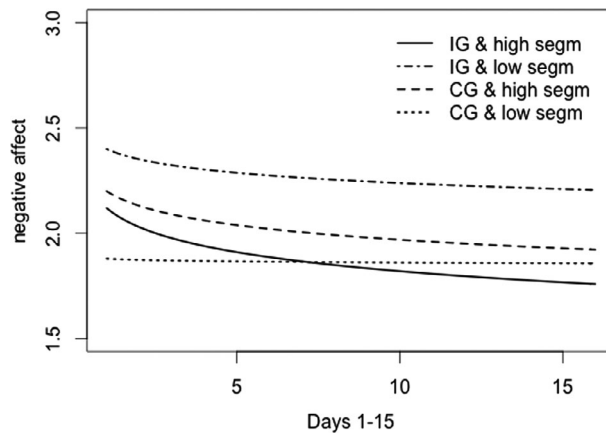


Figure 4. Growth trajectories of negative affect over the course of the study. CG = control group; IG = intervention group; high segm = high segmentation preference; low segm = low segmentation preference.

preferences would affect responses to training. Findings were mixed, supporting some but not all hypotheses.

Intervention effectiveness and change trajectories

In line with our hypotheses, mindfulness training significantly enhanced detachment from work, increased satisfaction with work–life balance, and decreased psychological conflict over time. However, it failed to significantly affect strain-based WFC or negative affect.

Growth curve analyses revealed a log-linear trajectory, indicating that the intervention affected detachment, work–life balance, and negative affect immediately after the intervention started, then affecting the outcomes slowly but steadily. Such trajectories are more common for clinical interventions (cf. the dose-effect model in psychotherapy; e.g., Falkenström et al., 2016). Occupational health research has provided few studies for comparing our results, but our analyses differed from Hülshager et al. (2015) in showing a different development for detachment, perhaps because the interventions were designed differently. We find that the MBI conveys immediate benefits rather than having continuous effects over time, an encouraging indication that MBI participants enjoy quick wins. However, we cannot determine whether the particular content of the first module caused the strong acceleration, or whether other interventions, whatever their content, would show the same general effect. Future research could randomly assign topics to modules and compare change trajectories. Also, future research should identify the most effective durations for MBI practice (Eby et al., 2019). Would a micro-intervention with one module have the same effects as the three-week intervention? Are other modules necessary to stabilize the effects?

Our results indicate that MBI enhances work–life balance. Our findings regarding detachment and psychological conflict concur with research showing that mindfulness training enhances abilities to refrain from work-related worries (Haun et al., 2018; Hülshager et al., 2014; Michel et al., 2014; Querstret, Cropley, & Fife-Schaw, 2017) and that being present in the moment enhances satisfaction with work–life balance (Michel

et al., 2014). Surprisingly, we diverged from Michel et al. (2014) when we failed to find effects on strain-based WFC, perhaps because we observed daily changes rather than comparing pre- and post-data.

Also surprising was that we found no intervention effect on affective well-being. Participants of both groups reported less negative affect over time, which conflicts with findings from a similar three-week mindfulness segmentation training (Rexroth et al., 2017) and with general evidence showing MBIs to positively affect well-being (Bartlett et al., 2019; Lomas et al., 2017). One explanation might be that our training was designed specifically to promote work–life balance. Another explanation is that study participation had a positive effect by itself because our control group was active; all participants regularly answered questionnaires. Well-being may have been improved simply by thinking about work–life balance, mindfulness, and well-being, as was shown in a study in which participants showed improved mental health and well-being by using a reflection-focussed self-monitoring mental health app and completing daily mood surveys (Bakker & Rickard, 2018). Further research should investigate more closely whether diaries alone might improve well-being, and whether self-awareness or other mechanisms would mediate the effect.

Another open research question arises from the strong effects found within the first week of training and the positive effects on well-being in the control group. The intervention's first module required reflection about detachment and segmentation. Mindfulness practice was introduced later. In completing the daily surveys, the active control group had to reflect on the questions. Hence, reflection and mental engagement with work–life and well-being issues may be central mechanisms for training effectiveness. Future research should therefore investigate whether mindfulness practice is the critical ingredient by exploring specific mechanisms in detail (Allen et al., 2015; Virgili, 2015).

Segmentation preference effects on training responsiveness and change trajectories

Segmentation preference moderated the trajectory of psychological detachment in the intervention group. Integrators derived the strongest benefits for psychological detachment, but both integrators and segmenters benefitted equally in psychological WFC and satisfaction with work–life balance. In summary, segmentation skills enhance work–life balance for both segmenters and integrators (Rexroth et al., 2014).

Segmenters appeared to benefit from study participation regarding psychological detachment and satisfaction with work–life balance, whether they received training or just filled out diaries. A tentative interpretation is that segmenters are particularly responsive to any engagement with work–life balance and well-being. Again, simple reflection about work–life balance and affective well-being might have positive effects, especially for segmenters. Regarding affective well-being, segmenters who received training received the most benefits in reducing negative affect, a promising indication that similar interventions would be equally beneficial.

Our findings show promise for integrating the positive-activity model with boundary theory. Segmentation preference appears to affect how cognitive–emotional boundary management interventions will encourage detachment. Moreover, segmentation preference determines whether engagement in training or in reflection only will influence detachment and satisfaction with work–life balance. Although our study supports boundary theory's proposition that individuals differ in segmentation preferences, it contradicts earlier findings showing that integrators enjoy spillover between life domains

and experience less WFC. For instance, one study showed that integrators who frequently used smartphones for work after work hours indicated reduced work–family conflict and better family role fulfilment (Derks, Bakker, Peters, & van Wingerden, 2016). Hence, more research is needed to examine whether segmentation preference alone can alleviate work–life conflicts, and how important segmentation skills are.

Moreover, segmentation preference seems to moderate how strongly MBIs will increase detachment but not to moderate how strongly MBIs will affect work–life balance constructs and affective well-being. Hence, future boundary research and resource-oriented intervention research should include segmentation preference as a person feature that affects training effectiveness. Moreover, further research should draw on the positive-activity model to investigate which person features serve as individual boundary conditions of interventions.

Limitations and implications for future research

As with every empirical study, our study has limitations. First, we experienced a high dropout rate. About 51% in the intervention group and 33% in the control group completed fewer than three diary questionnaires. However, dropout rates of 50% and higher are expected in web-based interventions (Bausch, Michel, & Sonntag, 2014; Nistor & Neubauer, 2010), in MBIs for employees (Hülshager et al., 2013; Michel et al., 2014; Rexroth et al., 2017) and in organizational survey research (Anseel, Lievens, Schollaert, & Choragwicka, 2010). Participants may drop out for various individual or environmental reasons. In addition, many may have disliked having to answer several questionnaires and perform daily tasks for three weeks. Of course, some may have continued practicing mindfulness but stopped filling out questionnaires.

Another limitation is that participants were self-selected. However, self-selectors are likely to be highly motivated and have high outcome expectancy, ensuring that they will benefit from interventions (Sin & Lyubomirsky, 2009). Self-selection may also explain why three quarters of our participants were women, and aligns with the positive-activity model in that women are more likely to choose interventions with specific features such as meditation (Lyubomirsky & Layous, 2013; Michel et al., 2014). Our use of self-report measures raises concerns about common method bias. We believe that self-reports were reasonable considering our interest in internal states and perceptions of mindfulness, detachment, work–life balance, and well-being (Spector, 2006). Our data were from 2013. We believe that the underlying processes should remain stable, but recent accelerations of technological change may have intensified spillovers from work to life domains.

When recruiting participants, we told them that the web-based intervention was designed to support better work–life balance and that it would teach them how to use mindfulness as a strategy for detachment and recovery after work. Their expectations might have worked as a demand characteristic, evoking responses that confirmed the hypotheses (Nichols & Maner, 2008). However, the intervention group went beyond demand-induced responses in showing effects on detachment, satisfaction with work–life balance, and psychological conflict over time. Nevertheless, future research should consider further reducing possible demand effects.

Our objective was to evaluate change trajectories over the course of an intervention rather than long-term outcomes. To extend our findings, future research should evaluate long-term MBI effectiveness by conducting follow-up measurements after several weeks and months, including third-party ratings and further outcomes as those discussed below. Moreover, future research should use high-quality randomized controlled designs (Lomas

et al., 2019) to investigate whether people benefit more from mindfulness training than from being in active control groups. For example, mindfulness training teaching cognitive–emotional segmentation strategies could be compared with behavioural boundary management skill training. Boundary management skills, such as boundary creation and segmentation competency, should be directly measured as in previous boundary management interventions (Rexroth et al., 2016). Differential effects of behavioural and cognitive–emotional boundary tactics on behaviour-based or time-based WFC (Greenhaus & Beutell, 1985) could be evaluated.

A major limitation is the underlying assumption that individuals can regulate their boundaries according to their preference. However, organizations provide supplies and cultural norms that determine how extensively employees can manage their boundaries. For instance, Adkins and Premeaux (2014) showed that role integration preference and being required to be connected after hours were associated with the use of technology for after-hours work-related connectivity. Foucreault et al. (2018) showed that when segmenters perceived that their organizational culture strongly supported integration, they were less able to detach after work. Park et al. (2011) showed that high organizational norms for segmentation ensured that employees segmented their use of technology. Yang et al. (2019) showed that group norms moderated the relationship between segmentation preferences and work-related technology use at home. In another study, integrators who had low perceptions of organizational integration norms were able to use work-related PC/laptops at home without feeling time-based or strain-based WFC (Gadeyne, Verbruggen, Delanoëje, & De Cooman, 2018). Rexroth et al. (2014) showed that both segmenters and integrators who were not given the possibility to segment were emotionally exhausted and dissatisfied with work–life balance. Brauner et al. (Brauner, Wöhrmann, & Michel, 2020) showed that employees working in jobs that allow segmentation of life domains were more satisfied with their work–life balance. Thus, having the possibility to segment work and home may be as important as matching preferences and supplies for reducing WFC (Kreiner, 2006). Future research should therefore consider segmentation supplies or cultural norms and evaluate interactions with personal boundary management strategies to better account for such contextual influences. Moreover, future research should conduct multilevel interventions that are aimed at building resources at multiple levels (individual, group, leader, or organizational level) (Nielsen et al., 2017). A further limitation is that we used reduced WFC and increased satisfaction with work–life balance to evaluate effects on the work–life interface. To better capture effects, future research should include work–family enrichment processes, their interaction with conflict and satisfaction, and further facets of work–life balance, such as balance effectiveness or involvement (Casper et al., 2018; Wayne et al., 2017).

We did not differentiate between preference for segmentation at work or at home, although researchers are showing that preferences differ for segmenting work from the family domain versus family from the work domain, with domain-specific effects on boundary creation (Methot & LePine, 2016; Park & Jex, 2011). Future research should consider whether the bidirectional nature of segmentation preferences shapes responsiveness to MBIs. Moreover, future research might evaluate whether mindfulness practiced at work also alleviates family–work conflict through domain-specific mindfulness measures, aligned with research showing the need to consider domain-specific state mindfulness (Haun et al., 2018).

Furthermore, more research is needed to better understand boundary conditions, underlying processes, and factors that influence the success of mindfulness practice. Future research could examine the positive-activity model in more detail (Lyubomirsky &

Layouts, 2013), including how person features affect well-being and activity characteristics (e.g., dosage, variety, or social support) or workplace characteristics as potential boundary conditions (Jamieson & Tuckey, 2017).

A further limitation is that we focused on affective well-being. Subjective well-being includes numerous components (Diener, Emmons, Larsen, & Griffin, 1985; Diener, Suh, Lucas, & Smith, 1999), so we propose that future research should examine effects on cognitive well-being indicators such as daily life satisfaction. Moreover, we focused on negative affect as an indicator for affective well-being. Future research could expand this by including asset-based well-being measures such as positive affect.

We used the state version of the MAAS (Brown & Ryan, 2003), a mindfulness scale explicitly designed to assess state or trait mindfulness in a general adult population with no experience with mindfulness training. The scale is well-established for intervention studies in the work context (Hülshager et al., 2013, 2015; Kiburz et al., 2017) and recommended as a manipulation check in intervention studies (Jamieson & Tuckey, 2017), but it is increasingly criticized for measuring only present-centred attention awareness (e.g., Grossman, 2011). According to the two-component model of mindfulness (Bishop et al., 2004), mindfulness is a multifaceted construct that includes accepting and non-judgemental attitudes that are not measured with the MAAS. Future research could include potentially different operationalizations of mindfulness in work contexts. Moreover, we assessed only state mindfulness, although participants may have varied in trait mindfulness. Thus, future research should observe trait and state mindfulness to address the potential limitation.

Last, organizations share responsibilities for well-being and work–life balance. They should provide employees with the opportunity to separate work and private life, for example by establishing suitable human resource practices and policies or facilitating supervisor behaviours and a workplace climate that encourage segmentation of life domains (Kreiner, 2006).

Conclusion

By showing that a brief mindfulness-based self-training intervention can foster detachment, reduce psychological work–life conflict, and improve satisfaction with work–life balance, our study advances the literatures of boundary theory, mindfulness, and positive psychology. We show how the positive effects unfold over time and that MBI intervention research should include personal characteristics. Although interventions can help all participants derive work–life balance benefits, segmentation preferences determine effects on psychological detachment. As a practical implication, boundary management interventions should include emotional–cognitive segmentation strategies. Moreover, organizations should tailor interventions to both integrators and segmenters because both can gain from interventions. Last, organizations should offer segmentation possibilities.

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Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Sarah Elena Althammer (Writing – original draft; Writing – review and editing; Formal analysis). Dorota Reis (Formal analysis; Writing – original draft; Writing – review and editing). Sophie van der Beek (Investigation; Writing – original draft) Laura Beck (Investigation; Writing – original draft). Alexandra Michel (Conceptualization; Methodology; Project administration; Supervision; Writing – original draft; Writing – review and editing).

Data Availability Statement

The corresponding author will provide supporting data on request.

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Meeting the Challenges of Flexible Work Designs: Effects of an Intervention Based on Self-Regulation on Detachment, Well-being, and Work–Family Conflict

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The data that support the findings of this study are openly available in OSF at https://osf.io/5mh74/?view_only=5ad6ac8393e5466185c8a620089e8d99

Abstract

Self-regulation is important for coping with demands of flexible work designs (FWD) such as telework, remote work, or flextime. This article evaluates a web-based intervention based on self-regulation models to enable workers meet challenges of FWD and thus, improve recovery, work-life balance, and well-being. Over six weeks, participants learnt self-regulation strategies to detach from work, segment work and private life, and organize their workday. In a randomized controlled trial, participants were assigned to an intervention group or a waitlist control group. Study participants rated their levels of self-regulation, psychological detachment, strain-based work–family conflict (WFC), and affective, cognitive and work-related well-being (indicated by positive affect, stress, and work engagement) before and after the intervention, and at a four-week and six-month follow-up. The final sample after the training included 358 participants (intervention group: $n = 147$; control group: $n = 211$). As expected, covariance analyses revealed that the intervention improved positive affect and work engagement, and that it reduced stress and strain-based WFC. Moreover, we found positive effects on psychological detachment for participants with low baseline levels of psychological detachment. Self-regulation mediated intervention effects on positive affect and work engagement. Effects hold at four-week and six-month follow-ups, except for work engagement. Overall, findings indicate that the intervention is an effective tool for promoting self-regulation and enabling workers to achieve their goals regarding recovery, work-life balance, and well-being.

Keywords: psychological detachment, stress, well-being, work engagement, work–family conflict

Meeting the Challenges of Flexible Work Designs: Effects of an Intervention Based on Self-Regulation on Detachment, Well-being, and Work–Family Conflict

Over the last decade, information and communication technologies have enabled employees to work almost anywhere and anytime. This promotes flexible work designs (FWD), such as flextime, telework, and remote work, which give workers temporal and spatial flexibility (Demerouti et al., 2014; Lewis, 2003). The COVID-19 pandemic dramatically increased the number of remote workers around the globe. In the European Union, the number of teleworkers doubled between 2019 and 2021, with 20% of employees teleworking (Eurofound, 2022). In Germany, similar numbers were observed in 2021, with more people working from home than ever before: Almost 25 percent worked from home at least occasionally and 10 percent worked from home every day (Destatis, 2022). The share of workers with FWD is expected to remain at a high level in the post-pandemic future (Eurofound, 2022). Although increased flexibility to choose when and where to work can be associated with opportunities, research indicates that it also poses potential risks for recovery, work-life balance, and well-being (Boell et al., 2016; Demerouti et al., 2014; Oakman et al., 2020; Thörel et al., 2022).

Researchers have emphasized the importance of self-regulation, the ability to steer thoughts, emotions, and actions toward a self-determined goal (Bandura, 1991), to adapt to challenges of new working conditions in the FWD context by adjusting individual work routines (Kubicek et al., 2015; Mäkikangas et al., 2022). FWD require increased self-regulation (Allen et al., 2003; Müller & Niessen, 2019). For example, when workers with FWD set a goal to improve their recovery, work-life balance, or well-being, they need to engage in goal-directed activities (Bandura, 1991; Zacher & Frese, 2018) to shape their workday (e.g., recovery strategies; Demerouti, 2023). Besides, they need general self-regulation strategies (Bandura, 1991; Zacher & Frese, 2018) to implement these goal-directed

activities and facilitate behavior change (e.g., setting a goal when to implement a recovery strategy). Thus, self-regulation becomes a key individual ability in the context of FWD as it is required to adjust and change behavior (Inzlicht et al., 2021; Michie et al., 2008). Adapting to new working conditions and, particularly during the COVID-19 pandemic, suddenly working remotely requires individuals to shape their workday according to their needs. Thus, a better understanding of how to support workers with FWD in their self-regulation to ensure their recovery, work-life balance, and well-being is important for both theory and practice.

Previous research suggests that individual web-based interventions can provide strategies to help workers self-regulate to overcome challenges associated with FWD (Demerouti, 2023). Moreover, other interventions have shown to be effective in teaching goal-directed activities to promote recovery, work-life balance, and well-being (Althammer et al., 2021; Hahn et al., 2011; Michel et al., 2014; Rexroth et al., 2016; Rexroth et al., 2017). Yet, there is a theoretical and empirical gap in understanding how an intervention based on self-regulation can empower workers to change their behavior to achieve their goals of managing the potential challenges of FWD (Mäkikangas et al., 2022). Previous interventions have rarely targeted the general ability to self-regulate, which is particularly important for facilitating behavior change (Michie et al., 2008). Hence, interventions need to teach two aspects of self-regulation: (1) different goal-directed activities (i.e., behaviors directed toward a goal; Hirschi et al., 2019; Zacher & Frese, 2018) workers can engage in to attain their goals in coping with specific risks of FWD (e.g., boundary management strategies to achieve better work-life balance), and (2) general self-regulation strategies (Bandura, 1991; Zacher & Frese, 2018) which help regulate goal-directed behaviors and thus help implement these goal-directed activities (e.g., goal setting strategies to effectively conduct boundary management strategies).

Consequently, using self-regulation theory as the overarching theoretical framework, we developed an intervention aimed at strengthening general self-regulation strategies (i.e., goal setting, self-monitoring, self-evaluation, and self-reward) as well as teaching goal-directed activities (Hirschi et al., 2019; Zacher & Frese, 2018) such as segmentation strategies, respite exercises, or mindfulness exercises. Combining these two aspects of self-regulation should enable workers with FWD to change their behavior and achieve their goals of managing specific risks to recovery, work-life balance, and well-being that they are likely to experience. In this article, we report the results of the evaluation of this intervention. Integrating research on self-regulation and FWD, we argue that self-regulation can improve recovery, work-life balance, and well-being. Specifically, we argue that the use of general self-regulation strategies in combination with goal-directed activities will enable workers to cope with challenges of FWD. Thus, we tested training effectiveness on outcomes that are at risk particularly in the context of FWD: recovery, work-life balance, and well-being.

This study aims to contribute to the literature in several ways. First, this study aims to extend our understanding of interventions based on self-regulation as a framework. Interventions that aim at behavior change require self-regulation, thus interventions that target causal determinants of behavior change, such as self-regulation, can be more effective (Michie et al., 2008). For example, prompting self-regulation can reinforce training effectiveness (Sitzmann et al., 2009). Yet few interventions specifically target self-regulation in addition to goal-directed activities. We contribute to this stream of research by targeting not only *what* participants ought to learn (i.e., goal-directed activities that help direct thoughts, emotions, and actions toward goals) but also *how* they can attain their training goals (i.e., general self-regulation strategies). By combining these two aspects of self-regulation, we also aim to contribute to a broader understanding of self-regulation in situations that require adaptation, and to provide a new perspective on how to train self-regulation to

facilitate behavior change. We focus on self-regulation as a determinant of behavior change and base the intervention on self-regulation models as a framework for development, responding to calls to link behavior change determinants (self-regulation) to theories of behavior change (self-regulation models) for both designing and evaluating theory-based interventions (Michie et al., 2013). Moreover, we test the applicability of self-regulation process models for interventions (Bandura, 1991; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000). Building on research showing that training self-regulation strategies improves individual self-regulation capacity (Ebner et al., 2018; Marques-Quinteiro et al., 2019; Mrazek et al., 2021), we aim to show that teaching self-regulation strategies based on these models can increase self-regulation.

Second, this study contributes to research on FWD by highlighting the role of self-regulation as a requirement for adapting to FWD, that is, adopting effective coping strategies that reduce the potentially adverse effects of FWD on recovery, work-life balance, and well-being. This was particularly important during the COVID-19 pandemic when the study was conducted, as many were working remotely more than ever before or for the first time, often on a mandatory basis, and the rapid adaptation to new working conditions required high levels of self-regulation. Thus, this web-based intervention addresses calls for an intervention that can help workers manage challenges associated with FWD (Allen et al., 2021). By proposing that different aspects of self-regulation – both general strategies of self-regulation and specific goal-directed activities – are important to facilitate adaptation to FWD and attain individual goals (e.g., improving work-life-balance), this study can yield guidelines on how to increase self-regulation in the FWD context and improve recovery, work-life balance, and well-being. Moreover, by teaching a wide range of goal-directed activities (e.g., segmenting life domains, ensuring recreation during leisure time, and organizing work), we provide a more comprehensive view of how individuals can shape their workday in the FWD context.

Third, this study is conducted as a randomized controlled trial research design with four measurement points to assess the maintenance of effects over a substantial time period, following the call for more randomized controlled trials in work-specific interventions (O'Shea et al., 2016). This study also sheds further light on self-regulation as a mechanism, answering calls to identify processes of intervention effectiveness (Michel et al., 2015).

Theoretical Background

FWD can make it easier for workers to successfully structure their workday and manage the boundary between work and private life. This can help meet both work and private life demands, thus reducing work–family conflict (WFC; Allen et al., 2013) and improving mental and physical health (Kröll et al., 2017; Shifrin & Michel, 2021). However, as boundaries between work and private life are likely to blur when working with FWD (Glavin & Schieman, 2012), workers find it difficult to establish boundaries between work and private life (Rau & Hyland, 2002). They are then at an increased risk for boundaryless working hours such as working overtime, being available during leisure time, working weekends, or taking fewer breaks (Demerouti et al., 2014; Wöhrmann et al., 2020; Wöhrmann & Ebner, 2021). Reduced or interrupted rest periods can make it difficult to detach mentally, thus hindering recovery processes (Pak et al., 2021; Vieten et al., 2022; Wöhrmann & Ebner, 2021), which in turn impedes well-being (Park et al., 2011). Blurring boundaries and extended availability can also increase the experience of WFC (Ashforth et al., 2000; Cho et al., 2020; Powell & Greenhaus, 2010). In summary, FWD is associated with increased risks to recovery, work-life balance, and well-being.

FWD impacts recovery, work-life balance, and well-being by challenging, amongst others, individuals' self-regulation (Allen et al., 2003). FWD provide fewer physical and psychosocial constraints than traditional office settings, such as physical separation between the work place and private life, fixed working hours and breaks, or direct supervision and

monitoring of work behaviors and methods by supervisors and peers (Allen et al., 2003). Although FWD may increase perceptions of autonomy, it also requires individuals to take on additional responsibility to manage their own behavior and design some or all aspects of their work environment; thus, FWD provide opportunities but also require self-regulating behavior (Allen et al., 2003; Müller & Niessen, 2019). Workers must develop suitable work routines according to their individual needs (Allen et al., 2013; Kubicek et al., 2015; Mellner et al., 2015). Adjusting individual working conditions (e.g., ways, methods, and times of work) requires high levels of self-regulation (Mäkikangas et al., 2022; Müller & Niessen, 2019). That is, workers actively shape their workday by setting work and private life goals and actively managing their thoughts, emotions, and actions toward them (Hirschi et al., 2019). For example, to overcome challenges associated with FWD and to improve recovery, work-life balance, and well-being, people may set goals to separate work and private life more clearly, to mentally detach from work during rest periods, or to effectively organize work to stay focused. Thus, self-regulation becomes essential in the context of FWD.

Process models of self-regulation describe goal-relevant self-regulation strategies in a sequential process (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000). People form objectives (*goal setting*); scrutinize their behavior, thoughts, and emotions (*self-monitoring*); judge whether it aligns with their self-set goals (*self-evaluation*); and lastly affirm their actions through positive affective reactions or tangible rewards (*self-reward*), whose anticipation is motivating. People do not always follow this sequence rigidly; they may move back and forth between steps, repeat or skip steps, or enact phases simultaneously (Zacher & Frese, 2018). Previous research indicates that teleworkers employ such general self-regulation strategies (Troll et al., 2022), and employees use self-regulation strategies more on home days than on office days (Müller & Niessen, 2019). These general self-regulation strategies regulate people's actions, which are goal-

oriented behaviors, or behaviors directed toward a goal (Zacher & Frese, 2018). That is, people engage in goal-directed activities to attain their goals (Hirschi et al., 2019).

Reinforcing the concept of goal-directed activities that constitute self-regulation in the context of FWD behaviors, managing boundaries between work and private life to separate work and private life more clearly requires self-regulation (Grawitch et al., 2010), engaging in recovery activities such as breathing exercises to recover from work requires self-regulation (Zijlstra et al., 2014), and organizing daily tasks (e.g., plan, structure, and organize the workday, prioritize and select tasks) to stay focused at work requires self-regulation (Aspinwall & Taylor, 1997; Oettingen et al., 2015). As these activities direct thoughts, emotions, and actions toward a goal, they are also a form of self-regulation.

Hence, the web-based intervention aims to enable workers with FWD to attain their work and private life goals regarding their recovery, work-life balance, and well-being by teaching both self-regulation strategies (i.e., goal setting, self-monitoring, self-evaluating, and self-rewarding) and goal-directed activities (e.g., segmentation strategies, recovery strategies, work organization strategies). We expected the intervention to improve recovery (i.e., increased psychological detachment), work-life balance (i.e., reduced WFC), and affective, cognitive, and work-related well-being (i.e., increased positive affect, reduced stress, and increased work engagement), and expected increased self-regulation as a facilitator of behavior change to mediate intervention effects (Figure 1).

Intervention Effects on Psychological Detachment

Workers with FWD are at an elevated risk for boundaryless working hours such as working overtime, being available during free time, working Sundays, or taking fewer breaks (Demerouti et al., 2014; Wöhrmann & Ebner, 2021). This can hinder recovery processes because time periods between workdays are shortened or interrupted (Pak et al., 2021; Vieten et al., 2022). *Psychological detachment* describes an essential recovery experience (i.e., a

distinct off-job experience that is crucial for recovery) in which participants become mentally disengaged from work and its stressors, and derive benefits for a range of health, well-being, and work performance outcomes (Sonnentag & Fritz, 2007, 2015; Wendsche & Lohmann-Haislah, 2017). The intervention teaches participants to regulate their recovery periods with general self-regulation strategies (e.g., to set recovery goals), and teaches different goal-directed activities that promote recovery experiences (Hahn et al., 2011), build up energy in rest periods (Steidle et al., 2017), or help segmenting life domains (Kreiner et al., 2009). Implementing these activities can enhance psychological detachment (Michel et al., 2014; Rexroth et al., 2016). In addition, participants receive training in mindfulness, facilitating to focus on the present and to detach from work-related thoughts (Bishop et al., 2004; Michel et al., 2014). Hence, the intervention should help participants adhere to rest periods and focus on the present during their leisure time, which should then promote psychological detachment:

Hypothesis 1: After training, intervention participants report increased psychological detachment compared to control group participants.

We expect the intervention to have an indirect effect on psychological detachment via self-regulation. The intervention trains participants to establish recovery periods by teaching general self-regulation strategies. For example, learning how to set goals for their recovery and how to monitor their recovery behavior should enable them to better plan and, consequently, adhere to work breaks and rest periods. General self-regulation strategies (e.g., goal setting) also facilitate psychological detachment because they allow workers to redirect attention away from work-related goals during leisure time (Smit & Barber, 2016). Hence, we hypothesize:

Hypothesis 2: Self-regulation mediates intervention effects on psychological detachment.

Intervention Effects on Work–Family Conflict

FWD often result in less physical boundaries between work and private life, for example, when working from home. This makes the blurring of role boundaries more likely (Glavin & Schieman, 2012), which increases WFC (Ashforth et al., 2000; Powell & Greenhaus, 2010). We evaluated effects on strain as an indicator of WFC: *Strain-based WFC* occurs when strain experienced in a work role intrudes into and interferes with participation in a private role (Carlson et al., 2000; Greenhaus & Beutell, 1985). To help participants manage their boundaries, the intervention enables participants to regulate their boundaries with general self-regulation strategies (e.g., self-monitoring their segmentation behavior) and teaches goal-directed activities to segment life domains. In line with boundary theory (Ashforth et al., 2000), workers can use behavioral (e.g., establishing physical boundaries; Kreiner et al., 2009) or cognitive-emotional (e.g., practicing mindfulness; Michel et al., 2014) segmentation strategies to create and maintain boundaries separating work from private life. Implementing these strategies can reduce WFC (Michel et al., 2014). In line with this, Brauner et al. (2020) found the possibility to segment life domains to be positively related to workers' satisfaction with their work-life balance. Concluding, the intervention should help participants manage their boundaries, which should reduce strain-based WFC:

Hypothesis 3: After training, intervention participants report decreased strain-based WFC compared to control group participants.

We expect the intervention to have an indirect effect on WFC via self-regulation. Setting and attaining goals in accordance with their segmentation preferences gives participants greater control over boundaries (Mellner et al., 2015) and helps attain work and private life goals (Grawitch et al., 2010; Hirschi et al., 2019). In line with this, excessive e-mail demands have less of an impact on WFC of workers high in self-regulation than those low in self-regulation (Steffensen et al., 2021). Hence, self-regulation can help workers

manage their work-home boundaries in line with their preferences for segmenting or integrating aspects of work and private life (i.e., segmentation preferences). Thus, we expect:

Hypothesis 4: Self-regulation mediates intervention effects on strain-based WFC.

Intervention Effects on Well-Being

Subjective well-being is a broad category including “emotional responses, domain satisfactions, and global judgments of life satisfaction” (Diener et al., 1999, p. 277). To capture different aspects of well-being, we evaluate positive affect, stress, and work engagement as affective, cognitive, and work-related well-being. *Positive affect* is an essential part of overall mental health (Bech et al., 2003). *Stress* occurs when well-being is endangered because individuals perceive that the environment overtaxes their resources (Larazus & Folkman, 1984). *Work engagement* indicates “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli et al., 2002, p. 74) and is a factor of occupational well-being (Schaufeli et al., 2008). The intervention empowers participants to employ general self-regulation strategies to attain their goals and teaches them goal-directed activities to cope with FWD challenges, which should improve their well-being. Activities for segmenting life domains (i.e., boundary management) and promoting recovery experiences have been shown to enhance well-being (Althammer et al., 2021; Hahn et al., 2011; Rexroth et al., 2017). Segmenting life domains can prevent private life events from affecting energy levels at work, thereby improving work engagement (Bakker et al., 2019). Moreover, sufficient recovery should help workers maintain energy levels at work. Thus, the intervention should help participants achieve their goals how to shape their workday, which should then improve well-being:

Hypothesis 5: After training, intervention participants report a) increased positive affect, b) decreased perceived stress, and c) increased work engagement compared to control group participants.

We expect the intervention to have an indirect effect on well-being via self-regulation. Progressing toward goals can improve well-being (Carver & Scheier, 1990). For example, the general self-regulation strategy of setting goals can increase affective and cognitive well-being (MacLeod et al., 2008; Ouweneel et al., 2013). Moreover, setting personal goals rather than following organizational goals can enhance affective well-being (Welsh et al., 2020). Moreover, self-regulation (Wojdylo et al., 2017), as well as goal setting and self-observation, representing two aspects of general self-regulation, have been shown to be related to work engagement (Zeijen et al., 2018). In addition, goal-setting interventions have been shown to increase work engagement (Weintraub et al., 2021). Hence, as the intervention trains participants' general ability to self-regulate, cognitive, affective, and work-related well-being should improve:

Hypothesis 6: Self-regulation mediates intervention effects on a) positive affect, b) stress, and c) work engagement.

Method

Study Design and Procedure

We recruited participants via snowball sampling, e-mail distribution lists, newsletters, social media, online professional networking sites, and magazine articles. We promoted the study as a free web-based training to support workers facing challenges of temporal and spatial flexibility. Because working with FWD involves different levels of flexibility (e.g., working in an office with flexible hours, telecommuting part-time, or working completely remotely), we have not limited participation to a specific type of FWD. Participants confirmed during online registration that their jobs allowed them temporal and spatial flexibility, that they were at least 18 years old, and that they were willing to complete the training and all questionnaires.

We conducted a randomized controlled trial with an intervention group and a waitlist control group from October 2020 to May 2021 during the COVID-19 lockdown in Germany. Measurements were assessed before and after the intervention and four weeks and six months later. Participants had two weeks to complete each questionnaire. The ethics committee of the Federal Institute for Occupational Safety and Health in Germany granted ethical approval for this study. Participants completed the baseline questionnaire (T1) before we randomly allocated them to the intervention group or the waitlist control group. Participants were aware of two training start dates, but were unaware of their group assignment (i.e., single-blind). The intervention group started the training immediately. After six weeks the intervention group had completed the training and participants from both groups received the post-intervention questionnaire (T2). We administered the first follow-up questionnaire (T3) four weeks later to assess stability of effects. Next, we gave the control group access to the training, and sent them a final questionnaire post-training. The intervention group completed an extended follow-up questionnaire (T4) six months after they completed the intervention to assess long-term effectiveness. Both groups were offered participation certificates and information about the project results as an incentive for active participation.

The Intervention

Based on self-regulation models (Bandura, 1991; Kanfer et al., 2006; Zacher & Frese, 2018; Zimmerman, 2000), the web-based training taught two aspects of self-regulation: specific goal-directed activities to achieve goals in coping with specific risks of FWD, and general self-regulation strategies to facilitate behavior change. For six weeks, participants completed 45-minute weekly online modules between Thursdays and Sundays. Each module introduced participants to the topic of the week and then presented theoretical background information, self-reflection prompts, and practical exercises. To stimulate active learning and enhance training transfer (Burke & Hutchins, 2007), participants were assigned a 5- to 10-

minute task to be performed on the five workdays after each module. We sent three emails or text messages each week reminding them to perform daily tasks. Moreover, we based the training on learning principles (e.g., various sensory modalities) and gamification. The training was pilot-tested and revised based on user feedback.

A detailed overview of the intervention is provided in Appendix A. In each module, participants learned at least one general self-regulation strategy (i.e., goal setting, self-monitoring, self-evaluating, self-rewarding) and applied it to implement a goal-directed activity in the FWD context (e.g., planning self-rewards for practicing new activities) to gradually promote self-regulation. Participants set goals for the overall training (Module 1). They practiced mental contrasting with implementation intentions, a self-regulation strategy that reduces stress and increases work engagement (Gollwitzer et al., 2018), in each module. Moreover, they implemented self-regulation strategies to improve their work organization in Module 4. Each module concluded with a self-regulatory exercise (e.g., setting specific goals for daily tasks).

In addition, each module featured a focus topic. Three modules (Modules 2, 3 and 5) introduced theory-based goal-directed activities to attain goals of improving recovery, work-life balance, and well-being in the context of FWD. Module 1 gave an overview of the aim, content, and structure of the training. To focus on their resources, participants reflected which strategies they already used to address challenges of FWD. Modules 2 and 3 focused on regulating boundaries between work and private life: Module 2 introduced behavioral segmentation (Ashforth et al., 2000; Kreiner et al., 2009; Rexroth et al., 2016), Module 3 introduced mindfulness as cognitive-emotional segmentation (Michel et al., 2014). In Module 4, participants applied self-regulation strategies to organize daily work routines. Module 5 focused on recovery and respite from work through self-regulated rest periods in leisure time and work breaks (Hahn et al., 2011; Steidle et al., 2017). In Module 6, previous modules were

reviewed before participants reflected their resources to self-regulate in the FWD context (Hobfoll et al., 2018).

Participants

Participants who completed the pre-questionnaire ($n = 453$) were randomly assigned to the intervention group (IG; $n = 226$) or the control group (CG; $n = 227$). Figure 2 gives an overview of the flow from pre-questionnaire to follow-up. Participants who dropped out at T2 reported lower baseline levels of self-regulation, $F(1, 446) = 4.52, p < .05$. Participants who dropped out at T3 were younger than those who completed the follow-up questionnaire, $F(1, 449) = 7.91, p < .01$, and were less likely to hold a PhD, $\chi^2(7, 442) = 19.71, p < .01$. The final pre-post sample (i.e., sample at T2) included 358 working adults ($n_{IG} = 147, n_{CG} = 211$); 18 to 71 years-old ($M = 44.34, SD = 10.70$); 82.5% held a university degree; 72.0% were women, 75.1% were married or lived in a partnership; 37.5% had one or more children. Participants worked in various sectors such as law, administration, business, science, teaching, training, and financial services. They worked an average of 38.79 ($SD = 10.35$) hours per week; 90.8% were employees; 7.6% were self-employed; and 1.7% were atypically employed; 26.9% held a leadership position. The extent of temporal and spatial flexibility varied across our sample, participants reported having the possibility to work from home or other locations on an average of 2.96 days ($SD = 1.55$) per week, and working flexible hours on an average of 4.08 days ($SD = 1.66$) per week. We conducted the study during the COVID-19 pandemic; 59.8% stated that opportunities to work from home had increased in response to the pandemic; 25.3% had not worked from home before the pandemic. Analyses revealed no significant pre-intervention differences between intervention and control groups in the pre-post sample regarding demographic and outcome variables. In the pre-post follow-up sample (i.e., sample at T3), intervention group participants reported higher baseline self-regulation, $F(1, 285) = 5.34, p < .05$.

Measures

All measures except for demographic data were assessed at all measurement points. Post- and follow-up questionnaires included additional training evaluation questions. All online questionnaires were in German. A translation/back translation procedure was used for items available only in other languages (Brislin, 1980; Graham & Naglieri, 2003). Unless indicated otherwise, we asked participants to answer items on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) referring to the preceding two weeks.

Self-regulation was assessed with 12 items of the German version (Andreßen & Konradt, 2007) of the revised self-leadership questionnaire (Houghton & Neck, 2002), adapted to focus on general work and private goals. We used three items each from the subscales *self-goal setting* (e.g., “I establish specific goals”), *self-observation* (e.g., “I make a point to keep track of how well I’m accomplishing my goals”), *self-reward* (e.g., “When I have successfully completed something, I reward myself with something I like”), and *visualizing successful performance* (e.g., “I visualize myself successfully achieving a goal before I implement it”). This scale showed very good reliabilities at all time points ($\alpha_{T1} = .86$; $\alpha_{T2} = .89$; $\alpha_{T3} = .90$, $\alpha_{T4} = .90$).

Psychological detachment was assessed with the 4-item subscale of the recovery experience questionnaire (Sonnentag & Fritz, 2007). For example, “After workhours, I distance myself from my work.” This scale showed very good reliabilities at all time points ($\alpha_{T1} = .90$; $\alpha_{T2} = .89$; $\alpha_{T3} = .92$, $\alpha_{T4} = .91$).

Strain-based WFC was measured with the 3-item subscale from the WFC scale (Carlson et al., 2000), adapted to focus on private rather than family life (Michel et al., 2014). For example, “Due to all the pressures at work, sometimes I feel too stressed to do the things I enjoy in my leisure time.” This scale showed good reliabilities at all time points ($\alpha_{T1} = .84$; $\alpha_{T2} = .85$; $\alpha_{T3} = .84$, $\alpha_{T4} = .85$).

Positive affect was measured with the WHO-five well-being index (WHO-5; Brähler et al., 2007). Participants rated all items on a 6-point frequency scale (1 = at no time; 6 = all the time). For example, “Over the last two weeks, I have felt cheerful and in good spirits.” This scale showed good reliabilities at all time points ($\alpha_{T1} = .87$; $\alpha_{T2} = .90$; $\alpha_{T3} = .91$, $\alpha_{T4} = .88$).

Stress was measured with four items from the perceived stress scale (PSS-10; Cohen et al., 1983; Hahn et al., 2011). Participants rated all items on a 5-point frequency scale (1 = rarely or never; 5 = often or always). For example, “How often have you felt that you were unable to control the important things in your life?” This scale showed good reliabilities at all time points ($\alpha_{T1} = .83$; $\alpha_{T2} = .82$; $\alpha_{T3} = .83$, $\alpha_{T4} = .73$).

Work engagement was assessed with the 9-item version of the Utrecht work engagement scale (Schaufeli et al., 2006), rated on a 5-point frequency scale (1 = rarely or never; 5 = often or always). For example, “At my job, I feel strong and vigorous.” This scale showed very good reliabilities at all time points ($\alpha_{T1} = .92$; $\alpha_{T2} = .93$; $\alpha_{T3} = .94$, $\alpha_{T4} = .92$).

Analysis Strategy

Analyses were performed in R 4.0.2 (R Core Team, 2022). To test Hypotheses 1, 3, and 5 regarding intervention effectiveness, we first conducted a multivariate analysis of covariance (MANCOVA) with the pre-post-sample to take account of the relationship between outcome variables and detect whether groups differ along a combination of outcome variables (Field et al., 2012). We used post-intervention scores (T2) as dependent variables, group as the independent variable, and baseline scores (T1) of the respective constructs as covariates. Then, we investigated univariate effects with analyses of covariance (ANCOVAs) using the R package *car* (Fox & Weisberg, 2019). When the assumption of homogeneity of regression slopes was violated, we applied the R package *WRS2* (Mair & Wilcox, 2020) to run robust ANCOVAs. In the robust analyses, we were interested in comparisons at three

particular design points: average baseline scores (M), as well as low ($M-1*SD$) and high ($M+1*SD$) baseline scores. To investigate training effects four weeks after the training had ended, we repeated both multivariate and univariate analyses with the pre-post-follow-up-sample and follow-up scores (T3) as dependent variables. To investigate stability of training effects six months after the training had ended, we conducted repeated measures analyses of variance (RM-ANOVA) with the intervention group of the pre-post follow-up-sample with the R package ez (Lawrence, 2016). We used Bonferroni correction to account for Type I error (Field et al., 2012), resulting in an alpha threshold of 0.0083 for a significant effect. To examine whether self-regulation acted as the mechanism of change for the outcome variables (Hypothesis 2, 4, 6), we performed a mediation analysis with the pre-post follow-up sample. We used bootstrap confidence intervals for indirect effects (Hayes, 2017) with the R package lavaan (Rosseel, 2012). In our bootstrap analysis, we specified 10,000 resamples and 95% confidence intervals with confidence intervals including zero indicating a null effect. We included T1 scores as covariates when predicting T2 scores of mediators and T3 scores of outcomes (i.e., ANCOVA model; Valente & MacKinnon, 2017). The dataset generated and analyzed during this study is available in an OSF repository (BLINDED).

Results

Table 1 shows means, standard deviations, and intercorrelations for all study variables at T1, T2, and T3. Table 2 provides descriptive information for the intervention and control groups. Figure 3 shows mean scores of the intervention and control groups at T1, T2, and T3 for the full pre-post follow-up sample.

Manipulation Check

To check whether our intervention successfully increased self-regulation of participants (i.e., the manipulation of self-regulation was successful), we examined whether intervention participants would report increased self-regulation compared to control group

participants. An ANCOVA revealed that after controlling for the respective baseline values, the intervention had significant main effects at T2 on self-regulation, $F(1, 346) = 8.24, p < .01, \eta_p^2 = .02$. Cohen's (1988) guidelines indicate that partial eta squared (η_p^2) values of .01, .06, and .14 constitute small, medium, and large effect sizes respectively; therefore, we found a small effect. This indicates that training increased participants' level of self-regulation.

Effectiveness of the Intervention

We hypothesized that intervention participants would report increased psychological detachment (Hypothesis 1), decreased strain-based WFC (Hypothesis 3), increased positive affect, decreased stress, and increased work engagement (Hypothesis 5) compared to control group participants. Wilks's lambda statistic revealed that group had a significant multivariate main effect on all outcome variables $\Lambda = 0.89, F(5, 336) = 7.8, p < .001$. Separate ANCOVAs showed that after controlling for the respective T1-values, the intervention had significant main effects at T2 on strain-based WFC, $F(1, 346) = 6.82, p < .01, \eta_p^2 = .02$; positive affect, $F(1, 344) = 18.06, p < .001, \eta_p^2 = .05$; stress, $F(1, 344) = 12.95, p < .001, \eta_p^2 = .04$; and work engagement, $F(1, 344) = 7.35, p < .01, \eta_p^2 = .02$. Effect sizes were small (Cohen, 1988). Robust ANCOVAs revealed that, adjusted for the baseline values, groups significantly differed in psychological detachment at T2 for low baseline scores of psychological detachment (Table 3). In summary, when we compared intervention and control groups, we found that training increased psychological detachment for participants who reported having difficulties in detaching psychologically from work at baseline, which partially supports Hypothesis 1. Training participants reported increased positive affect and work engagement, and reduced strain-based WFC and stress, consistent with Hypotheses 3 and 5.

Sustainability of Training Effects

Four weeks after the intervention and again six months later, we assessed whether training effects held over time in the intervention group. Separate ANCOVAs showed that after controlling for the respective baseline values, the intervention had small significant main effects at T3 on psychological detachment, $F(1, 276) = 14.51, p < .001, \eta_p^2 = .05$, strain-based WFC, $F(1, 276) = 4.63, p < .05, \eta_p^2 = .02$; positive affect, $F(1, 276) = 19.32, p < .001, \eta_p^2 = .07$; and stress, $F(1, 276) = 12.52, p < .001, \eta_p^2 = .04$. Effect sizes were small to medium (Cohen, 1988). However, we found no main effect on work engagement, $F(1, 276) = 3.33, p = .069$. As Table 4 shows, RM-ANOVAs indicated that time had a significant main effect for all outcome variables except work engagement. Post-hoc analyses with Bonferroni adjustment revealed that for all outcome variables, the pairwise differences T2 vs. T4 and T3 vs. T4 were statistically nonsignificant. In summary, training participants reported increased psychological detachment and positive affect and reduced strain-based WFC and stress compared to a control group four weeks after training, but reported no changes in work engagement. Trainings participants reported persisting effects regarding psychological detachment, positive affect, strain-based WFC, and stress six months after the training.

Mediation Analysis

Hypotheses 2, 4, and 6 predicted the intervention to positively affect the outcome variables via increases in self-regulation. Table 5 shows that the indirect effects of the intervention on positive affect and work engagement via self-regulation were significant as the confidence intervals did not include zero. This supports Hypotheses 6a and 6c. Increased self-regulation fully mediated intervention effects on work engagement because direct effects on outcomes became insignificant when the mediator was included in the model. Increased self-regulation partially mediated effects on positive affect because direct pathways remained significant with the mediator in the model. That is, the intervention influenced positive affect

also independently of its effect on self-regulation. However, we found no significant effects for the mediation of effects on psychological detachment, stress, and strain-based WFC through self-regulation. Thus, Hypotheses 2, 4, and 6b were not supported.

Additional Analyses

To examine the robustness of the findings, we investigated the impact of the specific context on training effectiveness. Participants in our sample reported a wide range of temporal and spatial flexibility, and working remotely due to pandemic regulations was a new experience for some of our participants. It was possible that the extent of temporal and spatial flexibility or whether the situation of working at home was new to participants could affect training effectiveness. We conducted moderation analyses with the number of days on which participants had the opportunity to work with spatial or temporal flexibility and previous experience with working at home before the pandemic (participants having worked at home before the pandemic never vs. less often, similarly often, more often, or always) as potential moderators. Results of ANCOVAs at T2 held for the significance of training effects on all outcome variables, and confirmed sustainability of training effects regarding all outcomes except work engagement at T3. Moreover, the interaction group x extent of flexibility/novelty of the situation was not significant for any outcome variable, except for the interaction term group x novelty of the situation, which was significant for psychological detachment, but only in the control group. This adds to the robustness of the findings.

Moreover, we tested whether engagement with intervention modules (i.e., completing modules and practicing daily tasks)¹ predicted post-training levels of outcome variables and

¹ To measure engagement with intervention modules, we asked in the post-questionnaire: “Did you complete the module?” Participants answered on a 5-point scale (1 = no, not at all; 5 = yes, completely). We also asked “After you learned about the daily exercise, how many days a week did you do it?”

self-regulation in the intervention group. Results of a linear regression with post-intervention scores as dependent variables and engagement scores as predictors revealed effects of engagement with intervention content on self-regulation and training outcomes of intervention participants: level of engagement with Module 1 affected WFC and work engagement, level of engagement with Module 6 affected self-regulation, level of practicing the savoring nature exercise (Module 5) affected work engagement, and level of practicing resource activation (Module 6) affected positive affect and self-regulation.

Discussion

In this article, we report the results of a randomized controlled trial evaluating the effectiveness of a web-based intervention for workers with FWD based on self-regulation theories (Bandura, 1991; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000). As FWD lack structures of traditional work environments such as spatial separation or fixed working hours, workers need to shape their workday and adjust their behavior to reduce potential risks to recovery, work-life balance, and well-being they are likely to experience. Achieving their goals for behavior change requires self-regulation. Hence, the intervention approach combined two aspects of self-regulation, specific goal-directed activities that workers engage in to achieve their goals in the FWD context (e.g., segmentation strategies) and general self-regulation strategies that help implement these activities (i.e., goal setting, self-monitoring, self-evaluating, and self-rewarding). The intervention was successful in fostering self-regulation. Moreover, it reduced strain-based WFC and improved affective (positive affect), cognitive (stress), and work-related (work engagement) well-being. Participants with low baseline levels of psychological detachment reported increased psychological detachment. Positive effects on psychological detachment, strain-based WFC, and affective and cognitive well-being sustained at four weeks and six months after the intervention. Self-regulation mediated intervention effects on two of three well-being aspects,

namely affective and work-related well-being. These findings contribute to a better theoretical understanding of interventions based on self-regulation by demonstrating an effective combination of training content (i.e., goal-directed activities), and behavior change determinant (i.e., general self-regulation strategies). This intervention may help mitigate potential negative effects of FWD on recovery, work-life balance, and well-being.

Furthermore, the findings are based on a randomized controlled trial and inform about self-regulation as a training mechanism.

Theoretical Contributions

This study contributes to the literature in three ways. First, this study extends the understanding of interventions based on self-regulation. Our results indicate that the intervention strengthens self-regulation both post-training and over the mid- and long-term. This confirms that teaching general self-regulation strategies based on self-regulation process models is effective (Bandura, 1991; Kanfer & Karoly, 1972; Zacher & Frese, 2018; Zimmerman, 2000). By targeting self-regulation as a determinant of behavior change and using self-regulation as a framework for developing an intervention in the context of adaptation to FWD, we answer calls to link determinants of behavior change (i.e., self-regulation) to theories of behavior change (i.e., self-regulation models) for both designing and evaluating theory-based interventions (Michie et al., 2013). Moreover, we contribute to this stream of research as we developed an intervention that targets not only *what* participants should learn (i.e., goal-directed activities that help steer thoughts, emotions, and actions toward a goal) but also *how* they can attain these training goals (i.e., general self-regulation strategies). By combining these two aspects of self-regulation, we provide a new perspective on how to train self-regulation to facilitate behavior change in situations that require adaptation.

Second, this study contributes to research on FWD by providing valuable insights how to train self-regulation and thus address common risks to recovery, work-life balance, and well-being in the context of FWD. Previous research has pinpointed the important role of self-regulation in the FWD context (Allen et al., 2013; Kubicek et al., 2015; Mäkikangas et al., 2022; Mellner et al., 2015; Müller & Niessen, 2019). Our results suggest that learning both general self-regulation strategies and specific goal-directed activities seemed to facilitate adaptation to FWD and enabled participants to address risks related to recovery, work-life balance, and well-being: The intervention reduced strain-based WFC and improved affective (i.e., increased positive affect), cognitive (i.e., reduced stress), and work-related well-being (i.e., increased work engagement). Participants with low baseline levels of psychological detachment were the only ones who improved in psychological detachment. Thus, individuals with a higher need for training to detach were more likely to experience benefits in detachment, which is in line with propositions regarding training effectiveness (Briner & Walshe, 2015). Introducing an intervention that can affect a wide range of outcomes also adds to the literature as there are numerous interventions that have focused on psychological detachment (Karabinski et al., 2021) or well-being (Weiss et al., 2016), but fewer interventions targeting work engagement (e.g., Bakker & van Wingerden, 2021; Knight et al., 2017) or work-life balance (Althammer et al., 2021; Michel et al., 2014).

Our results also indicate mid- and long-term effectiveness of the intervention over four weeks and six months regarding psychological detachment, strain-based WFC, and affective (positive affect) and cognitive (stress) well-being demonstrating the sustainability of results. One possible explanation for the lack of long-term effects on work engagement is that, in the long term, work engagement may be influenced more by personal resources such as self-efficacy or resilience than by self-regulation (Bakker & van Wingerden, 2021; Knight et al., 2017). As this study was conducted during the COVID-19 pandemic, when many were

working remotely more than before or for the first time, knowing how to adapt to new working conditions by shaping work behaviors was particularly important. In developing this web-based intervention, we respond to calls to provide strategies for overcoming challenges associated with FWD with an intervention tailored to workers with FWD (Allen et al., 2021).

Third, this study has several methodological strengths, such as the randomized controlled training design, four measurement points to assess sustainability of effects over a substantial time period, and measurement of intervention mechanisms. This answers the call for more rigorous research designs in evaluating work-specific interventions (O'Shea et al., 2016), and to identify processes of intervention effectiveness (Michel et al., 2015). Regarding the latter, our results indicate that self-regulation as a training mechanism mediated positive effects affective (positive affect) and work-related (work engagement) well-being.

Psychological detachment, strain-based WFC, and stress were directly improved by the intervention. Thus, in the context of FWD, self-regulation may be important in improving affective and work-related well-being.

Limitations and Implications for Future Research

This study has several limitations. In the intervention, we combined multiple goal-directed activities that address different challenges in the context of FWD (i.e., cognitive-emotional and behavioral boundary management, establishment of recovery periods, work organization) with general self-regulation strategies (e.g., goal setting). We believe that this comprehensive intervention approach is of high practical relevance because first, the challenges of FWD are not limited to one aspect, and second, people face different challenges that are of particular concern to them (e.g., some might have more problems with segmenting life domains whereas for others it is particularly difficult to detach from work). However, the present evaluation design does not allow for disentangling the effectiveness of single intervention elements. Future research could test whether one of the goal-directed activities in

combination with general self-regulation strategies is more effective than others. For example, future research could test effects of separate goal-directed activities against the complete training. The training could be shortened should one or a combination of several of the goal-directed activities prove to be as effective. However, researchers should be careful not to vary the length of training, because the continuous training over six weeks may have actively contributed to training effectiveness.

Pointing in the direction that the intervention as a whole, rather than specific intervention elements, was effective, additional analyses showed only few effects of engagement with particular intervention modules (i.e., completing modules and practicing daily tasks) on post-training levels of outcome variables and self-regulation in the intervention group. Results indicate that participants who engaged more with Module 1 (focus on self-reflection and goal setting) and practiced the respite exercise more often felt more engaged at work. Moreover, those who engaged more with Module 6 (summary of training and focus on resources) and practiced resource activation reported to engage more in self-regulation strategies. Activating resources more often also improved positive affect. These results may provide guidance on which intervention elements may be particularly helpful. However, we had to rely on self-report measures to assess module engagement, as we were unable to link participants' questionnaires to their module engagement due to privacy requirements. This retrospective assessment may of course be inaccurate. Hence, more research on comparative effectiveness of intervention elements is needed. Future studies should include objective measures, such as module completion status or time stamps, to measure actual engagement with intervention modules and daily tasks to learn more about the relationship with outcomes.

The waitlist control group design allowed us to provide evidence of the general effectiveness of our intervention. To infer causality of effects to the elements of the

intervention (O'Shea et al., 2016), future research would need to include active control groups, with control groups would receiving an alternative intervention with activities that are unrelated to self-regulation and thus neutral components of the intended manipulation (e.g., a web-based communication training of similar intensity). This could strengthen the argument that self-regulation (both goal-directed activities and general self-regulation strategies) act as the active ingredient in our intervention. An additional inactive or placebo control group (i.e., receiving exercises that are plausible to or have been shown to be inert) could address concerns that participants' expectations about their participation served as a demand characteristic that evoked hypothesis-conforming behavior (Nichols & Maner, 2008), that is, whether the expectation of positive training effects alone elicited positive changes. To examine the equivalence or superiority of existing intervention approaches, future research could add an active control group that receives an alternative intervention (O'Shea et al., 2016).

One of our objectives in this study was to evaluate self-regulation as a potential mechanism explaining training effects. As general self-regulation mediated effects on work engagement and positive affect, and the direct effect of the intervention on psychological detachment, WFC, and stress was not mediated by general self-regulation, future research should focus on the specific effects of goal-directed activities and general self-regulation, for instance, whether direct training effects result from implementing the goal-directed activities alone. As we cannot conclude from our results that general self-regulation strategies were the only component of the intervention that affected outcomes, future research should further explore the role of general self-regulation as an intervention mechanism for situations that require adaptation.

Study participants were from diverse occupations, but they failed to represent the general working population because women were over-represented and participants were

self-selected. However, interventions are most successful when participants sign up for them themselves (Sin & Lyubomirsky, 2009). We made a conscious decision to address people who were facing FWD-related challenges and needed support to adapt, regardless of the extent of flexibility they had in choosing when and where to work. Moreover, we did not differentiate whether participants needed support in adapting to FWD because the situation was new for them due to pandemic regulations or whether they were used to temporal and spatial flexibility from pre-pandemic times. Additional analyses supported these decisions, confirming that participants benefited from training regardless of whether they had worked remotely before the COVID-19 pandemic and their level of temporal and spatial flexibility. This is promising that the intervention is well applicable in a post-pandemic context, as people work on a broad continuum of little to complete temporal and/or spatial flexibility.

In selecting the intervention content, we included activities that are highly relevant to workers with FWD to address risks to recovery, work-life balance, and well-being that are particularly important in this work context. We deliberately focused on challenges that can be addressed individually and through self-regulation (e.g., mental detachment from work, segmentation of work and personal life, work organization). Although not the focus of this intervention, non-psychological aspects such as ergonomics or non-individual aspects such as good leadership are also important in the FWD context. Moreover, workers without FWD may face similar challenges, and in particular, pandemic changes demanded higher levels of self-regulation from workers without FWD as well (e.g., because of care for a family member). Consistent with this, we found that the extent of temporal and spatial flexibility had no effect on post-training outcomes, suggesting that anyone who faces challenges with these issues could benefit. Due to pandemic demands, baseline levels of recovery, work-life balance, and well-being were likely different in the population from pre-pandemic times. However, we investigated intervention effectiveness with a randomized controlled trial, and

such an experimental design controls for baseline values. Thus, the results show that this intervention could improve outcomes even in times of potentially higher demands due to pandemic changes.

We aimed to make a sensible choice for time intervals between study waves to investigate the long-term effectiveness of the intervention, while at the same time limiting the impact of societal or organizational changes (e.g., pandemic-related curfews and remote working regulations) on intervention effects. Like Ployhardt & Vandenberg (2010), we expected training effects to occur quickly and thus assessed repeated measurements within a shorter duration between assessments right after training (post-training and after four weeks), and implemented one further measurement as we expected long-term effects. Although there are no general rules of thumb or empirically validated recommendations regarding the appropriate time lags between measurements (Taris & Kompier, 2014), time intervals of four weeks (e.g., Mensmann & Frese, 2019) and six months (e.g., Fan & Lai, 2014) are not unusual in intervention research. Thus, six months seemed to be a reasonable time to observe changes in general behavior. Future research is needed to generate general recommendations for follow-up time lags. Moreover, we based our choice for time lags on practical considerations, as we did not want to overburden participants' time. For the same reason, we did not invite the control group to the six-month follow-up, as this would have required them to complete a fifth questionnaire.

We experienced a high dropout rate. This often occurs in web-based intervention studies (e.g., Heskiu & McCarthy, 2021), however rates differed between groups with dropout being higher in the intervention group. In the intervention group, about 35% dropped out at T2, 53% dropped out at T3, and 54% dropped out at T4. In the control group, about 7% dropped out at T2, and 19% dropped out at T3. As this dropout pattern was observed in similar research designs (Althammer et al., 2021; Michel et al., 2014), we suspect that the

control group was more committed because they were waiting to receive the intervention in exchange for completing the questionnaires, whereas the intervention group had already received training. Future research might offer additional incentives for the intervention group, other than participation certificates and information on project results. Moreover, researchers might allocate more participants to the intervention group rather than the control group, especially when research resources are limited. Last, effective interventions should focus on individuals, work groups, leaders, and organizational resources (Nielsen et al., 2017). Thus, future research could complement this individual training with small group meetings, team workshops, or organizational changes.

Practical Implications

When workers feel challenged by working conditions of FWD, such as blurred boundaries and extended working hours, self-regulating the workday by engaging in specific goal-directed activities and applying general self-regulation strategies can help manage risks to recovery, work-life balance, and well-being. In this study, we show that conducting a web-based training based on self-regulation helps promote self-regulation, which improves affective (positive affect) and work-related (work engagement) well-being. Moreover, the results reveal that the intervention reduces both WFC and stress, and improves psychological detachment for those with low baseline levels of psychological detachment. Thus, this study presents an intervention to improve self-regulation for coping with FWD. We advise supervisors and occupational health managers to offer interventions based on self-regulation to workers with FWD, especially those who struggle with the demands of FWD. These interventions should teach specific goal-directed activities (e.g., managing boundaries, detaching from work, establishing recovery periods) as well as general self-regulation strategies (i.e., goal setting, self-monitoring, self-evaluation, and self-reward) for easier goal

attainment. Providing such an intervention can help workers and employers take advantage of the potential benefits of FWD while minimizing its potential risks.

Achieving individual goals by shaping the workday can help participants adapt to new working conditions (Mäkikangas et al., 2022; Müller & Niessen, 2019). This was especially important during the COVID-19 pandemic, when many were working remotely more than before, often unintentionally. When workers work remotely or from home, traditional instruments of occupational health and safety are not always effective. Then, web-based interventions can be a valuable addition to human resource practices and policies. The cost-efficient intervention can help large groups of workers develop strategies to enhance their self-regulation and attain both their work and private life goals (e.g., improve recovery, work-life balance, and well-being). However, individual trainings can only complement appropriate working conditions. These include for instance an adequate workload, supervisor and peer support, a workplace climate encouraging FWD, and corporate telework agreements (Kossek & Lautsch, 2012; Wöhrmann et al., 2020).

Conclusion

In this study, we show that a web-based training for workers with FWD based on self-regulation (i.e., goal-directed activities and general self-regulation strategies) is effective: In a randomized controlled trial, the intervention improved affective and work-related well-being (i.e., positive affect and work engagement) via changes in self-regulation. Moreover, it alleviated WFC and cognitive well-being (stress). Workers who had difficulties to detach from work benefited regarding psychological detachment. A large share of workers has temporal and spatial flexibility, and the COVID-19 pandemic accelerated this trend. Because such flexibility comes with certain challenges and a high need for self-regulation to adapt to these challenges, interventions such as the one examined in this study may be a helpful tool

in supporting workers to cope with FWD demands and risks to recovery, work-life balance, and well-being.

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Figure 1

Hypothesized Model of Intervention Effects

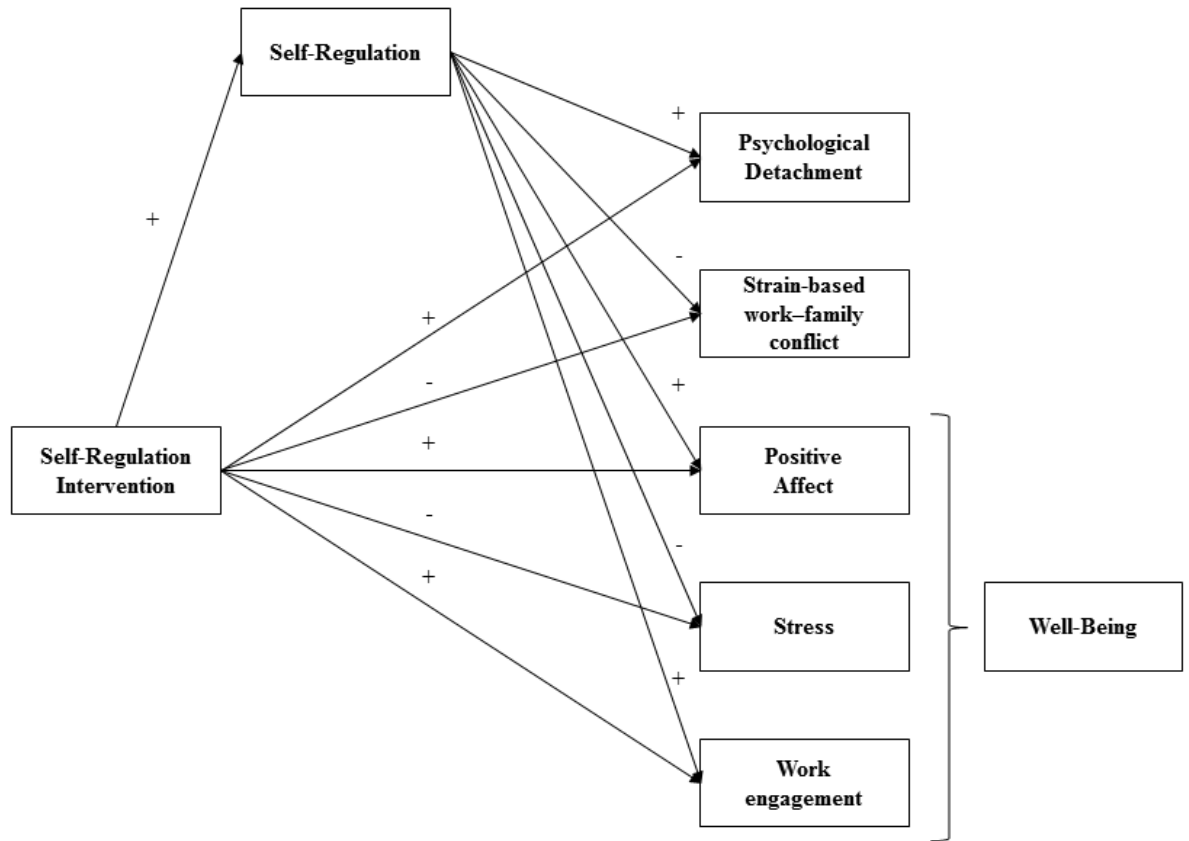


Figure 2

CONSORT Flow Diagram

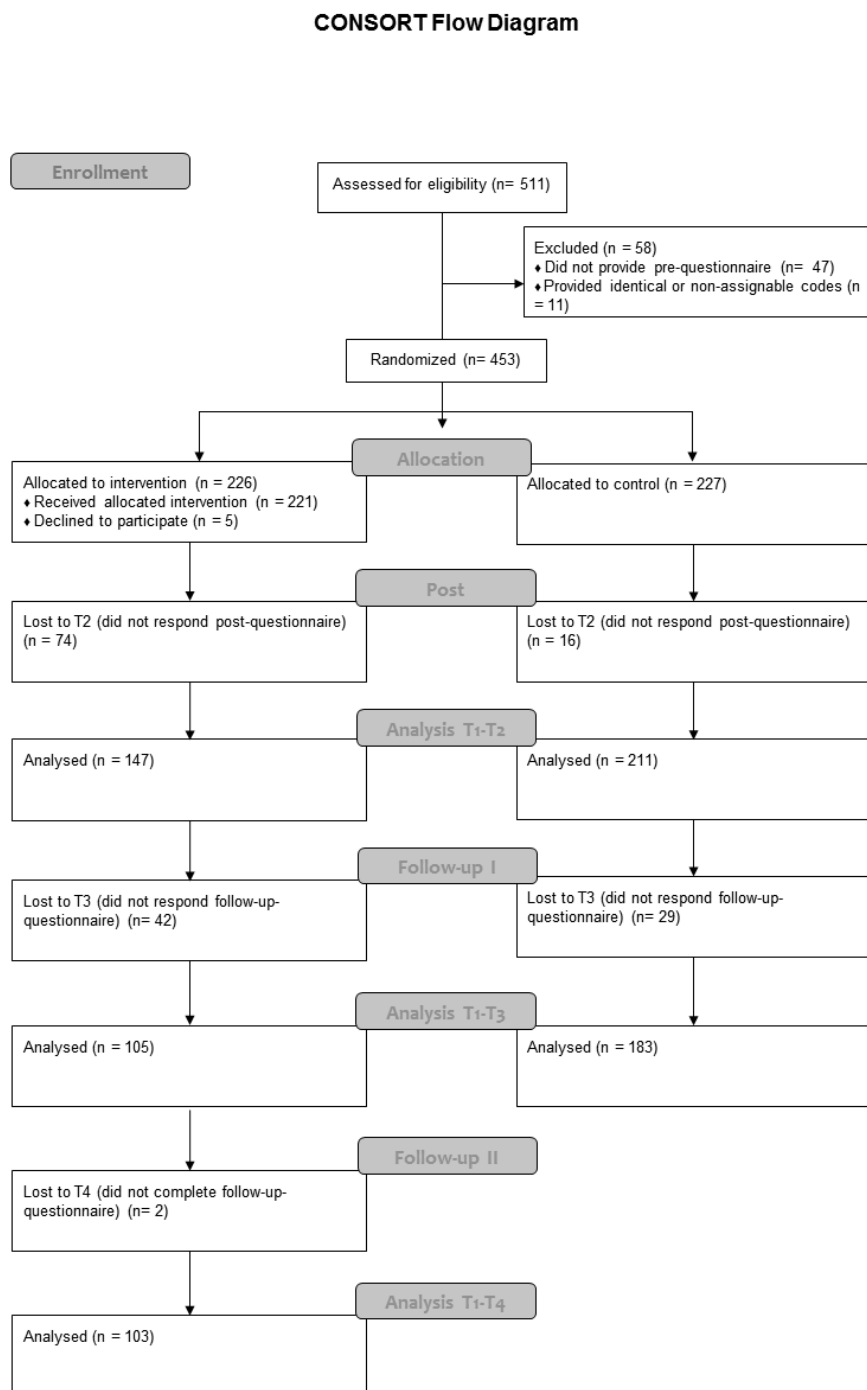


Figure 3

Means of Outcome Variables for Intervention Group and Control Group Before (T1) and After (T2) Training Completion and at Four-Week Follow-Up (T3)

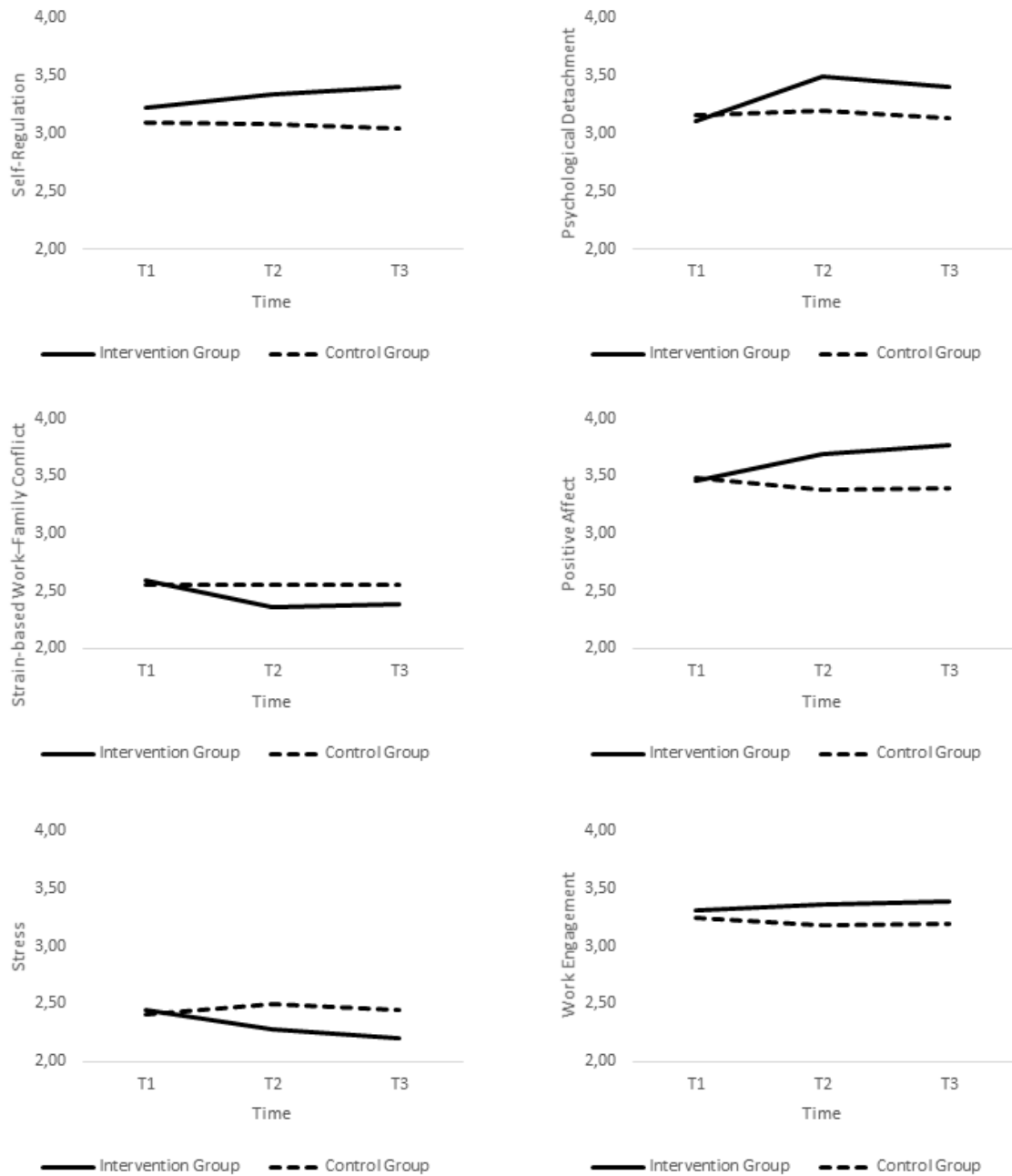


Table 1*Means, Standard Deviations, and Correlations Over Both Groups*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19
1. SR.t1	3.15	0.71																	
2. PD.t1	3.08	0.97	.05																
3. WFC.t1	2.61	1.07	-.01	-.45**															
4. PA.t1	3.47	1.01	.25**	.38**	-.55**														
5. WE.t1	3.26	0.82	.32**	.13*	-.30**	.53**													
6. PSS.t1	2.44	0.85	-.19**	-.25**	.49**	-.63**	-.40**												
7. SR.t2	3.20	0.74	.72**	.07	-.05	.24**	.31**	-.21**											
8. PD.t2	3.26	0.92	.09	.67**	-.42**	.37**	.16*	-.29**	.17*										
9. WFC.t2	2.52	1.03	-.06	-.36**	.64**	-.50**	-.30**	.39**	-.09	-.47**									
10. PA.t2	3.50	1.09	.32**	.26**	-.46**	.72**	.54**	-.50**	.37**	.38**	-.56**								
11. WE.t2	3.25	0.83	.30**	.12	-.29**	.49**	.82**	-.43**	.40**	.22**	-.35**	.64**							
12. PSS.t2	2.42	0.82	-.23**	-.22**	.44**	-.51**	-.36*	.64**	-.31**	-.32**	.45**	-.66**	-.49**						
13. SR.t3	3.18	0.76	.70**	.06	-.05	.22**	.31**	-.18**	.79**	.16**	-.10	.36**	.35**	-.29**					
14. PD.t3	3.23	0.98	.05	.64**	-.40**	.32**	.06	-.23**	.10	.73**	-.42**	.35**	.12	-.21**	.11*				
15. WFC.t3	2.50	1.00	-.07	-.29**	.64**	-.44**	-.26**	.37**	-.12	-.40**	.72**	-.53**	-.35**	.45**	-.15**	-.51**			
16. PA.t3	3.54	1.12	.26**	.23**	-.42**	.70**	.46**	-.46**	.30**	.29**	-.44**	.78**	.50**	-.52**	.34**	.39**	-.54**		
17. WE.t3	3.27	0.86	.26**	.14*	-.34**	.51**	.78**	-.38**	.33**	.23**	-.34**	.61**	.82**	-.44**	.40**	.22**	-.44**	.62**	
18. PSS.t3	2.37	0.82	-.21**	-.16*	.40**	-.53**	-.33**	.66**	-.23**	-.21**	.39**	-.58**	-.41**	.65**	-.28**	-.30**	.48**	-.65**	-.47**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$. t1 = Pre, t2 = Post, t3 = Follow-up, SR = Self-Regulation, PD = Psychological Detachment, WFC = Strain-based WFC, PA = Positive Affect, WE = Work engagement, PSS = Stress. $N = 288$.

Table 2

Means and Standard Deviations for the Outcome Variables at Time 1 (Pre-Questionnaire), Time 2 (Post-Questionnaire), Time 3 (4-Week Follow-Up), and Time 4 (6-Month Follow-Up)

Variable	T1 (n = 358)				T2 (n = 358)				T3 (n = 288)				T4 (n = 103)	
	IG		CG		IG		CG		IG		CG		IG	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Self-Regulation	3.23	0.67	3.10	0.71	3.34	0.68	3.09	0.73	3.41	0.70	3.05	0.76	3.37	0.75
Psychological Detachment	3.11	0.97	3.16	0.96	3.50	0.80	3.20	0.93	3.40	0.87	3.13	1.02	3.51	0.88
Strain-based WFC	2.60	1.00	2.56	1.07	2.37	0.94	2.56	1.03	2.39	0.96	2.56	1.03	2.27	0.90
Positive Affect	3.46	0.96	3.49	1.01	3.70	1.03	3.39	1.11	3.77	1.04	3.40	1.14	3.79	0.99
Stress	2.45	0.77	2.41	0.86	2.28	0.73	2.51	0.85	2.21	0.70	2.45	0.87	2.18	0.71
Work engagement	3.31	0.78	3.25	0.83	3.37	0.77	3.19	0.85	3.39	0.75	3.20	0.91	3.36	0.77

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. IG = Intervention Group, CG = Control Group.

Table 3

Results of the Robust ANCOVA for Psychological Detachment

T1 score	<i>n</i> _{KG}	<i>n</i> _{IG}	<i>M</i> _{diff}	<i>SE</i> _{diff}	95% CI	<i>p</i>
M-1*SD	105	82	-0.54	0.11	[-0.81; -0.28]	0.0000
M	142	92	-0.11	0.10	[-0.35; 0.13]	0.2752
M+1*SD	128	85	-0.13	0.12	[-0.42; 0.16]	0.2930

Note. *M*_{diff} and *SE*_{diff} are used to represent trimmed mean differences and standard errors for trimmed mean differences, respectively. IG = Intervention Group, CG = Control Group.

Table 4

Results of the RM-ANOVAS and Bonferroni Adjusted Pairwise Paired T-Test Comparisons

Variable	RM-ANOVA			T1 vs. T2	T1 vs. T3	T1 vs. T4	T2 vs. T3	T2 vs. T4	T3 vs. T4
	<i>F</i>	<i>df</i>	η^2	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>
Self-regulation ¹	4.63**	2.82, 205.51	0.016	-2.87*	-2.87*	-2.85*	0.32	-0.03	-0.39
Psychological Detachment	17.31***	3, 219	0.060	-5.43***	-5.51***	-5.40***	0.18	-0.13	-0.28
Strain-based WFC	7.67***	3, 219	0.028	2.51	3.59**	4.15***	1.18	1.81	0.82
Positive Affect	9.96***	3, 219	0.030	-3.28*	-4.99***	-4.13***	-1.84	-1.32	0.18
Stress ¹	8.50***	2.82, 205.86	0.032	2.83*	4.60***	3.45**	1.69	1.01	-0.79
Work engagement	1.66	3, 219	0.004	-1.04	-2.40	-0.60	-1.29	0.28	1.42

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$. ¹Mauchly’s test indicated that the assumption of sphericity had been violated, thus degrees of freedom were corrected using Huynh–Feldt estimates of sphericity.

Table 5

Regression Table for the Mediation Analysis

Outcome Variables	<i>b</i>	<i>c</i>	<i>c'</i>	<i>ab</i>	95% CI	
					Lower	Upper
Psychological Detachment	0.01 (0.07)	0.19 (0.09)***	0.19 (0.09)***	0.001 (0.01)	-0.02	0.03
Strain-based WFC	-0.08 (0.07)	-0.11 (0.09)*	-0.10 (0.10)*	-0.010 (0.02)	-0.05	0.01
Positive Affect	0.15 (0.07)**	0.19 (0.10) ***	0.17 (0.10)***	0.020 (0.02)*	0.01	0.09
Stress	-0.09 (0.06)	-0.16 (0.07) ***	-0.15 (0.07)**	-0.012 (0.01)	-0.05	0.00
Work engagement	0.12 (0.05)*	0.08 (0.06)*	0.06 (0.07)	0.016 (0.01)	0.01	0.06

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$. The effect of the intervention on self-regulation (*a* path) was $b = 0.14$, $SE = 0.07$, $p < .01$. All coefficients reported for paths *b* (unique effect of self-regulation), *c* (total direct effect), *c'* (direct effect), and *ab* (indirect effect) are standardized slopes with the corresponding standard error of the slope in parentheses. Bias-corrected CIs of each indirect effect are based on 10,000 resamples.

Appendix A

Intervention Overview

Modules	Intervention Elements
Module 1: <i>Working flexibly – healthfully and happy</i>	<ul style="list-style-type: none"> • formulate a training goal to strengthen motivation and commitment • reflect on goals achieved in the past to activate personal resources • set specific, measurable, achievable, relevant, time-bound (SMART) participation goals (Doran, 1981) to assure regular participation • reflect on personal training motivation using mental contrasting with implementation intentions (MCII; Gollwitzer & Oettingen, 2013) to strengthen goal striving • reflect on previously used strategies to activate personal resources for coping with FWD <p><i>Daily task:</i> adapted version of the 54321 exercise (Dolan, 1991): When you find yourself ruminating about work, focus on the moment instead.</p> <p><i>Self-regulatory element:</i> set specific participation goals and use MCII to set the overall training goal</p>
Module 2: <i>Finding personal balance</i>	<ul style="list-style-type: none"> • study theoretical background regarding conflict between work and nonwork roles (Greenhaus & Beutell, 1985), boundary theory, and the segmentation-integration continuum (Ashforth et al., 2000) in the context of FWD • learn the importance of establishing and managing boundaries aligned with segmentation preferences for separating or integrating work and nonwork domains (Kossek & Lautsch, 2012) and how integrators can profit from segmentation strategies in certain times and situations • reflect on actual and preferred separation or integration between work and nonwork domains • introduce physical, temporal, behavioral, and technological boundary management tactics (Kreiner et al., 2009) and transition rituals (Ashforth et al., 2000) to separate work from nonwork <p><i>Daily task:</i> Use two specific strategies for separating work and nonwork domains.</p> <p><i>Self-regulatory element:</i> set specific goals and apply MCII for the daily task</p>

Module 3: *Switching off from work – setting boundaries*

- learn about detachment practices that enhance health and well-being (e.g., Sonnentag, 2012)
- reflect on activities that block out thoughts about work, based on recovery training from Hahn et al. (2011)
- introduce the two-component model of mindfulness (Bishop et al., 2004) and discuss its positive effects on stress and well-being (e.g., Bartlett et al., 2019; Eby et al., 2019; Lomas et al., 2019; Virgili, 2015)
- focus on self-regulation of attention, the first component of mindfulness
 - an audio exercise guides participants to focus on their breathing, and to draw their attention back to their breath when minds wander (Kabat-Zinn, 2006; Segal et al., 2002; Weiss et al., 2010)
 - participants learn to distance themselves from work-related thoughts by turning attention to the current moment and away from past or future-orientated cognitions
- focus on mindful orientation to experience, the second component of mindfulness
 - an audio exercise shows how incidents evoke subjective viewpoints (Kabat-Zinn, 2006; Segal et al., 2002; Siegel, 2010; Weiss et al., 2010)
 - participants learn that being mindfully oriented helps them escape undesired work-related thoughts and feelings.

Daily task: Use the adapted version (Michel et al., 2014) of the 3-minute breathing exercise (Segal et al., 2002; Weiss et al., 2010) to support transition to private life after work or to distance from work-related thoughts and feelings

Self-regulatory element: setting specific goals and applying MCII for daily tasks

Module 4: *Staying focused – working concentrated*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- introduce the four central processes of self-regulation: self-goal setting, self-monitoring, self-evaluation, and self-reward (Bandura, 1991; Kanfer et al., 2006; Zimmerman, 2000)
- explain how to improve work organization using the selection, optimization, and compensation (SOC) model (Moghimi et al., 2017; Müller et al., 2016)
- set a specific goal for organizing daily work using SMART goals and MCII
- learn how to use general self-regulation strategies to achieve this goal

Daily task: Use general self-regulation strategies to organize daily work.

Self-regulatory element: setting specific goals for organizing daily work and applying MCII to them; planning strategies for self-monitoring, self-evaluating, and self-rewarding when goals are met

Module 5: *Looking after myself – everyday rest and recharge*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- learn about self-regulation of recovery, daily recovery in leisure time, and recovery experiences (Sonnentag & Fritz, 2007) in the FWD context
- list all leisure activities that yield detachment, relaxation, mastery and/or control (see Hahn et al. (2011))
- learn the importance of breaks
- reflect on past recreative breaks
- perform respite exercise of listening to a natural soundscape combined with a short mindfulness component, a guided imagination technique, and a savoring component (Steidle et al., 2017)

Daily task: During work breaks, perform the savoring nature exercise to improve recovery

Self-regulatory element: setting specific goals and applying MCII for the daily task; planning specific ways to self-monitor, self-evaluate and self-reward progress

Module 6: *My strategies, my sources of strength*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- recall the modules, reflect on insights gained from the training, judge which goals were attained, repeat and amplify the training content and make the training effects sustainable
- retain and build resources perceived as relevant for reaching goals (Halbesleben et al., 2014; Hobfoll et al., 2018)
- using the tree metaphor, reflect on personal and contextual resources (ten Brummelhuis & Bakker, 2012)

Daily task: Consciously use resources.

Self-regulatory element: identify resources through self-observation; participants reward themselves by filling in the tree with resources they identify

General Intervention Design

Gamification techniques (Hoffmann et al., 2017) were included to enhance training effectiveness (Johnson et al., 2016):

- participants viewed a system-generated illustration of a tree that added more blooms as each module was completed
- blooms showed learning levels and served as a visual reward
- at the beginning of each module, participants could create a personal toolbox containing their favorite exercises from the past week, to be accessed at any time

Various sensory modalities and interactive multimedia elements were used to enable information processing and facilitate learning:

- exercises were a mix of written explanations, audios explaining exercises, and videos of a trainer welcoming participants and explaining training content (Moreno, 2006).
 - exercises were interactive and required reflection, writing, or guided imagination.
 - audio exercises began with a brief mindfulness component (Michel et al., 2014; Steidle et al., 2017)
 - four fictitious models shared experiences and provided examples of personal applications to increase behavioral modelling, learning, and transfer (Burke & Hutchins, 2007; Moreno, 2006)
-

Paper 3:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). How Positive Activities Shape Emotional Exhaustion and Work-Life Balance: Effects of an Intervention via Positive Emotions and Boundary Management Strategies [Manuscript under review]. *Occupational Health Science*.

How Positive Activities Shape Emotional Exhaustion and Work-Life Balance: Effects of an Intervention via Positive Emotions and Boundary Management Strategies

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Data availability statement:

The data that support the findings of this study are openly available in OSF at https://osf.io/cj3sg/?view_only=be75643dc5f844d4abdf018d6a53463d.

Conflict of interest disclosure:

The authors have no conflict of interest to disclose.

Ethics approval statement:

We obtained ethical approval for this study from the ethics committee of the Federal Institute for Occupational Safety and Health in Germany.

How Positive Activities Shape Emotional Exhaustion and Work-Life Balance: Effects of an Intervention via Positive Emotions and Boundary Management Strategies

Abstract

The positive-activity model (PAM) proposes how and for whom positive activity interventions work best. This article evaluates the effectiveness of a web-based self-regulation intervention that teaches participants positive activities. Over six weeks, participants engage in different positive activities to meet the particular challenges in flexible work designs (FWD) such as remote work or mobile work. In line with the PAM, we expected the intervention to decrease emotional exhaustion and increase satisfaction with work-life balance via increases in both positive emotions and boundary management. Moreover, individuals' depressive symptoms were expected to moderate this relationship. In a randomized controlled trial, participants were assigned to a waitlist control group or an intervention group. Study participants received questionnaires before and after the intervention and at a four-week follow-up. The final sample included 288 participants (intervention group: $n = 105$; control group: $n = 183$). Results of mixed variance analyses were in line with our predictions. Findings indicate that the intervention is an effective tool for improving well-being and work-life balance for workers with FWD. Changes in positive emotions and boundary management explained intervention effects. The intervention was effective regardless of participants' baseline level of depressive symptoms.

Keywords: flexible work design, emotional exhaustion, German sample, positive activity intervention, randomized controlled trial, work-life balance

Flexible work designs (FWD) such as remote work or mobile work give workers at least some autonomy in choosing their work times and locations (Demerouti et al., 2014; Lewis, 2003). The COVID-19 pandemic increased the number of workers with at least some temporal and spatial flexibility, and the share of workers with FWD is expected to remain high in the post-pandemic future. This personal flexibility can be associated with reduced work-family conflicts (Liao et al., 2019) and improved physical health (Shifrin & Michel, 2021). However, it challenges workers' self-regulation (ability to control thoughts, feelings, and actions; Bandura, 1991) as workers need to manage work routines according to their individual needs (Allen et al., 2013; Kubicek et al., 2015; Mellner et al., 2015). For example, it becomes more difficult to establish boundaries between work and private life and some workers feel they have to be constantly available and work more intensely than before, hampering work-life balance and psychosomatic health (Wöhrmann et al., 2020; Wöhrmann & Ebner, 2021). Another challenge comes with recovering from work, which is essential for well-being (Park et al., 2011).

Given these contradicting effects of FWD (Allen et al., 2013; Demerouti et al., 2014), it is important to support workers. We developed a web-based self-regulation toolkit intervention that teaches different positive activities, specifically, environmental (Kreiner et al., 2009) and cognitive-emotional boundary management strategies (Michel et al., 2014), self-regulation strategies (i.e., self-goal setting, self-monitoring, self-evaluation, and self-reward), and recovery strategies (Hahn et al., 2011; Steidle et al., 2017). Combining different positive activities has been found to increase well-being (Michel et al., 2021), and the specific positive activities of this intervention have been shown to increase well-being and work-life balance (Althammer et al., 2021; Hahn et al., 2011; Michel et al., 2014; Rexroth et al., 2016; Rexroth et al., 2017).

In this study, we evaluated the effectiveness of this toolkit intervention for decreasing emotional exhaustion and increasing satisfaction with work-life balance. The PAM (Lyubomirsky & Layous, 2013) provides a framework for how positive activity interventions work, proposing activities to improve well-being via increases in positive emotions, thoughts, and behaviors, as well as need satisfaction. Moreover, it states that features of positive activities, person features, and person-activity fit moderate this relationship. Focusing on the mediation via positive emotions and behaviors, we explored whether positive emotions and boundary management, as a positive behavior, mediate the proposed intervention effects. Focusing on the moderation through person features stated in the PAM, we investigated whether participants' baseline level of depressive symptoms moderates intervention effectiveness (Figure 1).

This study aims to contribute to the literature in several ways. First, by testing applicability of the PAM for a self-regulation toolkit intervention, we established a framework for linking self-regulation and positive activities, showing that self-regulation strategies often involve positive activities. Our aim was to provide empirical evidence for the PAM's theoretical assumptions that positive emotions and behaviors mediate and depressive symptoms moderate intervention effectiveness, addressing Michel et al.'s (2015) call to identify intervention processes. Second, we explored depressive symptoms, one of the most prevalent workplace mental health issues, as a person feature that may affect intervention effectiveness. This research also answers calls to investigate the role of depressive symptoms as an important person characteristic in the PAM (Lyubomirsky & Layous, 2013). Using a randomized controlled trial with multiple measurement points follows the call for more high-quality research designs in work-specific well-being interventions (Michel et al., 2015; O'Shea et al., 2016). Third, we contribute to the PAM by proposing boundary management as a positive behavior, combining the PAM with elements of boundary theory (Ashforth et al.,

2000; Kreiner, 2006). Evaluating an intervention that addresses specific challenges of FWD, we can now guide workers with FWD to reduce their emotional exhaustion and enhance their satisfaction with work-life balance.

Positive Activities Can Shape Well-Being

Positive activities are simple, intentional, and regular practices emulating thoughts and behaviors of happy people (Lyubomirsky & Layous, 2013), and require self-regulation (Lyubomirsky et al., 2005). Thus, positive activity interventions are intentional activities aimed at cultivating positive emotions, behaviors, or cognitions (Sin & Lyubomirsky, 2009). According to the PAM (Lyubomirsky & Layous, 2013), people can enhance their well-being through positive activities. The PAM proposes that increases in positive emotions, positive thoughts, positive behaviors, and need satisfaction mediate the relationship between positive activities and well-being. Further, it states that features of positive activities (e.g., variety, sequence, dose), person features (e.g., efficacy beliefs, baseline affective state), and person-activity fit (suitability of an activity for an individual) moderate the effect of positive activities on well-being.

Well-being includes both affective and cognitive aspects (Diener et al., 1999). We focus on emotional exhaustion indicating the absence of affective well-being, and satisfaction with work-life balance as an aspect of cognitive well-being. Emotional exhaustion develops from intense cognitive, affective, and/or physical strain and is a dimension of burnout (Demerouti et al., 2002). People feel emotionally exhausted when they are persistently exposed to specific working conditions or stressors. Cognitive well-being comprises global judgements of life and domain satisfactions (Diener et al., 1999). We focus on satisfaction with work-life balance as a domain that is highly relevant in the context of FWD. Workers are satisfied with their work-life balance when they meet both the demands of work and private life roles (Valcour, 2007).

Our multicomponent self-regulation toolkit intervention teaches several positive activities (Appendix A) requiring self-regulation (Lyubomirsky et al., 2005). Intervention participants learn to manage boundaries using environmental (e.g., positive activities such as performing a ritual before starting work) and cognitive-emotional segmentation strategies (e.g., mindfulness). Participants also learn recovery strategies, including positive activities such as taking work breaks, practicing respite exercises, and spending leisure time in recreational ways. Boundary management (Grawitch et al., 2010; Hirschi et al., 2019) and recovery (Zijlstra et al., 2014) are both forms of self-regulation, and mindfulness is specifically a self-regulation strategy to manage emotions (Koole et al., 2013). Given that work organization and time management require self-regulation (Aspinwall & Taylor, 1997; Oettingen et al., 2015), participants are taught strategies to help organize their workday and maintain focus (e.g., rewarding themselves for completion of tasks). Participants are encouraged to implement these positive activities into their daily lives, and to pursue activities they found most helpful (Pogrebtsova et al., 2022). This toolkit design follows the PAM in that it aims to increase the person-activity fit.

Previous studies of positive activities have shown that training boundary management can reduce emotional exhaustion and negative affect, enhance life satisfaction (Rexroth et al., 2017), improve satisfaction with work-life balance and reduce work-family conflicts (Binnewies et al., 2020; Michel et al., 2014). Recovery training can reduce negative affect and perceived stress (Hahn et al., 2011). The training of self-regulation positively affects well-being, as it reduces negative affect and stress, and improves life satisfaction (Mrazek et al., 2021). Strategies to manage boundaries, recover, and self-regulate can also help people set boundaries between life domains and be more present in their private life, reducing role conflict. Overall, we expected the positive activities in our intervention to help participants reduce their emotional exhaustion and better balance work and private life roles:

Hypothesis 1: After the intervention, intervention group participants will report a) reduced emotional exhaustion and b) increased satisfaction with their work-life balance, compared to control group participants.

The Mediating Role of Positive Emotions and Boundary Management

According to the PAM, positive activities stimulate increases in positive emotions. As mentioned before, our self-regulation toolkit intervention teaches positive activities to manage boundaries between work and private life, establish recovery periods from work, and self-organize the workday. The implementation of these activities should entail positive experiences as they enable people to organize their workday and boundaries to meet their needs. Thus, positive activities should lead to the experience of positive emotions. Indeed, earlier studies have shown that recovery (Througakos et al., 2008) and self-organization (e.g., task accomplishment or self-leadership; Sonnentag et al., 2018; Unsworth & Mason, 2012) can enhance positive emotions. Although there is little evidence on the effect of boundary management on positive emotions, both work-to-family and family-to-work conflicts increase negative affect (French & Allen, 2020), and boundary management interventions have the potential to reduce negative affect (Althammer et al., 2021; Rexroth et al., 2017). Thus, we hypothesized:

Hypothesis 2: After the intervention, intervention group participants will report increased positive emotions compared to control group participants.

According to boundary theory and its person-environment fit perspective (Ashforth et al., 2000; Kreiner, 2006), individuals create and maintain boundaries to separate life domains, such as work and private life. Some individuals prefer highly differentiated domains (segmentation), while others favor overlapping domains (integration). Matching segmentation preferences and possibilities can improve well-being and reduce work-family conflicts. Hence, individuals use segmentation strategies to manage boundaries, that is, they engage in

boundary management (Kreiner et al., 2009). This is in line with the PAM, proposing the fit between person and activity to positively affect well-being. As stated previously, participants in our intervention learn how to manage their life domains according to their segmentation preference (Kreiner et al., 2009; Michel et al., 2014), how to self-organize their workday (Bandura, 1991; Kanfer, 1977), and how to recover during work breaks and leisure time (Hahn et al., 2011; Steidle et al., 2017). These skills may also help participants manage the boundaries between work and private life. Hence:

Hypothesis 3: After the intervention, intervention group participants will report increased boundary management compared to control group participants.

According to the PAM, positive emotions, thoughts, and behaviors, as well as need satisfaction mediate the effect of positive activities on well-being. Our intervention aims to stimulate positive emotions, and as a positive behavior, boundary management. Based on the PAM, we expected positive emotions and boundary management to mediate intervention effects on emotional exhaustion and satisfaction with work-life balance. The effect of positive emotions on well-being can be explained by broaden-and-build theory (Fredrickson, 1998), which proposes that experiencing positive emotions broadens the array of thoughts and actions that come to mind, helping people build further personal resources. Over time, these effects accumulate and trigger an upward spiral toward enhanced well-being (Fredrickson, 2001). Supporting studies have shown the mediating role of positive emotions on well-being in a positive activity intervention (Meyers & van Woerkom, 2017). Integrating boundary theory and the PAM, we propose boundary management to be a positive behavior, likely to result in reduced emotional exhaustion and increased satisfaction with work-life balance. Earlier studies have shown that boundary management interventions can improve well-being and work-life balance (Althammer et al., 2021; Binnewies et al., 2020; Michel et al., 2014). Thus, we hypothesized:

Hypothesis 4: The intervention will affect a) emotional exhaustion and b) satisfaction with work-life balance through I) positive emotions and II) boundary management.

The Moderating Effect of Baseline Depressive Symptoms

Comparatively little is known about the conditions under which positive activity interventions are most beneficial. As outlined above, the PAM states that, amongst others, person features moderate the relationship between positive activities and well-being (Lyubomirsky & Layous, 2013). For example, baseline affective state is proposed to affect intervention effects (Lyubomirsky & Layous, 2013). Individuals with depressive symptoms might not have the energy or motivation to commit to an intervention, or they might feel discouraged if the intervention has no immediate effects (Layous & Lyubomirsky, 2014) which could limit or even reverse beneficial intervention effects. At the same time, it is reasonable to assume that interventions might be more effective for participants with higher levels of depressive symptoms. They might derive more benefits from an intervention because they have more room to improve (Lyubomirsky & Layous, 2013). In line with this, it has been argued that it is difficult to further enhance average or high levels of well-being (Briner & Walshe, 2015).

Empirical evidence with regard to the effectiveness of positive activity interventions dependent on participants' baseline affective state is mixed. For example, Sin et al. (2011) found certain positive activities to impair the well-being of dysphoric participants. They concluded that depressive symptoms can limit or even reverse the effects of positive activities. However, challenging the notion that participants with higher levels of depressive symptoms might benefit less from positive activity interventions, positive activities have been shown to help those with depression (Seligman et al., 2005). Further, meta-analytical evidence has shown that in such interventions depressed individuals experienced more

improvements in well-being and greater reductions in depressive symptoms than those without depression (Sin & Lyubomirsky, 2009).

Given conflicting findings, no clear expectation can be deduced from previous research for how baseline levels of depressive symptoms affect intervention effectiveness via positive emotions and boundary management. We, thus, posed the following research question:

Research Question: Will depressive symptoms moderate the indirect effect of the intervention on emotional exhaustion and satisfaction with work-life balance via positive emotions and boundary management?

Method

Study Design and Procedure

From October 2020 to May 2021, we conducted a randomized controlled trial with measurements before and after the intervention and four weeks later. Participants had two weeks to complete questionnaires. We used a snowball sampling approach, e-mail distribution lists, newsletters, online professional networking sites, and magazine articles to recruit participants. We promoted the study as a free web-based intervention to help workers cope with the challenges of FWD. Participants confirmed their jobs allowed them some flexibility (e.g., remote work), that they were willing to complete the intervention and all questionnaires, and that they were of age. We asked participants to complete a baseline questionnaire (T1) before randomly assigning them to a waitlist control group or an intervention group. The latter started the intervention immediately. Participants knew that starting dates for the intervention varied, but they were unaware of their group assignment (i.e., single-blind). After the intervention group completed the six-week intervention, we sent the post-intervention questionnaire (T2) to all participants. Four weeks later, we sent them the follow-up questionnaire (T3). Then, the control group could access the intervention. As an

incentive for active participation, we offered participation certificates and information about project results. We obtained ethical approval for this study from the ethics committee of the (BLINDED).

The Intervention

Our six-week web-based intervention was designed as a multicomponent self-regulation intervention with a toolkit of positive activities to cope with specific challenges of FWD: segmentation, mindfulness, self-organization, and recovery exercises. Different positive activities can be effectively combined in interventions (Michel et al., 2021). Participants were encouraged to keep engaging in activities and exercises from their toolkit they found most helpful and were in line with their preferences and needs (Pogrebtsova et al., 2022). Designing the intervention as a toolkit is in line with the PAM, that is, to increase the person-activity fit.

Between Thursdays and Sundays each week for six consecutive weeks, participants completed 45-minute online modules. In each module, participants received theoretical background information, self-reflection prompts, and practical exercises. We introduced a five- to 10-minute daily task to engage in different positive activities for the five workdays each week. We sent three emails or text messages each week to remind participants to perform daily tasks. To facilitate engagement in positive activities, each module concluded with a self-regulation exercise, for example, setting a specific goal for the next week or applying mental contrasting with implementation intentions (Gollwitzer & Oettingen, 2013). To promote positive experiences, we kept the focus on strengths and resources in all tasks.

Each module featured a focus topic (details provided in Appendix A). Module 1 gave an overview of the toolkit intervention and introduced goal-setting techniques. The daily task was an adapted version of the 54321 exercise (Dolan, 1991). Modules 2 and 3 focused on managing boundaries between work and private life (Ashforth et al., 2000). Module 2

stimulated reflection on segmentation preference and introduced environmental boundary management strategies (Kreiner et al., 2009), of which two were to use as the daily task, including positive activities such as performing a ritual at the end of the workday. Module 3 introduced mindfulness practice as a cognitive-emotional boundary management strategy and positive activity (Michel et al., 2014). The daily task was an adapted version of the three-minute breathing exercise (Michel et al., 2014). Module 4 introduced the self-regulation strategies and positive activities of self-goal setting, self-monitoring, self-evaluation, and self-reward (Bandura, 1991; Kanfer, 1977). As a daily task, participants were to use these self-regulation strategies to organize their daily work. Module 5 focused on recovery in leisure time and work breaks. Participants reflected on spending leisure time in a recreational way (Hahn et al., 2011) and learned positive activities such as a respite exercise (Steidle et al., 2017). The daily task was to perform the respite exercise during work breaks. In Module 6, participants reflected on their personal and contextual resources (ten Brummelhuis & Bakker, 2012). The daily task was to use resources consciously.

Participants

This study used the same sample examined by (BLINDED), though different measures were used to answer different research questions. Participants who completed the baseline questionnaire were randomly assigned to the intervention group (IG; $n = 226$) or the control group (CG; $n = 227$). Participants who dropped out at T2 (Figure 2) were similar to non-dropouts with regard to all study variables. Participants who dropped out at T3 were younger, $F(1, 449) = 7.91, p < .01$, and less likely to hold a PhD, $\chi^2(7, 442) = 19.71, p < .01$, than those who completed the follow-up questionnaire.

The final pre-post follow-up sample included 288 participants ($n_{IG} = 105, n_{CG} = 183$) who were 23 to 71 years old ($M = 45.13, SD = 10.49$). Women comprised 70.4% of the sample, and 82.6% of participants held a university degree. Participants worked on average

38.76 ($SD = 9.81$) hours per week. A majority of 90.9% reported being employees, 7.7% were self-employed and the remaining were employed atypically. About a quarter (25.4%) reported holding a leadership position. Regarding temporal and spatial flexibility, 60.6% worked flexible hours at least five days per week and 98.3% worked from home or in other locations for at least one day a week. They worked in various sectors such as law, business, administration, science, teaching, and financial services. The study was conducted during the COVID-19 pandemic, and 60.3% of participants stated that they worked from home more frequently in response to the pandemic, nearly a quarter (23.3%) had not worked from home before. Univariate ANOVAs and chi-squared tests revealed no pre-intervention differences between intervention and control group.

Measures

We assessed all variables except for demographics and depressive symptoms at all measurement points. We included questions regarding evaluation of the intervention in the post- and follow-up questionnaire. Online questionnaires were in German. We used a translation/back translation procedure for items available only in other languages (Brislin, 1980; Graham & Naglieri, 2003). Unless otherwise indicated, we asked participants to answer items on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) regarding the preceding two weeks.

Emotional exhaustion was measured using four items from the exhaustion subscale of the Oldenburg Burnout Inventory (Demerouti et al., 2002). For example, “After my work, I usually feel worn out and weary.” This scale showed good reliabilities at all three time points ($\alpha_{T1} = .78$; $\alpha_{T2} = .78$; $\alpha_{T3} = .84$).

Satisfaction with work-life balance was assessed using four items from the Satisfaction with Work–Family Balance Scale (Valcour, 2007) that Michel et al. (2014) adapted to focus on private rather than family life to give the questionnaire broader

applicability. Participants answered on a five-point scale (1 = very dissatisfied; 5 = very satisfied). For example, “How satisfied are you with how well your work life and your private life fit together?” This scale demonstrated very good reliabilities at all measurement points ($\alpha_{T1} = .91$; $\alpha_{T2} = .92$; $\alpha_{T3} = .94$).

Positive emotions were assessed using the German version (Rahm et al., 2017) of the SPANE (Scale of Positive and Negative Experiences; Diener et al., 2010) to measure the frequency of positive emotions. Participants were asked to report on a five-point frequency scale (1 = rarely or never; 5 = often or always) how often they had experienced six different positive emotions, for example “happy” or “contented”, in the past two weeks. The sum value varies between six and 30. This scale showed very good reliabilities at all three time points ($\alpha_{T1} = .91$; $\alpha_{T2} = .92$; $\alpha_{T3} = .94$).

Boundary management was assessed using three items (Rexroth et al., 2017). For example, “I can easily separate work and private life from each other, even when work demands are high.” This scale demonstrated good reliabilities at all measurement points ($\alpha_{T1} = .86$; $\alpha_{T2} = .88$; $\alpha_{T3} = .87$).

Depressive symptoms were assessed using the German version (Löwe et al., 2005) of the Patient Health Questionnaire (PHQ-2; Kroenke et al., 2003). The items on the PHQ-2 inquire about the frequency of depressed mood (“feeling down, depressed or hopeless”) and anhedonia (“little interest or pleasure in doing things”) over the past two weeks and can be used as a depression screening. Participants rated the items on a four-point frequency scale (0 = not at all, 3 = nearly every day). The sum value can range from zero to six.

Analysis Strategy

Analyses were performed in R 4.0.2 (R Core Team, 2023). To test Hypotheses 1, 2, and 3 regarding intervention effectiveness, we conducted univariate mixed analyses of variance (ANOVAs) with time (T1, T2, T3) as the within-subjects factor, and group

membership (intervention vs. control) as the between-subjects factor using the R package *ez* (Lawrence, 2016). We used Bonferroni correction to account for Type I error (Field et al., 2012), resulting in an alpha threshold of 0.025 for a significant effect.

To examine whether positive emotions and boundary management at T2 acted as the mechanism of change for emotional exhaustion and satisfaction with work-life balance at T3 (Hypothesis 4), we performed a mediation analysis. We used bootstrap confidence intervals (CIs) for indirect effects (Hayes, 2017) with the R package *lavaan* (Rosseel, 2012), specifying 10,000 resamples and 95% bias-corrected CIs with CIs including zero indicating a null effect. To investigate the moderated mediation (Research Question), we estimated conditional indirect effects and bias-corrected 95% CIs from 10,000 bootstrapped samples. We standardized all variables and included T1 scores of the respective variables as covariates when predicting T2 scores of mediators and T3 scores of outcomes (i.e., ANCOVA model; Valente & MacKinnon, 2017). We operationalized low and high levels of the moderator as one standard deviation below and above the variable's mean score and examined how the conditional indirect effects changed under the condition of low and high moderator levels (Preacher et al., 2007). The dataset generated and analyzed during the current study is available in the OSF repository (BLINDED).

Results

Table 1 shows means, standard deviations, and intercorrelations for all study variables at all measurement points for the full pre-post follow-up sample. Table 2 provides descriptive information for the intervention and control groups. Figure 3 shows the mean scores of the intervention and control groups at all measurement points.

Effectiveness of the Intervention

We hypothesized participation in the intervention would improve both emotional exhaustion and satisfaction with work-life balance (Hypothesis 1), as well as positive

emotions and boundary management (Hypotheses 2 and 3). Mixed ANOVAs revealed a significant group x time interaction for emotional exhaustion,¹ $F(1.93, 512.38) = 17.18, p < 0.001, \eta^2 = 0.014$, and for satisfaction with work-life balance, $F(2, 530) = 19.12, p < 0.001, \eta^2 = 0.013$, which supports Hypothesis 1. They also revealed a significant group x time interaction for positive emotions, $F(2, 530) = 11.17, p < 0.001, \eta^2 = 0.009$, and for boundary management,¹ $F(1.97, 521.74) = 5.87, p < 0.01, \eta^2 = 0.005$, which supports Hypotheses 2 and 3. Cohen's (1988) guidelines indicate that generalized eta squared (η^2) values of .01, .06, and .14 constitute small, medium, and large effect sizes respectively. By these categorizations, we found small effect sizes. Because assumptions of homoscedasticity (for satisfaction with work-life balance and positive emotions) and homogeneity of covariances (for satisfaction with work-life balance) were violated, we applied the R package WRS2 (Mair & Wilcox, 2020) to run robust mixed ANOVAs as a robustness check. Results held for the significance of the interaction term for satisfaction with work-life balance and positive emotions, which adds to the robustness of the findings.

Testing the Mediating Role of Positive Emotions and Boundary Management

We hypothesized positive emotions and boundary management to mediate the relationship between group membership and both emotional exhaustion and satisfaction with work-life balance (Hypothesis 4). Results of the mediation analysis demonstrated that indirect effects of the intervention on emotional exhaustion (through positive emotions: $b = -0.04, SE = 0.03, 95\% CI [-0.14, -0.03]$; through boundary management: $b = -0.03, SE = 0.03, 95\% CI [-0.13, -0.01]$) and satisfaction with work-life balance (through positive emotions: $b = 0.03, SE = 0.02, 95\% CI [0.02, 0.10]$; through boundary management: $b = 0.03, SE = 0.03, 95\% CI$

¹ Mauchly's test indicated that the assumption of sphericity had been violated for emotional exhaustion, thus degrees of freedom were corrected using Huynh–Feldt estimates of sphericity.

[0.01, 0.12]) were significant, as CIs did not include zero. This mediation was partial in that the intervention influenced emotional exhaustion and satisfaction with work-life balance independent of its effect on positive emotions and boundary management (as the direct pathways remained significant with the mediators in the model). These findings support Hypothesis 4.

Testing the Moderated Mediation of Baseline Depressive Symptoms

As a research question, we evaluated whether baseline depressive symptoms moderate the *a* paths (intervention group → positive emotions and intervention group → boundary management) of the mediation model, that is, whether there is an interaction between the moderator (depressive symptoms) and the intervention group because of differences in the *a* paths (Preacher et al., 2007). To assess this, we conducted a moderated mediation analysis and estimated conditional indirect effects with bias-corrected 95% CIs from 10,000 bootstrapped samples. The results (Table 3) revealed that the interaction of intervention group and baseline level of depressive symptoms was not significant for emotional exhaustion or for satisfaction with work-life balance. However, the conditional indirect effects on emotional exhaustion and satisfaction with work-life balance via positive emotions and boundary management were significantly different from zero when baseline levels of depressive symptoms were moderate or high, but not when they were low. To rule out a moderated mediation, we also analyzed the moderated mediation indexes (i.e., difference between conditional indirect effects for a high versus a low score of the moderator). The moderated mediation indexes were also non-significant as CIs included zero. Thus, we did not find sufficient evidence that baseline levels of depressive symptoms moderate the indirect effect of the intervention. We cautiously interpret the significance of the conditional indirect effects as a tendency suggesting the intervention could have been particularly beneficial for those with more depressive symptoms at baseline.

Robustness Check

At T2, we asked intervention group participants whether they had engaged in the six weekly modules and daily tasks.² As a robustness check, we excluded the noncompliant participants (i.e., participants who reported only rudimentary or no compliance to modules, or practiced daily tasks fewer than two days per week) from analyses. Results held for intervention effectiveness regarding outcomes, as well as for the mediation and moderation mediation. These results add to the robustness of the findings.

Discussion

This article reports results of a randomized controlled trial evaluating a web-based self-regulation toolkit intervention to promote engagement in positive activities in the context of FWD. The intervention aims to encourage engagement in various positive activities, defined as simple, intentional, and regular practices, such as activities that help managing boundaries between work and private life, detaching from work, establishing recovery periods, and self-organizing the workday. Integrating boundary theory and the PAM, the intervention improved well-being, specifically reducing emotional exhaustion and increasing satisfaction with work-life balance via beneficial changes in positive emotions and boundary management. Furthermore, we did not find depressive symptoms at baseline to affect intervention effectiveness.

FWD have challenges, such as establishing boundaries between work and private life, achieving work-life balance, managing work routines, and recovering from work (Demerouti et al., 2014; Kubicek et al., 2015; Wöhrmann et al., 2020). Participants in our intervention

² As a compliance check we asked, “Have you worked through modules?” Participants answered on a five-point scale (1 = no; 5 = yes, completely). We also asked, “On how many days during the week after you learned about the daily exercise did you practice it?” Participants could indicate “none” and up to “more than five days.”

were introduced to various positive activities to cope with these challenges. As predicted in the PAM, the implementation of positive activities in our intervention stimulated positive emotions, and fostered boundary management as a positive behavior. These changes in positive emotions and boundary management, in turn, improved satisfaction with work-life balance and reduced emotional exhaustion. The stimulation of positive emotions might be expected in any positive activity intervention. Increase in boundary management, however, is a specific positive behavior that we would expect only in specific interventions (such as ours) with a focus on strategies intended to enhance boundary management.

Because it can be assumed that participants' affective states play a role for intervention effectiveness as proposed in the PAM, we investigated whether differences in baseline levels of depressive symptoms had an effect on intervention effectiveness. No moderating effect was detected, which indicates that our intervention was effective for all participants regardless of their affective state at baseline. Specifically, we found no significant interaction of participation in the intervention and the moderator (baseline levels of depressive symptom) for emotional exhaustion or for satisfaction with work-life balance. This finding is encouraging as it suggests that all participants could benefit from engaging in different positive activities regarding their emotional exhaustion and work-life balance regardless of their baseline affective state.

Conditional indirect effects on emotional exhaustion and satisfaction with work-life balance via positive emotions and boundary management were significantly different from zero among participants whose baseline levels of depressive symptoms were moderate or high. Though it must be considered with caution, this tendency might indicate the intervention to be particularly beneficial for people experiencing more depressive symptoms. Moreover, PHQ-2 scores (i.e., the measure for depressive symptoms) ranged from zero to six with a mean of 1.69 ($SD = 1.33$) in our sample. When screening for depression, a score of

three or greater is used as a cut-off. Hence, we can infer that our sample mainly consisted of participants who would not screen positive for depression. Thus, we cannot rule out that a sample with more variability in depression screening scores would yield different results. Overall, our study provides evidence that an intervention that promotes positive activities to cope with FWD can reduce workers' emotional exhaustion and improve work-life balance by increasing positive emotions and by strengthening boundary management as a positive behavior. Our analyses do not support the reasoning that intervention effects are conditional on baseline levels of depressive symptoms.

Theoretical Contributions

This study contributes to literature linking self-regulation and positive activities (Lyubomirsky et al., 2005), with self-regulation strategies taught in this intervention consisting of positive activities. Specifically, boundary management with environmental and cognitive-emotional strategies (Grawitch et al., 2010; Hirschi et al., 2019; Koole et al., 2013), recovery strategies (Zijlstra et al., 2014), and work organizational strategies (Aspinwall & Taylor, 1997; Oettingen et al., 2015) are all forms of self-regulation. In the present toolkit, all of these self-regulation strategies involve engagement in positive activities, including performing a ritual before starting work (environmental segmentation), practicing mindfulness (cognitive-emotional segmentation), taking work breaks and practicing respite exercises (recovery), and rewarding oneself for completion of tasks (work organization).

Our study results support the PAM's proposal that positive activities stimulate increases in positive emotions and behaviors, which in turn enhance well-being. Conducting positive activities in the context of FWD over six weeks led to an increase of participants' positive emotions and boundary management as a positive behavior. This resulted, in turn, in increased well-being indicated by reduced emotional exhaustion, and enhanced satisfaction with work-life balance. Showing that increases in positive emotions result in enhanced well-

being is not only consistent with the proposition of the PAM, but also with the broaden-and-build theory, which proposes that positive emotions extend thought and action repertoires, helping build further personal resources, and, over time, triggering an upward spiral toward enhanced well-being (Fredrickson, 1998; Fredrickson, 2001).

Boundary theory states that workers engage in boundary management to create and maintain boundaries separating work from private life (Ashforth et al., 2000). In examining boundary management as a positive behavior stimulated by the intervention, we combined elements of boundary theory (Ashforth et al., 2000; Kreiner, 2006) with the PAM. This is, to the best of our knowledge, the first intervention showing boundary management as a positive behavior can partially explain intervention effectiveness. Thus, this study provides evidence for mechanisms explaining why performing the positive activities taught in our intervention was effective for achieving work-life balance. The improvement in well-being via changes in boundary management is consistent with propositions of the PAM and in line with previous empirical research (Althammer et al., 2021; Binnewies et al., 2020; Michel et al., 2014) showing that the training of boundary management enhances well-being indicated by affective well-being and work-life balance. By demonstrating that the enhancement of boundary management and positive emotions partially explains intervention effects, we follow calls to focus more on mechanisms that are impacted through engagement in an intervention, and through which interventions have effects (Michel et al., 2015).

By exploring depressive symptoms as a person feature that may affect intervention effectiveness, we tested the proposition of the PAM that person features, among other factors, moderate the relationship between positive activities and well-being. This also answers the call to explore whether positive activity interventions are particularly beneficial for individuals with specific baseline affective states (Lyubomirsky & Layous, 2013). We did not find sufficient evidence that baseline levels of depressive symptoms moderate intervention

effectiveness. Overall, our results provide empirical evidence that the PAM is an applicable model for predicting how and why self-regulation toolkit intervention in the context of FWD is effective.

Limitations and Implications for Future Research

This study has several notable strengths, such as randomized groups, of which one is a waitlist control group, a longer-term follow-up questionnaire, and measurement of intervention mechanisms. This study design provides robust evidence for intervention effectiveness, and answers calls for more randomized controlled trials in work-specific well-being interventions (Michel et al., 2015; O'Shea et al., 2016). Yet, this study also has limitations. In our toolkit intervention, we combined multiple positive activities that address different challenges in the context of FWD. We believe that this comprehensive intervention approach is of high practical relevance because the challenges of FWD are not limited to one aspect, and people have different challenges that are of particular importance to them. Nevertheless, future research could test whether one of these positive activities is more effective than others. For example, future research could test effects of separate positive activities against the complete intervention. This would also clarify whether all positive activities are required to obtain benefits. If a subset of the positive activities proves equally effective, the intervention could be shortened accordingly. However, researchers should then be careful not to vary the overall duration of intervention, because the intervention period of six weeks might have actively contributed to behavior change.

Another major limitation is a high dropout rate, which often occur in web-based intervention studies (Heskiau & McCarthy, 2021; Hülshager et al., 2013). However, dropout rates in our study differed between groups, with dropout being higher in the intervention group than in the control group (at T3, 53% dropout in intervention group, 19% dropout in control group). Such dropout patterns have been observed in similar intervention studies

(Althammer et al., 2021; Michel et al., 2014; Michel et al., 2021), so we assume the control group might have been more committed to participate in questionnaires because they were still waiting to take part in the intervention, while the intervention group had already completed the intervention. Offering participation certificates and information about the project results did not seem to be a sufficient incentive for the intervention group to participate in questionnaires after the intervention was completed, so we suggest greater incentives. If researchers have scarce resources at their disposal, they might allocate more participants to intervention groups than to control groups to achieve balanced numbers at the end of the study.

Furthermore, participants self-selected into the intervention study resulting in an over-representation of women and participants with very high levels of education. However, interventions are most successful when participants elect to participate (Sin & Lyubomirsky, 2009). This study provided evidence for the general effectiveness of our intervention. As we cannot rule out the equivalence or superiority of alternative interventions, or that expectations regarding participation served as a demand characteristic evoking hypothesis-conforming behavior (Nichols & Maner, 2008), future studies could add a second control group that receives an alternative or placebo intervention (O'Shea et al., 2016).

In this study, we examined the application of the PAM for our intervention regarding positive emotions and behavior as intervention mechanisms. Future research could expand this by investigating positive thoughts or need satisfaction as additional intervention mechanisms proposed in the PAM. Moreover, researchers could compare features of positive activities, such as dosage (e.g., number of modules), and the role of person-activity fit (e.g., whether participants with high segmentation preference profit more from boundary management exercises). From the present sample, we cannot conclusively say to what extent depressive symptoms affect intervention effectiveness, and thus suggest that in samples

including a broader range of depressive symptoms, researchers investigate whether other person features (e.g., self-efficacy, need for recovery) affect intervention effectiveness.

Practical Implications

Workers with FWD face specific challenges such as blurring boundaries between work and private life, detaching from work, establishing recovery periods, and self-organizing their workday. We recommend interventions for workers with FWD teach self-regulation strategies in a toolkit that includes different positive activities, specifically environmental (Kreiner et al., 2009) and cognitive-emotional boundary management strategies (Michel et al., 2014), self-regulation strategies (i.e., self-goal setting, self-monitoring, self-evaluation, and self-reward), and recovery strategies (Hahn et al., 2011; Steidle et al., 2017). In this study, we showed that conducting these exercises helped participants promote boundary management and positive emotions, which reduced their emotional exhaustion and improved satisfaction with work-life balance. Supervisors or occupational health managers can offer such a self-regulation toolkit intervention to support workers with FWD in improving well-being and work-life balance.

As traditional instruments of occupational health and safety cannot always be fully implemented when people work remotely or from home, web-based interventions can serve as a valuable addition to human resource practices and policies. However, individual interventions can only be complementary to appropriate working conditions such as supervisor and peer support, an encouraging workplace climate or corporate agreements on remote work (Kossek & Lautsch, 2012; Wöhrmann et al., 2020). Segmentation supplies provided by the workplace seem to be another important requirement for a successful work-life balance (Brauner et al., 2020).

Conclusion

In this study, we showed that a web-based self-regulation toolkit intervention that aims to promote positive activities to cope with FWD, such as managing boundaries, recovering from work, and self-organizing the workday, is effective: In a randomized controlled trial, the intervention improved well-being. Specifically, it reduced emotional exhaustion and enhanced satisfaction with work-life balance via changes in positive emotions and boundary management. It was effective regardless of participants' baseline levels of depressive symptoms. The COVID-19 pandemic dramatically increased the number of workers with FWD, and the share of workers with such flexibility is expected to remain high in the post-pandemic future. Because FWD come with certain challenges, interventions such as the one examined in this study can provide a helpful tool in supporting workers to maintain and better achieve well-being and work-life balance.

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Figure 1

Hypothesized Moderated Mediation Model

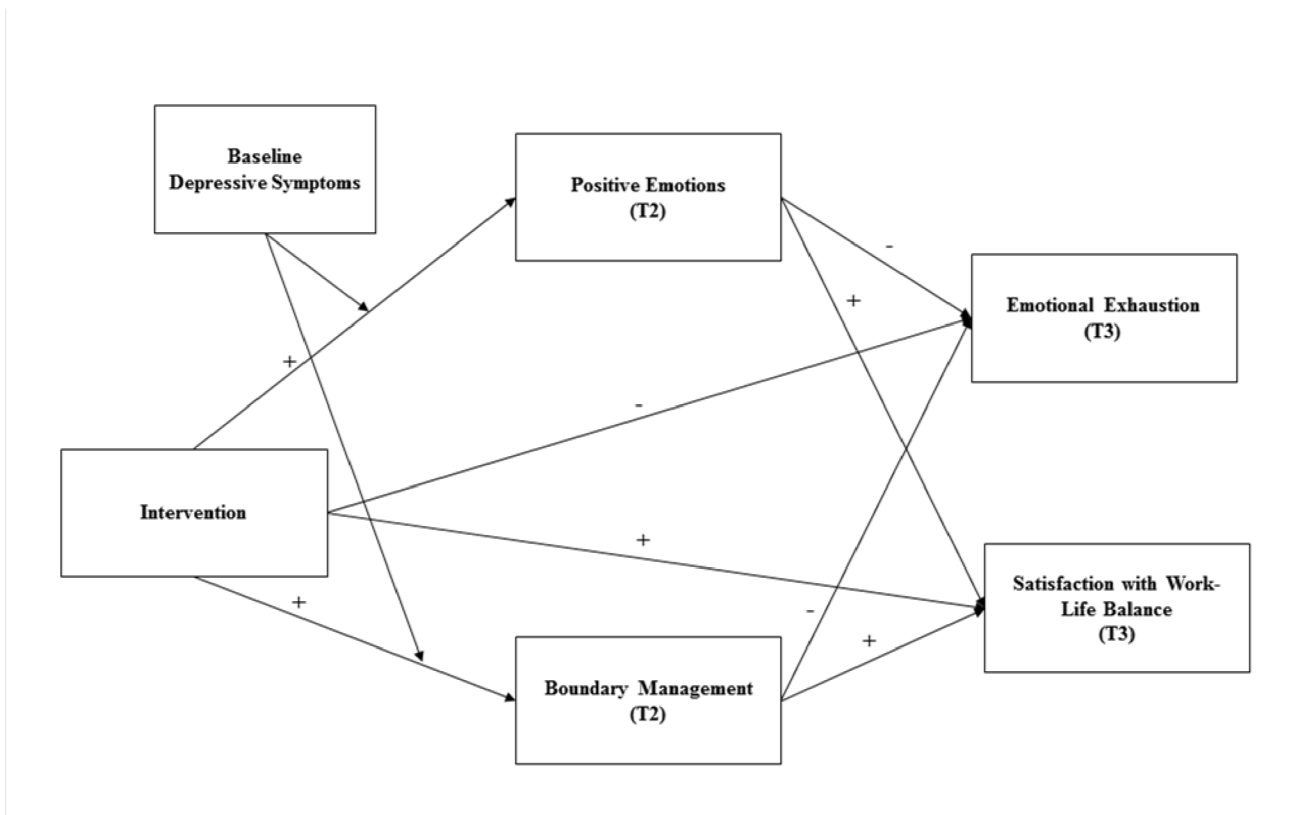


Figure 2

CONSORT Flow Diagram

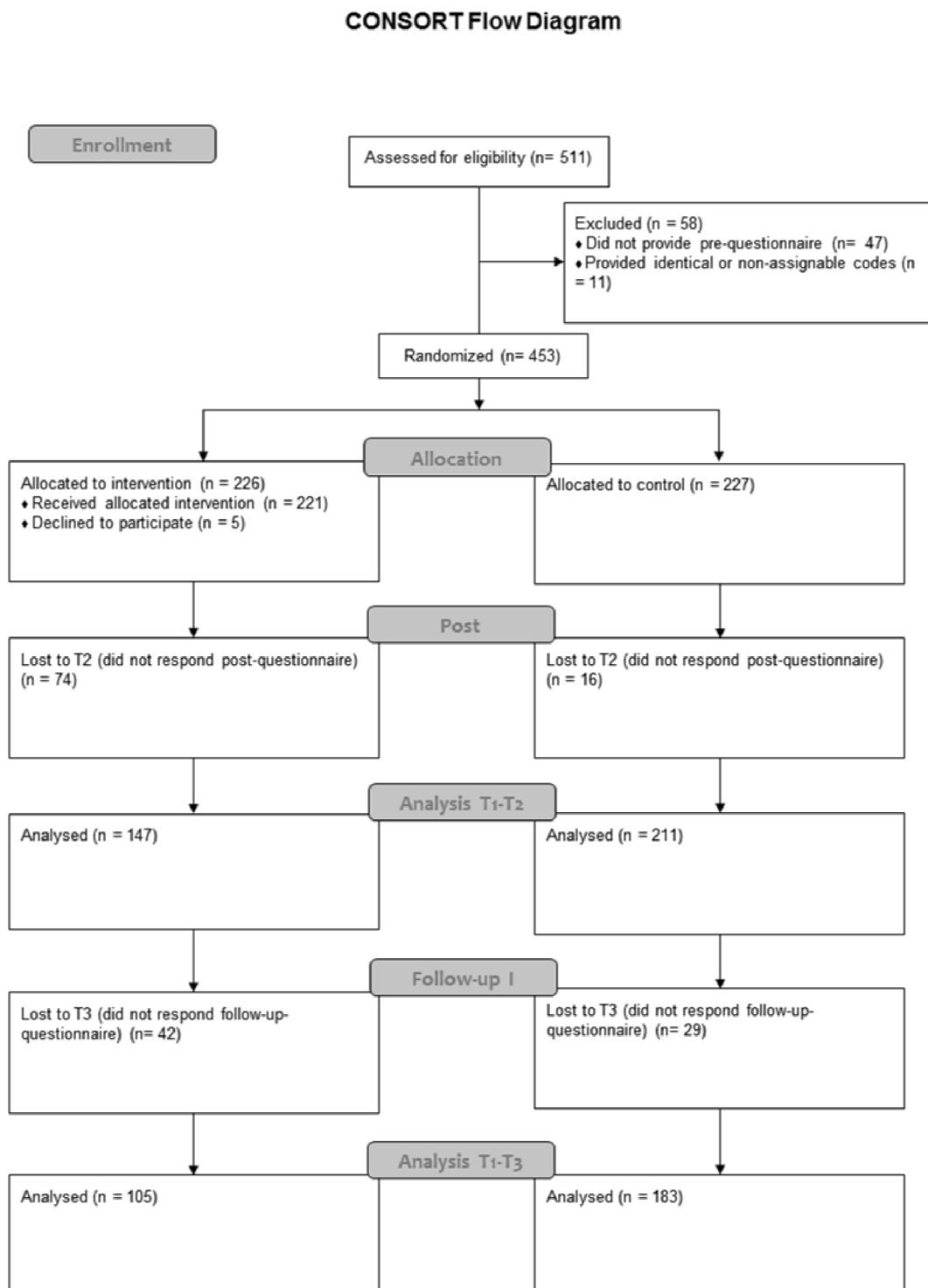


Figure 3

Means of Outcome Variables for Intervention Group (IG) and Control Group (CG)

Before (T1) and After (T2) Training Completion and at Four-Week Follow-Up (T3)

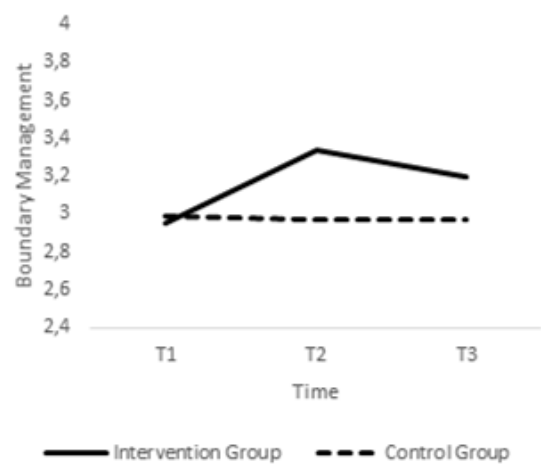
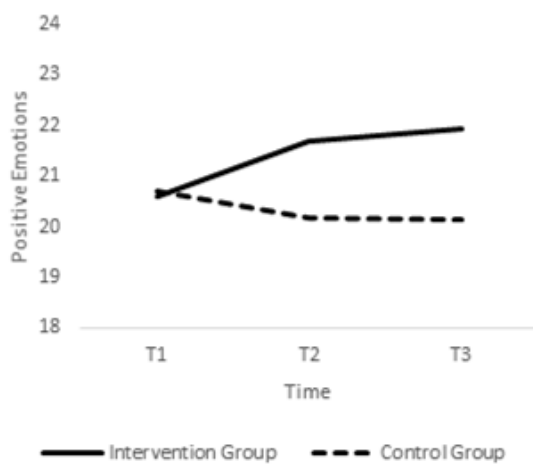
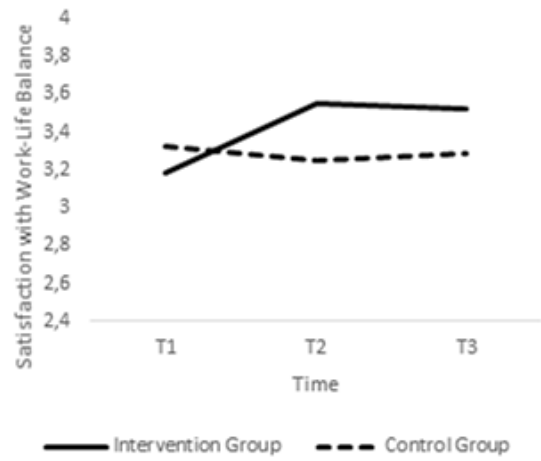
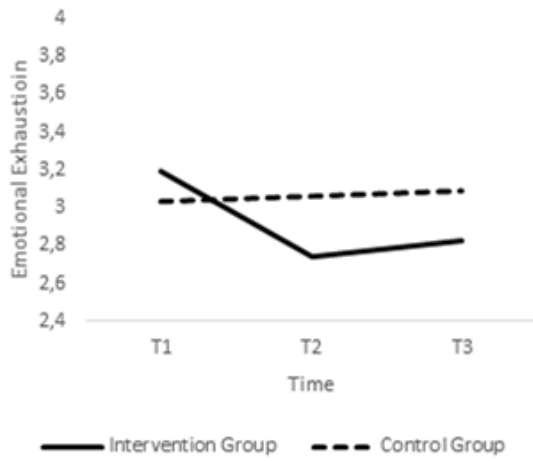


Table 1

Means, Standard Deviations, and Correlations Over Both Groups

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12
1. EE.t1	3.10	0.87												
2. SWLB.t1	3.22	0.93	-.52**											
3. PE.t1	20.56	4.77	-.52**	.48**										
4. BM.t1	2.95	0.91	-.56**	.52**	.35**									
5. DS.t1	1.69	1.33	.43**	-.32**	-.58**	-.25**								
6. EE.t2	2.97	0.85	.63**	-.39**	-.45**	-.35**	.33**							
7. SWLB.t2	3.36	0.92	-.47**	.67**	.46**	.43**	-.30**	-.57**						
8. PE.t2	20.72	4.87	-.42**	.35**	.66**	.31**	-.46**	-.54**	.55**					
9. BM.t2	3.08	0.97	-.47**	.51**	.39**	.63**	-.33**	-.50**	.68**	.46**				
10. EE.t3	2.99	0.86	.61**	-.40**	-.41**	-.39**	.35**	.74**	-.54**	-.53**	-.52**			
11. SWLB.t3	3.37	0.96	-.46**	.70**	.45**	.41**	-.30**	-.52**	.77**	.49**	.58**	-.61**		
12. PE.t3	20.80	4.96	-.34**	.40**	.64**	.30**	-.45**	-.41**	.48**	.72**	.42**	-.56**	.58**	
13. BM.t3	3.05	0.90	-.41**	.49**	.38**	.61**	-.27**	-.41**	.56**	.45**	.71**	-.55**	.63**	.53**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$. t1 = Pre, t2 = Post, t3 = Follow-up, EE = Emotional Exhaustion, SWLB = Satisfaction with Work-Life Balance, PE = Positive Emotions, BM = Boundary Management, DS = Depressive Symptoms. $N = 288$.

Table 2

Means and Standard Deviations for the Outcome Variables at Time 1 (Pre-Questionnaire), Time 2 (Post-Questionnaire), and Time 3 (Four-Week Follow-Up Questionnaire)

Variable	T1 ($n = 358$)				T2 ($n = 358$)				T3 ($n = 288$)			
	IG		CG		IG		CG		IG		CG	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Emotional Exhaustion	3.19	0.77	3.03	0.87	2.74	0.79	3.06	0.85	2.83	0.78	3.09	0.89
Satisfaction with Work-Life Balance	3.18	0.84	3.32	0.97	3.55	0.83	3.25	0.97	3.52	0.72	3.29	1.07
Positive Emotions	20.61	4.52	20.70	4.84	21.70	4.28	20.19	5.08	21.93	4.04	20.15	5.31
Boundary Management	2.95	0.92	2.99	0.93	3.34	0.89	2.97	0.99	3.20	0.75	2.97	0.97
Depressive Symptoms	1.69	1.31	1.68	1.27								

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. IG = Intervention Group, CG = Control Group.

Table 3

Results of the Moderated Mediation Analysis

Variables	<i>b</i>	<i>SE</i>	95% CI	
			Lower	Upper
DV: Emotional Exhaustion				
Intervention	-0.14**	0.09	-0.46	-0.11
Intervention x Depressive Symptoms	-0.07	0.10	-0.29	0.09
Positive Emotions	-0.25***	0.06	-0.36	-0.13
Boundary Management	-0.20**	0.06	-0.33	-0.08
Depressive Symptoms	-0.02	0.07	-0.11	0.17
DV: Satisfaction with WLB				
Intervention	0.15**	0.09	0.13	0.48
Intervention x Depressive Symptoms	-0.09	0.09	-0.03	0.32
Positive Emotions	0.18***	0.05	0.08	0.27
Boundary Management	0.20**	0.06	0.08	0.32
Depressive Symptoms	-0.04	0.05	-0.14	0.06
Indirect Effects				
Low Depressive Symptoms (- 1 SD)				
Positive Emotions x Emotional Exhaustion	-0.01	0.03	-0.10	0.03
Positive Emotions x Satisfaction with WLB	0.01	0.02	-0.02	0.08
Boundary Management x Emotional Exhaustion	-0.02	0.03	-0.12	0.00
Boundary Management x Satisfaction with WLB	0.02	0.03	-0.00	0.12
Moderate Depressive Symptoms (<i>M</i>)				
Positive Emotions x Emotional Exhaustion	-0.04	0.03	-0.14	-0.03
Positive Emotions x Satisfaction with WLB	0.03	0.02	0.02	0.10
Boundary Management x Emotional Exhaustion	-0.03	0.03	-0.13	-0.02
Boundary Management x Satisfaction with WLB	0.03	0.03	0.01	0.12
High Depressive Symptoms (+ 1 SD)				
Positive Emotions x Emotional Exhaustion	-0.07	0.05	-0.23	-0.04
Positive Emotions x Satisfaction with WLB	0.05	0.04	0.03	0.17
Boundary Management x Emotional Exhaustion	-0.04	0.04	-0.16	-0.01
Boundary Management x Satisfaction with WLB	0.04	0.04	0.01	0.16

Note. All coefficients are standardized slopes. Bias-corrected CIs of each indirect effect are based on 10,000 resamples. DV = dependent variable. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$. Zero is not included in the reported confidence intervals if the lower and upper bound of the confidence interval have the same sign. In these reported confidence intervals, numbers not equal to zero would appear if more decimal places were reported.

Appendix A

Intervention Overview

Modules	Intervention Elements
<p>Module 1: <i>Working flexibly – healthfully and happy</i></p>	<ul style="list-style-type: none"> • formulate a training goal to strengthen motivation and commitment • reflect on goals achieved in the past to activate personal resources • set specific, measurable, achievable, relevant, time-bound (SMART) participation goals (Doran, 1981) to assure regular participation • reflect on personal training motivation using mental contrasting with implementation intentions (MCII; Gollwitzer & Oettingen, 2013) to strengthen goal striving • reflect on previously used strategies to activate personal resources for coping with FWD <p><i>Daily task:</i> adapted version of the 54321 exercise (Dolan, 1991): When you find yourself ruminating about work, focus on the moment instead.</p> <p><i>Self-regulatory element:</i> set specific participation goals and use MCII to set the overall training goal</p>
<p>Module 2: <i>Finding personal balance</i></p>	<ul style="list-style-type: none"> • study theoretical background regarding conflict between work and nonwork roles (Greenhaus & Beutell, 1985), boundary theory, and the segmentation-integration continuum (Ashforth et al., 2000) in the context of FWD • learn the importance of establishing and managing boundaries aligned with segmentation preferences for separating or integrating work and nonwork domains (Kossek & Lautsch, 2012) and how integrators can profit from segmentation strategies in certain times and situations • reflect on actual and preferred separation or integration between work and nonwork domains • introduce physical, temporal, behavioral, and technological boundary management tactics (Kreiner et al., 2009) and transition rituals (Ashforth et al., 2000) to separate work from nonwork <p><i>Daily task:</i> Use two specific strategies for separating work and nonwork domains.</p> <p><i>Self-regulatory element:</i> set specific goals and apply MCII for the daily task</p>

Module 3: *Switching off from work – setting boundaries*

- learn about detachment practices that enhance health and well-being (e.g., Sonnentag, 2012)
- reflect on activities that block out thoughts about work, based on recovery training from Hahn et al. (2011)
- introduce the two-component model of mindfulness (Bishop et al., 2004) and discuss its positive effects on stress and well-being (e.g., Bartlett et al., 2019; Eby et al., 2019; Lomas et al., 2019; Virgili, 2015)
- focus on self-regulation of attention, the first component of mindfulness
 - an audio exercise guides participants to focus on their breathing, and to draw their attention back to their breath when minds wander (Kabat-Zinn, 2006; Segal et al., 2002; Weiss et al., 2010)
 - participants learn to distance themselves from work-related thoughts by turning attention to the current moment and away from past or future-orientated cognitions
- focus on mindful orientation to experience, the second component of mindfulness
 - an audio exercise shows how incidents evoke subjective viewpoints (Kabat-Zinn, 2006; Segal et al., 2002; Siegel, 2010; Weiss et al., 2010)
 - participants learn that being mindfully oriented helps them escape undesired work-related thoughts and feelings.

Daily task: Use the adapted version (Michel et al., 2014) of the 3-minute breathing exercise (Segal et al., 2002; Weiss et al., 2010) to support transition to private life after work or to distance from work-related thoughts and feelings

Self-regulatory element: setting specific goals and applying MCII for daily tasks

Module 4: *Staying focused – working concentrated*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- introduce the four central processes of self-regulation: self-goal setting, self-monitoring, self-evaluation, and self-reward (Bandura, 1991; Kanfer et al., 2006; Zimmerman, 2000)
- explain how to improve work organization using the selection, optimization, and compensation (SOC) model (Moghimi et al., 2017; Müller et al., 2016)
- set a specific goal for organizing daily work using SMART goals and MCII
- learn how to use general self-regulation strategies to achieve this goal

Daily task: Use general self-regulation strategies to organize daily work.

Self-regulatory element: setting specific goals for organizing daily work and applying MCII to them; planning strategies for self-monitoring, self-evaluating, and self-rewarding when goals are met

Module 5: *Looking after myself – everyday rest and recharge*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- learn about self-regulation of recovery, daily recovery in leisure time, and recovery experiences (Sonnentag & Fritz, 2007) in the FWD context
- list all leisure activities that yield detachment, relaxation, mastery and/or control (see Hahn et al. (2011))
- learn the importance of breaks
- reflect on past recreative breaks
- perform respite exercise of listening to a natural soundscape combined with a short mindfulness component, a guided imagination technique, and a savoring component (Steidle et al., 2017)

Daily task: During work breaks, perform the savoring nature exercise to improve recovery

Self-regulatory element: setting specific goals and applying MCII for the daily task; planning specific ways to self-monitor, self-evaluate and self-reward progress

Module 6: *My strategies, my sources of strength*

- perform a 3-minute breathing exercise (Michel et al., 2014) to focus on the present and promote openness for new experiences (Michel et al., 2021)
- recall the modules, reflect on insights gained from the training, judge which goals were attained, repeat and amplify the training content and make the training effects sustainable
- retain and build resources perceived as relevant for reaching goals (Halbesleben et al., 2014; Hobfoll et al., 2018)
- using the tree metaphor, reflect on personal and contextual resources (ten Brummelhuis & Bakker, 2012)

Daily task: Consciously use resources.

Self-regulatory element: identify resources through self-observation; participants reward themselves by filling in the tree with resources they identify

General Intervention Design

Gamification techniques (Hoffmann et al., 2017) were included to enhance training effectiveness (Johnson et al., 2016):

- participants viewed a system-generated illustration of a tree that added more blooms as each module was completed
- blooms showed learning levels and served as a visual reward
- at the beginning of each module, participants could create a personal toolbox containing their favorite exercises from the past week, to be accessed at any time

Various sensory modalities and interactive multimedia elements were used to enable information processing and facilitate learning:

- exercises were a mix of written explanations, audios explaining exercises, and videos of a trainer welcoming participants and explaining training content (Moreno, 2006).
- exercises were interactive and required reflection, writing, or guided imagination.
- audio exercises began with a brief mindfulness component (Michel et al., 2014; Steidle et al., 2017)
- four fictitious models shared experiences and provided examples of personal applications to increase behavioral modelling, learning, and transfer (Burke & Hutchins, 2007; Moreno, 2006)

Note. This table is cited from (BLINDED).

Paper 4:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). Online and Blended Training: Same Same but Different? A Randomized Controlled Trial Comparing Training Formats to Meet the Challenges of Flexible Work Designs [Manuscript under review]. *Journal of Medical Internet Research*.

Online and Blended Training: Same Same but Different? A Randomized Controlled Trial Comparing Training Formats to Meet the Challenges of Flexible Work Designs

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Abstract

Background: Workers with flexible work designs (FWD) face specific challenges such as difficulties to detach from work, to set boundaries between work and private life, and to recover.

Objective: This study evaluates the effectiveness of an intervention to improve recovery, work-life balance, and well-being of workers with FWD. It also compares the effectiveness of an online training format in which participants individually completed online modules and a blended training format whose members attended three group sessions in addition to the online modules.

Methods: Over six weeks, participants learnt self-regulation strategies to meet the particular challenges of FWD. In a randomized controlled trial, participants were assigned to an online intervention group ($n = 196$), to a blended intervention group ($n = 198$), or to a waitlist control group ($n = 181$). Study participants rated their levels of psychological detachment, satisfaction with work-life balance, and well-being before the intervention as well as after the intervention, and at a four-week and six-month follow-up. The final sample included 373 participants (online intervention group: $n = 107$; blended intervention group: $n = 129$; control group: $n = 137$).

Results: Results of multilevel analyses were in line with our predictions that both training formats would improve psychological detachment, satisfaction with work-life balance, and well-being. We expected blended training to reinforce these effects, but blended training participants did not profit more from the intervention than online training participants although they reported to have had more social exchange. However, blended training participants were more likely to adhere to the training.

Conclusion: Thus, both the online and the blended training are effective tools to improve recovery, work-life balance, and well-being of workers with FWD. Group sessions

can increase the likelihood that participants actively participate in online modules and exercises.

Keywords: blended training, online training, psychological detachment, well-being, work-life balance

Introduction

An increasing share of workers has at least some autonomy in choosing their work times and locations. The COVID-19-pandemic further increased this number, which is expected to remain at a high level. Flexible work designs (FWD) such as flextime, telework, and mobile work give workers temporal and spatial flexibility [1, 2]. This can help meet both work and private life demands and thus reduce work-family conflicts [3, 4]. It is also associated with physical health and less absenteeism [5]. However, workers with FWD find it difficult to establish boundaries between work and private life [6]. This can impede achieving work-life balance and psychosomatic health or recovering from work [7-9], which is essential for well-being [10].

Therefore, it is important to support workers in coping with these specific challenges of FWD. Individual occupational online interventions can improve recovery, well-being, and work-life balance [11-14]. Online trainings have numerous advantages, such as their flexible use for workers, high availability and accessibility to a large target group, and lower running costs. Thus, we developed an online intervention to promote self-regulation strategies in the context of FWD, such as managing boundaries between work and private life, detaching from work, establishing recovery periods, and self-organizing the workday.

However, we notice that research tends to overlook shortcomings of online interventions, such as high and easy dropout and feelings of isolation [15, 16]. Common theories state that social interactions and the sense of belonging to a group strengthen social support and motivation [17, 18]. Based on these theoretical frameworks, we propose that a blended intervention – combining online self-training and face-to-face elements [15, 19] – should increase social support and adherence compared to online interventions. This should then reinforce the effectiveness of an online training and further improve outcomes. Thus, we also developed a blended training for workers with FWD, offering group sessions in addition

to the online modules. In this study, we aim to examine the effectiveness of the general training approach and compare whether a blended training format can address the shortcomings of an exclusively online training format, that is, strengthen social support as a resource and improve adherence.

This study contributes to the literature in several ways. First, there is little research comparing the effect of training formats in the work context, and past research which compared formats of occupational interventions has focused on comparing the effectiveness of face-to-face versus online interventions [14]. However, a more thorough investigation of these different training formats and their effect on outcomes is particularly important for practitioners who are to decide whether to offer self-learning online trainings or blended trainings, which come with higher costs. This is even more important when there is less social interaction at the workplace as people increasingly work in different locations and social support is an important resource. We aim to investigate if individuals can profit more from an intervention with additional group sessions, comparing the effectiveness of online and blended training.

Second, based on social identity theory and self-determination theory, we aim to provide an empirical test for the theoretical assumption that group interactions increase commitment, social support, and thus training effectiveness. In doing so, we integrate research on blended learning, that is mainly discussed in education psychology, and occupational intervention research, that is mainly discussed in occupational psychology. In particular, we combine research on learning settings and occupational interventions with theoretical frameworks of group interactions. Moreover, we contribute to the discussion on how to reduce attrition in online interventions [16] and follow calls for research to investigate whether perceived social support may influence treatment adherence [20].

Third, we conduct this study as a randomized controlled trial with four measurement points, following the call for more randomized controlled trials in work-specific interventions [15, 21, 22]. Overall, this also contributes to the broader literature on occupational resource-oriented interventions.

Effectiveness of an Intervention for Coping With FWD

Workers with FWD may face challenges particularly regarding their work-life balance, recovery, and well-being [2], such as difficulties to disengage mentally from work, to set boundaries between work and private life, and to recover during breaks or leisure time. As FWD usually come with less physical boundaries between work and private life, the blurring of role boundaries is likely [23]. This increases the likelihood of boundaryless working hours such as working overtime, taking fewer breaks, or being available during free time [2, 8]. When time periods between workdays are shortened or interrupted, this can hinder recovery [9, 24].

The training provides participants with several self-regulation strategies, that is, strategies to manage their behavior, thoughts, and emotions [25] to address these specific challenges. They learn environmental [e.g., establishing physical boundaries; 26] and cognitive-emotional [e.g., practicing mindfulness; 12] segmentation strategies that help them create and maintain boundaries between work and private life. They learn respite strategies that help them enhance their recovery during work breaks and after work; particularly strategies for promoting recovery experiences [27] and for self-conducting rest periods [28]. Further, they learn specific self-regulation strategies that help them organize their workday and stay focused at work, facilitating mental disengagement after work.

These training strategies should allow workers to experience psychological detachment. This describes an essential recovery experience (i.e., an off-job experience that is crucial for recovery) in which participants mentally disengage from work and its stressors,

and derive benefits for health, well-being and work performance [29, 30]. The training strategies should also allow workers to manage their boundaries, which should increase their satisfaction with work-life balance. Workers are satisfied with their work-life balance when they feel that they meet the multiple demands of work and family roles [31]. This should, then, improve well-being, which describes a broad category including “emotional responses, domain satisfactions, and global judgments of life satisfaction” [32, p. 277]. Previous studies show that implementing the training strategies enhances psychological detachment and improves satisfaction with work-life balance and well-being [12, 27, 33-35]. Hence, we expect:

Hypothesis 1: After training, participants of both intervention groups report increased a) psychological detachment, b) satisfaction with work-life balance, and c) well-being, compared to control group participants.

The Importance of Intrinsic Motivation and Social Interaction for Training Effectiveness

Besides their advantages, such as high availability and accessibility as well as lower running costs, online trainings have shortcomings, such as high and easy dropout and feelings of isolation [15]. Blended trainings combine the virtues of face-to-face and online approaches while compensating their disadvantages [19, 36]. In the blended training for this study, we combine the individual online training with videoconferencing group sessions that focus on group-based methods (e.g., group discussions, sharing challenges with FWD, reflecting experiences with training strategies together).

Group sessions may affect motivation to engage in the training, thus improving training effectiveness. Self-determination theory [18] proposes that people possess more or less self-determined motivation to engage in a particular behavior (e.g., training exercises). The satisfaction of basic psychological needs facilitates intrinsic motivation, that is, self-

determined behavioral engagement. These basic needs [37] include competence (i.e., feel effectiveness and mastery), autonomy (i.e., enact self-endorsed behaviors), and relatedness (i.e., belonging and feeling cared for by others). We expect the online training to satisfy needs for competence and autonomy, and the additional group sessions to satisfy the need for relatedness. Hence, intrinsic motivation to conduct the training exercises should be higher in blended training participants. Thus, we expect:

Hypothesis 2: Adherence and compliance rates will be higher for blended training participants compared to online training participants.

Moreover, based on social identity theory, social interactions and the sense of belonging to a group can strengthen social support [17]. Mutual social support in an intervention group increases when training participants develop a sense of shared identity because they are members of a group; thus, group interaction processes result in improved employee health and well-being [17, 38]. Moreover, based on the Work–Home Resources Model [39], social support perceived in the group sessions can be a contextual resource (i.e., a resource located outside the self); hence, strengthening social support as an important resource can have positive effects on outcomes both in the work and private life domain. As group interactions encourage the recognition that others also experience challenges with FWD, we expect a sense of belonging to arise in the group sessions, hence, a shared social identity regarding FWD and its management. This can facilitate reciprocal validation and social support. The availability of social support can then improve training transfer and, thus, the immediate and long-term benefits of the training [15, 40].

As stated previously, empirical evidence for these theoretical assumptions is scarce because the majority of studies focuses either on a specific workplace setting or on the comparison of blended or online versus face-to-face conditions [e.g., 41, 42, 43]. A meta-analysis which compared blended with non-blended learning (e.g., online learning, face-to-

face learning) for health professions came to the conclusion that blended learning may be more effective than non-blended learning alone [36]. Moreover, shared team participation in a stress management intervention improved occupational self-efficacy [44], and occupational online interventions with guidance yielded better mental health [14]. In educational research, learning in small groups has been shown to reinforce students' motivation and, thus, their achievements [45]. Further evidence stems from research on self-help support groups, showing that sharing of mutual support and experiential knowledge in group interactions can help people manage personal challenges and change their behavior [46]. Thus, we expect the blended training to be more effective than the online training in teaching participants how to mentally detach from work, how to set boundaries between work and private life, and how to recover during breaks or leisure time, thus:

Hypothesis 3: After training, blended training participants will report a higher increase in a) psychological detachment, b) satisfaction with work-life balance, and c) well-being than online training participants.

Method

Study Design and Procedure

To recruit participants we used a snowball sampling approach, e-mail distribution lists, newsletters, online professional networking sites, and magazine articles. We promoted the study as a free training to help workers cope with the challenges of flexible work designs (FWD). Participants were aware that they would be randomly assigned to either an online or blended training. Participants confirmed that they were of age, that their jobs allowed them some flexibility (e.g., telework, remote work), and that they were willing to complete the training and all questionnaires. From January to December 2021, we conducted a randomized controlled trial with two intervention groups and a waitlist control group. Because conduction of the group training sessions required a lot of resources, there were two passes: One cohort

(i.e., online training group, blended training group, control group) started in January, the other one in May.

This study was granted ethical approval from the ethics committee of the Federal Institute for Occupational Safety and Health in Germany. Participants completed a baseline questionnaire (T0) before we randomly allocated them to a waitlist control group, an online training group, or a blended training group. After the intervention groups had completed the training, we sent the post-intervention questionnaire (T1) to all participants. Four weeks later, we sent them the follow-up questionnaire (T2). Then, the control group could access the training. We sent intervention groups a second follow-up questionnaire (T3) six months after they completed the intervention. We asked participants to complete questionnaires within two weeks. As an incentive for active participation, we offered participation certificates and information about project results.

Intervention

All participants across both training formats received the same individual online training. The six-week online training was designed as a multicomponent self-regulation training with a toolkit of segmentation, mindfulness, self-organization and recovery exercises to help participants cope with the specific challenges of FWD. The chosen exercises are approved to increase psychological detachment, satisfaction with work-life balance, and well-being [12, 27, 33-35]. Participants completed six weekly 45-minute training modules. They were made accessible on Thursdays, and we recommended to engage with them until the end of the weekend. In each module, we introduced the focus topic of the week and then gave theoretical background information, self-reflections, and practical exercises. Each module concluded with a self-regulation exercise based on self-regulation theories [25, 47] to activate behavioral change, for example, mental contrasting with implementation intentions [48]. At the end of each module, we introduced a 5 to 10 minute daily task for the following five

workdays to enhance training transfer and stimulate active learning [49]. We sent three emails or text messages each week to remind participants to perform the daily tasks. The intervention was designed as a toolkit in line with the positive-activity model [50], which emphasizes among others the promotion of person-activity fit, that is, the fit between person and activity characteristics. Participants were encouraged to keep practicing the exercises from their toolkit which matched their preferences and needs, and which they found most helpful [51].

Appendix A gives a detailed overview of the intervention. Module 1 gave an overview of the aim and structure of the training. Participants formulated a participation goal to strengthen motivation and commitment. As a daily task, participants were to use an adapted version of the 54321 exercise [52]. Modules 2 and 3 focused on managing boundaries between work and private life, based on boundary theory [53]. Module 2 introduced environmental segmentation strategies [26, 33]. The daily task was to use two strategies for separating work and private life. Module 3 introduced mindfulness as a cognitive-emotional segmentation strategy [12]. The daily task was an adapted version of the 3-minute breathing exercise [12]. Module 4 introduced the self-regulation strategies of self-goal setting, self-monitoring, self-evaluation, and self-reward [25, 47]. The daily task was to use these strategies to organize daily work. Module 5 focused on recovery through rest periods during off-job time and work breaks. Participants reflected on their recovery experiences [27] and learned a respite exercise [28]. The daily task was the respite exercise. Module 6 gave a summary of previous modules and participants reflected on their personal and contextual resources [39]. The daily task was to use resources more often.

In addition, blended training participants were invited to participate in three group sessions. The groups included between 9 and 17 participants. The three-hour videoconference group sessions took place on Thursdays or Fridays right before the start of the online training,

that is before Module 1 (group session 1), after Module 3 (group session 2), and after Module 6 (group session 3). Group sessions were moderated by professional trainers. About half of the groups were co-facilitated by a member from the author team to ensure consistency between groups. Group sessions were designed to promote group interactions and social support (e.g., exchange in the group, in small groups and in learning partnerships) and consolidate what has been learned in the online training. Although the sessions adhered to a standardized procedure, the group interactions gave participants the chance to cover aspects in greater depth according to their own needs, based on the idea of optimizing the person-activity fit [50]. To further increase mutual support, we randomly assembled learning partnerships consisting of three or four participants, and encouraged them to interact between group meetings.

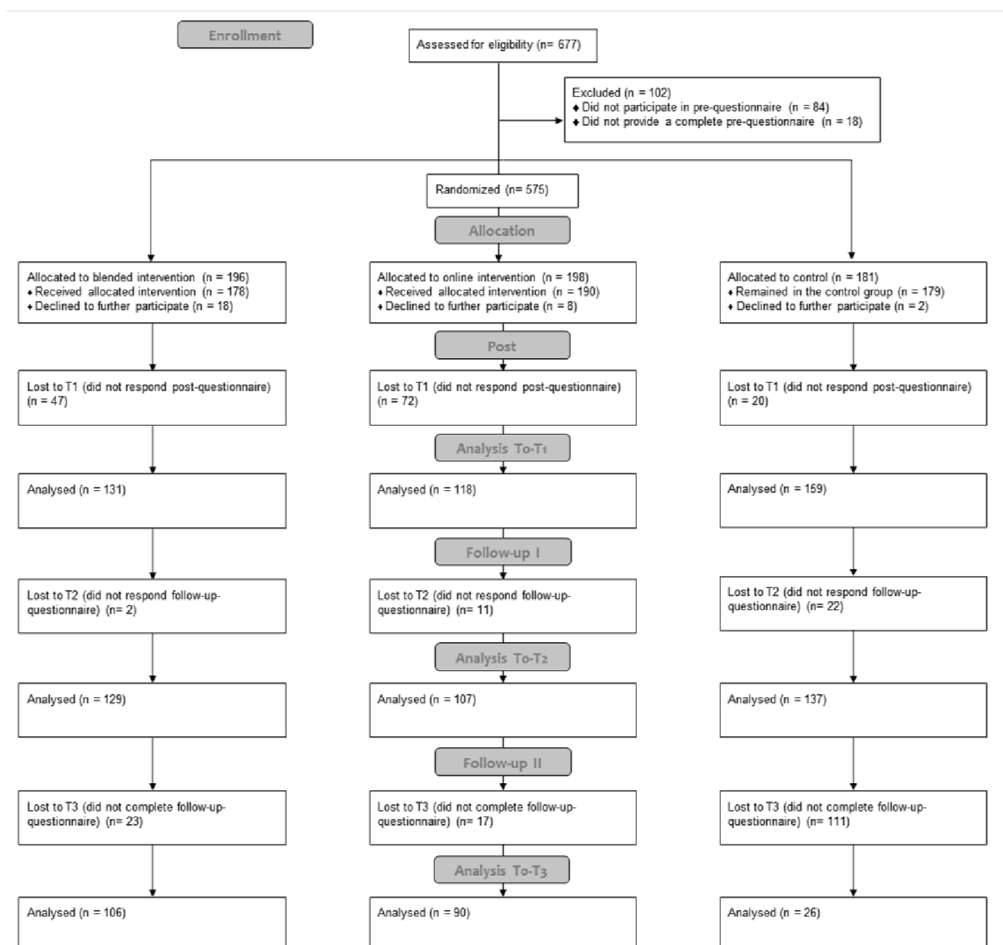
Participants

Participants who completed the baseline questionnaire were randomly assigned to the intervention group that received blended training (IG-BL; $n = 196$), the intervention group that received the online training (IG-ON; $n = 198$), or the control group (CG; $n = 181$). Participants who dropped out at T1, that is, after the training (Figure 1) were more likely to hold leadership positions, $\chi^2(1, 582) = 6.91, P = .009$, and to work longer hours, $F(1, 570) = 10.06, P = .002$, compared to non-dropouts. Participants who did not complete questionnaires at T2 and T3 were younger, $F(1, 580) = 8.30, P = .004$ and $F(1, 580) = 13.85, P < .001$, than those who completed the follow-up questionnaires. A higher dropout rate was observed in both intervention groups compared with the control group and particularly in the online intervention group; groups significantly differed at T1 ($\chi^2(2, 573) = 41.95; P < .001$) and T2 ($\chi^2(2, 573) = 21.01; P < .001$). Dropout rates also differed at T3 ($\chi^2(2, 573) = 67.42; P < .001$), when we observed a higher dropout in the control group, which had had access to the online training by then. Blended training participants were included only when they had joined group sessions for at least two sessions.

The final sample at T2 included 373 participants ($n_{IG-BL} = 129$, $n_{IG-ON} = 107$, $n_{CG} = 137$); 23 to 64 years old ($M = 46.40$, $SD = 10.44$); 72.9% were women; 80.6% held a university degree. Participants worked on average 39.34 ($SD = 9.64$) hours per week; 92.8% were employees and 6.4% were self-employed; 25.2% held a leadership position. Regarding temporal and spatial flexibility, 65.4% could work flexible hours at least 5 days per week and 96.8% could work from home or in other locations for at least one day a week. Participants worked in various sectors such as law, business, administration, science, teaching, and financial services. The study was conducted during the COVID-19-pandemic; 62.6% stated that they worked from home more frequently in response to the pandemic; 29.0% had not worked from home before the pandemic. Participants in the intervention groups and control group had similar sociodemographic characteristics with one exception: Participants in the intervention groups were more likely to hold a leadership position, $\chi^2(2, 373) = 8.43$, $P = .01$, than control group participants. Univariate ANOVAs showed that there were no significant differences regarding the study variables between the control and experimental groups at T0.

Figure 1

CONSORT Flow Diagram



Measures

We assessed all variables except demographics at all four measurement points. We included questions for training evaluation, compliance and manipulation checks in the post- and follow-up questionnaires. All online questionnaires were in German. We used translation/back translation procedures for items available only in other languages [54, 55]. Unless indicated otherwise, we asked participants to answer items on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) referring to the preceding two weeks.

Psychological detachment from work during time off was assessed with the four-item subscale of the Recovery Experience Questionnaire [29]. For example, “After workhours, I

distance myself from my work.” This scale showed very good reliabilities at all time points ($\alpha_{T0} = .89$; $\alpha_{T1} = .89$; $\alpha_{T2} = .91$, $\alpha_{T3} = .91$).

Satisfaction with work-life balance was assessed with four items from the Satisfaction with Work–Family Balance Scale [31] that Michel et al. [12] adapted to focus on private rather than family life. Participants answered on a five-point scale (1 = very dissatisfied; 5 = very satisfied). For example, “How satisfied are you with how well your work life and your private life fit together?” This scale demonstrated very good reliabilities at all measurement points ($\alpha_{T0} = .91$; $\alpha_{T1} = .90$; $\alpha_{T2} = .92$; $\alpha_{T3} = .93$).

Positive affective well-being was measured with the WHO-Five Well-Being Index [WHO-5; 56]. Participants rated all items on a 6-point frequency scale (1 = at no time; 5 = all the time). For example, “Over the last two weeks, I have felt cheerful and in good spirits.” This scale showed good reliabilities at all time points ($\alpha_{T0} = .88$; $\alpha_{T1} = .90$; $\alpha_{T2} = .90$, $\alpha_{T3} = .92$).

Learning about strategies. As a manipulation check for the intervention, we developed a five-item scale to assess learning about strategies to cope with FWD¹. We asked participants whether they had learned anything about strategies to cope with the challenges of FWD during the last six weeks. The items were “In the last six weeks, I learned...” “...how to set boundaries between work and private life.” “...how to detach from work.” “...how to improve my self-organization.” “...how to recover.” “...how to become aware of my resources.” This scale showed very good reliability ($\alpha = .92$).

¹ Following Hahn et al. (2011), using general questions seems appropriate because participants are not asked to adopt specific behaviors, but rather encouraged to identify and choose strategies that are helpful for them. Hence, participants could show a wide range of different behaviors after the training.

Social exchange. As a manipulation check for the blended training, we assessed *Experiential Knowledge Provided* (e.g., “I shared my feelings regarding my temporal and spatial flexibility.”) and *Emotional Support Received* (e.g., “Other people listened carefully when I talked about managing my temporal and spatial flexibility) with the respective three-item subscales of the Self-Help Support Group Social Exchange Scales [46], adapted to focus on the context of FWD. Items were rated on a 5-point frequency scale (1 = rarely or never; 5 = often or always). The subscales showed very good reliabilities ($\alpha_{\text{Experiential Knowledge Provided}} = .90$, $\alpha_{\text{Emotional Support Received}} = .89$).

Compliance. To measure compliance we asked at T1 with regard to each of the six training modules: “Have you worked through the module?” Participants answered on a five-point scale (1 = no; 5 = yes, completely). We also asked “On how many days during the week after you learned about the daily exercise did you practice it?” Participants could indicate “none” and up to “more than five days.” In addition, trainers had filled in an attendance list to document how often blended training participants had joined group sessions.

Analysis Strategy

To examine adherence and compliance among training participants, we performed logistic regressions to analyze the effects of group membership on the likelihood that participants would drop out and that participants would be compliant. To test the hypotheses regarding intervention effectiveness, we conducted multi-level regression analyses with measurement occasions (Level 1) nested within participants (Level 2). The calculation of intra-class correlation coefficients suggested that substantial amounts of variance could be attributed to the between-person level of analysis in all outcome variables (psychological detachment: 63.4%; satisfaction with work-life balance: 65.5%; well-being: 66.8%), justifying the use of multilevel analyses. We performed analyses in R [57], using the R package lme4 [58]. To test intervention effectiveness, our linear mixed model included fixed

effects of group, time, and their interaction effect, and a random effect of participants. Time was dummy coded [pre vs. post, pre vs. follow-up; 59]. Group was contrast coded [control group vs. both intervention groups, online training vs. blended training; 60]. Mean centering was not necessary because the multilevel model only contained dummy variables as independent variables [61].

Results

Table 1 provides descriptive information for the intervention and control groups at all measurement points. Figure 2 shows mean scores of all groups.

Table 1

Means and Standard Deviations for the Outcome Variables at Time 0 (Pre-Questionnaire), Time 1 (Post-Questionnaire), Time 2 (4-Week Follow-Up), and Time 3 (6-Month Follow-Up)

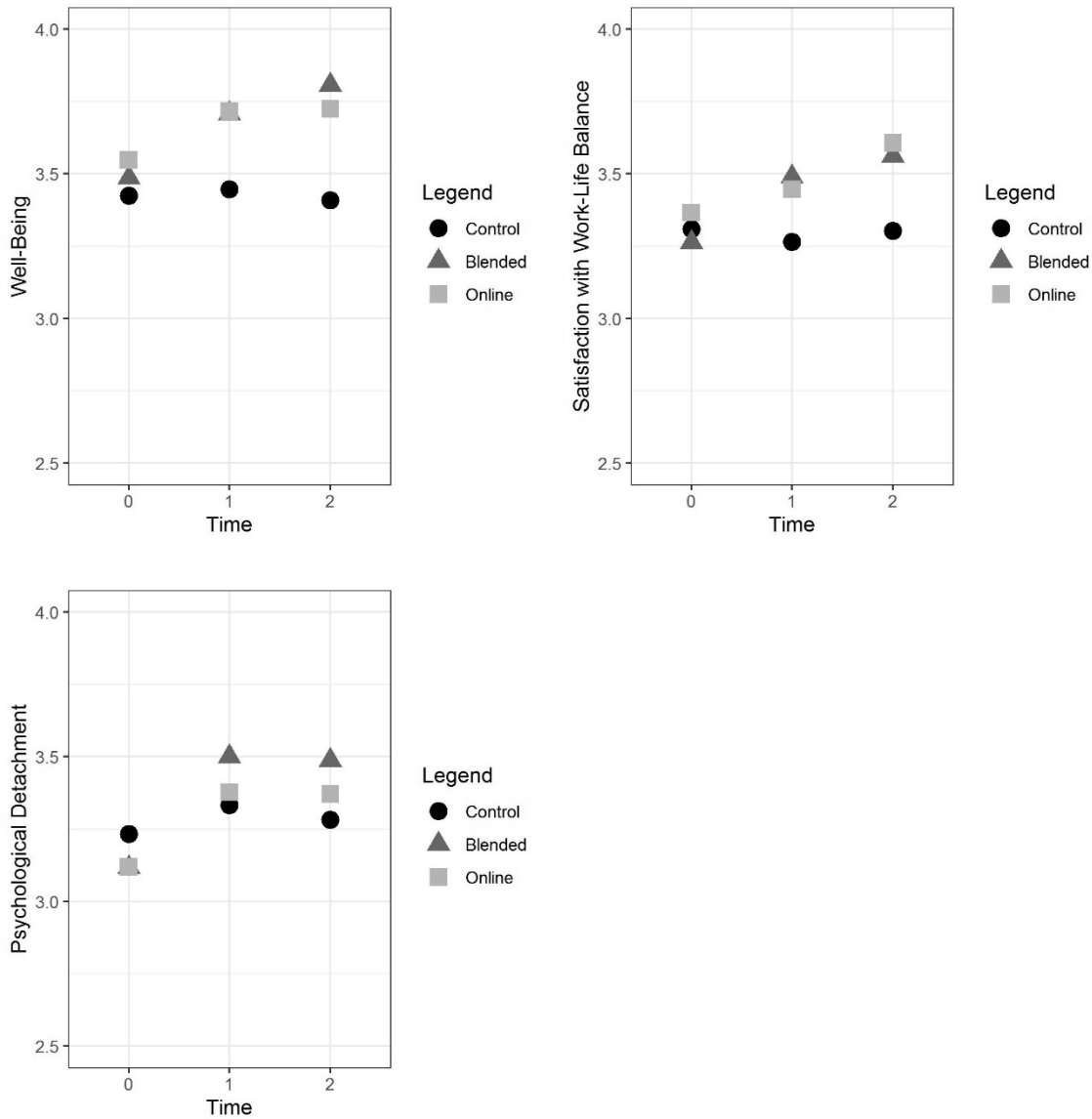
Variable			Psychological Detachment	Satisfaction with Work-Life Balance	Well-Being
	IG-	<i>M</i>	3.13	3.35	3.57
	ON	<i>SD</i>	0.89	0.92	1.03
T0 (<i>n</i> = 408)	IG-	<i>M</i>	2.96	3.20	3.52
	BL	<i>SD</i>	0.96	0.94	0.97
	CG	<i>M</i>	3.23	3.32	3.42
		<i>SD</i>	0.90	0.92	1.08
	IG-	<i>M</i>	3.36	3.43	3.72
	ON	<i>SD</i>	0.80	0.83	0.97
T1 (<i>n</i> = 408)	IG-	<i>M</i>	3.41	3.45	3.72
	BL	<i>SD</i>	0.87	0.80	0.94
	CG	<i>M</i>	3.34	3.28	3.45
		<i>SD</i>	0.90	0.88	1.12
	IG-	<i>M</i>	3.41	3.67	3.82
	ON	<i>SD</i>	0.88	0.75	0.99
T2 (<i>n</i> = 373)	IG-	<i>M</i>	3.45	3.57	3.85
	BL	<i>SD</i>	0.91	0.85	1.04
	CG	<i>M</i>	3.31	3.33	3.39
		<i>SD</i>	0.93	0.91	1.08
	IG-	<i>M</i>	3.40	3.42	3.69
	ON	<i>SD</i>	0.80	0.82	1.08
T3 (<i>n</i> = 222)	IG-	<i>M</i>	3.36	3.53	3.67
	BL	<i>SD</i>	0.95	0.89	1.09

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. IG-ON = Online Intervention Group, IG-BL = Blended Intervention Group, CG = Control Group.

Figure 2

Means of Outcome Variables for Intervention Group (IG) and Control Group (CG)

Before (T0) and After Training Completion (T1) and at 4-Week Follow-Up (T2)



Manipulation Checks

As a manipulation check for both interventions, we examined whether intervention participants reported to have learned anything about strategies to cope with the challenges of FWD during the last six weeks. An analysis of variance (ANOVA) yielded significant variation among groups, $F(2, 392) = 169.5, P < .001$. A post hoc Tukey test showed that the intervention groups differed significantly from the control group ($P < .001$); the blended

training group was not significantly different from the online training group. Thus, both intervention groups had learned strategies to cope with the challenges of FWD, which shows the effect of the intervention.

As a manipulation check for the different training formats, we tested whether the blended training participants reported more social exchange. ANOVAs yielded significant variation among groups for Experiential Knowledge, $F(2, 392) = 23.72, P < .001$, and Emotional Support, $F(2, 392) = 19.18, P < .001$. Post hoc Tukey tests showed that blended training participants differed significantly from both control group and online training participants ($P < .001$). Thus, blended training participants had experienced increased sharing of experiential knowledge and emotional support, affirming the effect of the blended training.

General Effectiveness of the Intervention

Table 2 summarizes all coefficients for the multilevel analyses. For psychological detachment, satisfaction with work-life balance, and well-being, the results showed a significant intervention effect (i.e., group IG vs CG x time interaction) at Time 1 and at Time 2, supporting Hypothesis 1, which assumed that both training formats would improve psychological detachment, satisfaction with work-life balance, and well-being.

Table 2*Results of the Multilevel Models for all Outcomes²*

Outcome Predictor	<i>B</i>	<i>SE B</i>	<i>t</i>	95% CI
Psychological Detachment				
Intercept	3.16	0.04	81.64	[3.08; 3.23]
IG vs CG	-0.07	0.06	-1.39	[-0.19; 0.03]
BT vs OT	-0.00	0.09	-0.01	[-0.18; 0.18]
Time 1	0.25	0.04	6.80	[0.18; 0.32]
Time 2	0.22	0.04	5.61	[0.15; 0.30]
IG vs CG x Time 1	0.15	0.05	2.98	[0.05; 0.24]
IG vs CG x Time 2	0.18	0.06	3.19	[0.07; 0.29]
BT vs OT x Time 1	0.12	0.09	1.35	[-0.06; 0.30]
BT vs OT x Time 2	0.12	0.10	1.17	[-0.08; 0.31]
Satisfaction with Work-Life Balance				
Intercept	3.31	0.04	87.70	[3.24; 3.39]
IG vs CG	0.00	0.05	0.07	[-0.10; 0.11]
BT vs OT	-0.10	0.09	-1.12	[-0.28; 0.08]
Time 1	0.09	0.03	2.58	[0.02; 0.15]
Time 2	0.18	0.04	4.54	[0.10; 0.25]
IG vs CG x Time 1	0.13	0.05	2.87	[0.04; 0.22]
IG vs CG x Time 2	0.18	0.05	3.42	[0.08; 0.29]
BT vs OT x Time 1	0.15	0.09	1.70	[-0.02; 0.31]
BT vs OT x Time 2	0.06	0.10	0.58	[-0.13; 0.25]
Well-being				
Intercept	3.49	0.04	80.77	[3.40; 3.57]
IG vs CG	0.06	0.06	0.99	[-0.06; 0.18]
BT vs OT	-0.06	0.10	-0.58	[-0.26; 0.14]
Time 1	0.14	0.04	3.46	[0.06; 0.21]
Time 2	0.16	0.05	3.48	[0.07; 0.25]
IG vs CG x Time 1	0.12	0.05	2.14	[0.01; 0.22]
IG vs CG x Time 2	0.18	0.07	2.78	[0.05; 0.30]
BT vs OT x Time 1	0.05	0.10	0.52	[-0.14; 0.25]
BT vs OT x Time 2	0.14	0.12	1.24	[-0.08; 0.37]

Note. $N = 1136$. IG vs CG = Intervention Groups vs. Control Group; BT vs OT = Blended Training vs. Online Training.

² Zero is not included in the reported confidence intervals if the lower and upper bound of the confidence interval have the same sign. In these reported confidence intervals, numbers not equal to zero would appear if more decimal places were reported.

Adherence and Compliance

Hypothesis 2 proposes that blended training participants would be more adherent and compliant compared to online training participants. Regarding the difference in dropout between training formats, online training participants were not more likely to dropout compared to blended training participants at T1 (OR = 1.37, 95% CI [.91, 2.06]) and T3 (OR = 1.41, 95% CI [0.95, 2.10]). At T2, online training participants were twice as likely to drop out compared to blended training participants (OR = 1.64, 95% CI [1.09, 2.46]). Regarding the difference in compliance between training formats, blended training participants were 17 times more likely to be compliant compared to online training participants (OR = 17.39, 95% CI [2.23, 135.87]). Thus, Hypothesis 2 was partially supported.

Differences Between Intervention Groups

Hypothesis 3 proposes that blended training participants would profit more from the intervention than online training participants regarding psychological detachment, satisfaction with work-life balance, and well-being. Analyses revealed that the intervention effects did not differ between intervention groups at Time 1 and at Time 2 (i.e., group $_{BT\ vs\ OT}$ x time interaction). Thus, we rejected Hypothesis 3.

Additional Analyses

To explore long-term effectiveness of the intervention, we analyzed the main effect of time at Time 3 for both interventions groups, which was significant for psychological detachment ($b = .24, SE = 0.08, t = 2.84, 95\% CI [0.07, 0.40]$), but not for satisfaction with work-life balance ($b = .05, SE = 0.08, t = 0.68, 95\% CI [-0.10, 0.20]$) and well-being ($b = .09, SE = 0.10, t = 0.90, 95\% CI [-0.11, 0.29]$). To explore differential long-term effects, we analyzed intervention effects (i.e., group $_{BT\ vs\ OT}$ x time interaction) between intervention groups at Time 3. These analyses did not reveal differences in interventions effects at Time 3 for psychological detachment ($b = .06, SE = 0.11, t = 0.55, 95\% CI [-0.16, 0.29]$) and well-

being ($b = .04$, $SE = 0.14$, $t = 0.30$, 95% CI [-0.23, 0.31]). However, there was a significant difference between training formats regarding satisfaction with work-life balance at Time 3 ($b = .21$, $SE = 0.10$, $t = 2.02$, 95% CI [0.01, 0.41]) such that the blended training participants profited more. Thus, when those who did not regularly engage with the online modules and exercises (online and blended training) and attended only one or none group meeting (blended training) were included in the analyses, blended participants were more satisfied with their work-life balance six months after the training had ended.

As a robustness check, we excluded those from analyses who reported only rudimentary or no compliance to training modules or practiced daily tasks fewer than two days per week. Results held for effectiveness at T1 and T2 for all outcomes. They were also similar for the long-term effectiveness of the intervention at T3, except that there was no longer a significant difference between training formats regarding satisfaction with work-life balance at Time 3. As a further robustness check, we conducted all multilevel analyses with time as a numeric variable [60]. Results held for both general and differential intervention effectiveness. These results add to the robustness of the findings regarding post-training measures and the four-week follow-up. The findings regarding long-term effectiveness regarding work-life balance after 6 months should be interpreted with caution.

To explore whether participants who reported low social support at baseline would profit more from the blended training, we conducted multilevel analyses with social support as an additional moderator. Social support was measured with the subscale for perceived available instrumental support of the Berliner Social-Support Scales [62]. For example, “When I am worried, there is someone who helps me.” This scale showed good reliabilities ($\alpha_{T0} = .90$). The interaction of interest (group_{BT vs OT} x time x social support) was not significant for psychological detachment at Time 1 ($b = -.03$, $SE = 0.11$, $t = -0.24$, 95% CI [-0.25, 0.19]) and Time 2 ($b = -.11$, $SE = 0.13$, $t = -0.83$, 95% CI [-0.36, 0.14]), satisfaction

with work-life balance at Time 1 ($b = -.01$, $SE = 0.11$, $t = -0.08$, 95% CI [-0.21, 0.20]) and Time 2 ($b = .06$, $SE = 0.12$, $t = 0.49$, 95% CI [-0.18, 0.30]), and well-being at Time 1 ($b = .15$, $SE = 0.12$, $t = 1.19$, 95% CI [-0.09, 0.39]) and Time 2 ($b = .04$, $SE = 0.15$, $t = 0.25$, 95% CI [-0.25, 0.33]).

Discussion

Workers with flexible work designs (FWD) face specific challenges regarding their work-life balance, recovery, and well-being [2]. The aim of this study was first, to examine the effectiveness of our general training approach, teaching participants to cope with these particular challenges with self-regulation strategies. Second, our aim was to compare the effectiveness of an online and a blended training format. Based on social identity theory and self-determination theory, we specifically expected social interactions within group sessions and the sense of belonging to strengthen both social exchange and motivation [17, 18], addressing the main shortcomings of an online format, the lack of social interaction and high dropout. Moreover, we expected more social exchange and higher motivation to increase training effectiveness. Multilevel analyses supported the overall effectiveness of the training approach. While there was no difference of effectiveness between training formats, blended training participants were more compliant.

In line with our hypotheses, multilevel analyses showed that the training (both online and blended format) improved psychological detachment, satisfaction with work-life balance, and well-being compared to a control group. This shows that our six-week online training offers strategies that help workers cope with the specific challenges of FWD. Specifically, it provides participants with segmentation strategies that help them set boundaries between life domains. They learn respite strategies that help them enhance their recovery during work breaks and after work. Further, they learn strategies that help them self-organize their workday.

In addition, we found that adherence and compliance were in some ways higher among blended training participants, partly supporting Hypothesis 2: Four weeks after the training, online training participants were twice as likely to drop out compared to blended training participants. Moreover, blended training participants were 17 times more likely to be compliant compared to online training participant, that is, to complete training modules at least partially and practice daily tasks at least two days per week. These results indicate that interacting with peers in group sessions in addition to the online modules did significantly affect social exchange, as well as motivation and commitment of participants. Feedback from blended training participants reflects these results; some felt that the regular meetings helped them follow through with the training. This is in line with the theorizing of self-determination theory that the satisfaction of relatedness as a basic need in the blended training would increase intrinsic motivation.

The manipulation in the blended training group was successful, as we found social exchange (i.e., experiential knowledge provided and emotional support received) to be higher among blended training participants than among online training participants. This is in line with the theorizing of social identity theory that group interactions in blended training increase social exchange. However, intervention effectiveness did not differ between intervention groups, neither directly after the training, nor four weeks or six months later. Group sessions did not reinforce the effects of the online training, although they seemed to have increased social exchange and motivation. These findings are inconsistent with the assumptions drawn from social identity theory that increased social exchange through group interactions should improve training effectiveness of the blended training. Although this is not in line with our hypotheses, there are some studies that point towards a similar direction. For example, a study that compared online, blended learning and face-to-face trainings did not find any effect of training mode on knowledge or confidence [64]. In the educational sciences, a meta-analysis

did not find the expected effect for combination of distance education and face-to-face instruction compared to distance education; however they could only include few effect sizes [65]. Nevertheless, as there have been few studies with inconclusive findings on this matter, this is an area in need of research attention.

It is likely that blended training participants built a sense of belonging to a group and relatedness through sharing their experiences with FWD and getting to know each other. Moreover, they may have perceived social pressure to work through the modules and implement the exercises because they knew they would talk about them with their group. This is in line with the reasoning that social influence of a group can affect people's commitment and motivation [66]. Articulating one's own challenges with FWD and desires for change within the group sessions may have increased intrinsic motivation to implement training strategies even more. However, the increased motivation did not affect training outcomes. One explanation for these unexpected results regarding group differences is that there might have occurred a selection effect: In the online training, those who did not find the training helpful likely dropped out, whereas in the blended training, participants felt committed to continue the training, even if they did not find it suitable for themselves. This could lead to training effects being overestimated in one group and underestimated in the other.

Limitations and Implications for Future Research

This study has several strengths, such as the randomized controlled trial design and two long-term follow-up questionnaires. This provides robust evidence for our research questions, followings calls for more randomized controlled trials in work-specific interventions [21, 22].

Yet, this study also has limitations. In our training, we combined multiple strategies that help address different challenges in the context of FWD. We believe that this comprehensive approach is of high practical relevance because of the multifaceted nature of

FWD challenges and the heterogeneity of emphasis people put to certain challenges. When all strategies are learnt in the first place, it becomes more likely to find personally helpful strategies to cope with FWD. Moreover, the focus of this study was to compare web-based and blended training. Nevertheless, future research could question the superiority of one of these components or their combination and test effects of separate and combined components against the complete training. Alternatively, weekly diaries and growth curve models would allow to evaluate effectiveness of specific modules.

Further, women and participants with high education are over-represented in this study because they selected themselves. However, interventions are most successful when participants self-select into the study [67], probably because they experience a high need for training. Face-to-face group sessions did not take place in presence but virtual because of the pandemic situation. However, the framing of additional video conferences as a blended training is common in intervention research [64]. Moreover, based on media richness theory, videoconferencing can be considered a rich media, being almost as rich as face-to-face communication [68]. This is also reflected in online support groups providing similar helping techniques as face-to-face support groups [69]. Hence, we expect similar underlying social processes and outcomes.

We only assessed compliance via self-report because due to data protection requirements, we were not able to link participants' questionnaires with their module engagement. Future studies could incorporate objective measures such as module completion status to measure actual compliance. To examine whether alternative interventions are similarly or more effective, and whether participants' expectations regarding their participation served as a demand characteristic evoking hypothesis-conforming behavior [70], future research could add a further control group that receives an alternative or placebo intervention [21]. We argued that motivation to conduct the training may play an important

role in explaining training effectiveness. Future research could explore this assumption in more detail and, in order to do so, measure motivation with specific scales. Moreover, we measured social exchange only as a manipulation check and, hence, only post-training. Future research could include social exchange measures from the beginning to allow for modeling the change over time.

Last, because of the conduction of group sessions, complete randomization was not feasible. As the dates for the blended training group sessions were set, complete randomization would have most likely resulted in higher attrition, since participants assigned to a specific group session might not have been able to attend. Hence, participants could provide their time preferences for the sessions when they registered. Participants who indicated that they did not have time on any of the available dates for the group sessions were only randomized between the online training group and the waitlist control group ($n = 158$). All other participants were randomized between all three experimental conditions ($n = 417$).

Practical Implications

Workers with FWD face specific challenges such as blurring boundaries between work and private life, detaching from work, establishing recovery periods, and self-organizing their workday. In this study, we show that a training that teaches self-regulation strategies, namely environmental and cognitive-emotional segmentation strategies, recovery strategies, and self-organization strategies, helps participants improve psychological detachment, satisfaction with work-life balance, and well-being. Hence, we recommend that interventions for workers with FWD teach them such self-regulation strategies. To support workers with FWD, occupational health or supervisors managers can offer such a self-regulation intervention.

To find out whether conducting a blended training is worth the additional time, effort and cost, we compared an online training group with a blended training group. We find the

intervention to be effective for all participants, regardless of the training format. However, we find that the blended format was beneficial for participants' adherence and commitment, supposedly because they experienced more social interaction. This is important as a key shortcoming of online trainings is high dropout. Accompanying group meetings can increase the likelihood of training adherence. This underlines the importance of sharing experiences with others to follow through and truly engage with an online training, which is in line with research showing that people who experience a sense of belonging to each other are more likely to coordinate with others' goal pursuit [71]. Moreover, blended trainings could address the danger of social isolation; people have less social interactions and perceive less social support when they work in different locations, and social isolation is one of the greatest disadvantage workers perceive with mobile work [63].

Thus, when practitioners decide that it is worth the increased effort of a blended training to strengthen social exchange and commitment, they should encourage group interactions accompanying online trainings. Moreover, employees who participate in online trainings can share their experiences and goals for participation with others to increase their own commitment to follow through with the training.

Individual interventions can serve as a valuable addition to human resource practices and policies. However, they should always be seen as an addition to appropriate working conditions. These include for example support from supervisors and peers and corporate agreements on telework [7, 72].

Conclusion

In this study, we show that an intervention that aims to promote self-regulation strategies to cope with flexible work designs (FWD), such as to manage boundaries, to recover from work, and to self-organize the workday, is effective: In a randomized controlled trial, multilevel analyses showed that participation in the intervention improved work-life

balance, recovery, and well-being. The training was effective regardless of the training format, which was either online or blended. However, adherence four weeks after training as well as compliance were higher among blended training participants. The share of workers with temporal and spatial flexibility is expected to remain at a high level in the future. The self-regulation online intervention can be a helpful tool in supporting workers to cope with the specific challenges of FWD. Moreover, group sessions accompanying the online training can strengthen training compliance.

Conflicts of Interest

The authors do not have any conflicts of interests to disclose.

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Paper 5:

Althammer, S. E., Wöhrmann, A. M., & Michel, A. (2022). The Effectiveness of a Team Coaching to Enhance Team Regulation in Hybrid Teams: A Randomized Controlled Trial [Manuscript under review]. *Journal of Occupational and Organizational Psychology*.

**The Effectiveness of a Team Coaching to Enhance Team Regulation in Hybrid Teams: A
Randomized Controlled Trial**

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Data availability statement:

The data that support the findings of this study are openly available in OSF at https://osf.io/pwnzr/?view_only=ff275e572e2b4ca79c6de6c0d2ec5c95

Ethical approval statement:

Ethical approval for this study was granted by the ethics committee of the Federal Institute for Occupational Safety and Health in Germany.

Abstract

With the rise of flexible work designs (FWD), more work teams collaborate both virtually and face-to-face. For such hybrid work teams, team regulation, the ability of teams to steer team-level actions to achieve team goals, is an important resource for shaping how they work together. This article evaluates the effectiveness of a team coaching promoting team regulation. In a two-session team coaching, teams engaged in team-regulatory strategies regarding hybrid team collaboration. In a cluster-randomized controlled trial, data from 750 individuals across 84 hybrid work teams were used to examine the effectiveness of a team regulation coaching on FWD-specific social support, psychological safety, and collaboration indicated by psychosocial management. Participants were assigned to intervention groups that received team coaching immediately ($n = 501$) or to a waitlist control group ($n = 249$). Participants received questionnaires before and after the coaching and at a 9-week follow-up. As expected, results of multilevel analyses revealed that coaching improved FWD-specific social support, psychological safety, and collaboration within teams. Team regulation mediated effects. Effects on collaboration and psychological safety persisted over 9 weeks. The team coaching is effective in promoting team regulation in hybrid work teams, which can improve collaboration and enhance team resources.

Keywords: collaboration, flexible work designs, psychological safety, randomized controlled trial, self-regulation, social support, team regulation

Practitioner points:

- The team coaching is an effective tool for promoting team regulation by teaching team-regulatory strategies.
- Team regulation coaching can improve FWD-specific social support and psychological safety, and improve their perception of how they manage their psychosocial work environment.
- This study yields guidelines how to support teams to achieve their shared goals, thus supporting them to dealing with challenges that arise with flexible work designs. Practitioners can offer such coaching to support hybrid teams.

The Effectiveness of a Team Coaching to Enhance Team Regulation in Hybrid Teams: A Randomized Controlled Trial

As flexible work designs (FWD) such as flextime and remote work become increasingly common, many work teams are collaborating both virtually and face-to-face. Such hybrid teams need to adapt to these changing demands and find new ways to organize their communication and work to attain team collaboration goals (e.g., dealing with social isolation, ways of conducting hybrid or virtual meetings, coordinating each other's availability). Thus team regulation, the ability of teams to steer team-level actions to attain collective team goals (Chen & Kanfer, 2006; Van Hooft & Van Mierlo, 2018), becomes an important resource for teams as it enables them to successfully adapt to changes (Inzlicht et al., 2021). To address this challenge, researchers have started to explore the critical role that self-regulation plays in coping with FWD challenges (Allen et al., 2003; Müller & Niessen, 2019). Self-regulation can help develop individual work routines (Kubicek et al., 2015; Mäkikangas et al., 2022) and is required for behavioral adaptation (Inzlicht et al., 2021). Previous research has demonstrated that self-regulation can positively affect a number of outcomes such as well-being (MacLeod et al., 2008; Ouweneel et al., 2013), psychological detachment (Smit & Barber, 2016), work engagement (Weintraub et al., 2021; Zeijen et al., 2018), and can help cope with changes and challenges caused by FWD (Demerouti, 2023; Schlaegel et al., 2023).

Despite these promising findings, this line of research remains limited in important ways. First, prior research has primarily considered the regulation process within persons and has placed less emphasis on processes of regulations within teams. Research has focused on self-regulation within individuals (Zacher & Frese, 2018) and has evaluated several self-regulation coaching programs (e.g., Ebner et al., 2018; Marques-Quinteiro et al., 2019; Unsworth & Mason, 2016; Yeow & Martin, 2013), but there is a theoretical and empirical

paucity in understanding whether and how coaching can enhance regulation at the team level. Moreover, the similarity of processes and concepts at the individual and team level is still debated (e.g., DeShon et al., 2004; Dierdorff & Ellington, 2012). Second, research has rarely focused on coaching to improve team regulation, with few exceptions (Panadero et al., 2015). Third, research on self-regulation in teams and team regulation has primarily focused on performance-related outcomes (Gevers et al., 2009; Konradt et al., 2009; Schlaegel et al., 2023).

To address these gaps, we developed a coaching for hybrid work teams to promote team regulation, with the aim of gaining more insight into the processes of team regulation by examining its effectiveness. The coaching is theoretically based on self-regulation models (Bandura, 1977, 1991; Kanfer, 1977; Zacher & Frese, 2018; Zimmerman, 2000) adapted to the team context, building on research that has shown self-regulation to be functionally similar to team-level regulation (Chen & Kanfer, 2006; Chen et al., 2005; DeShon et al., 2004; Dierdorff & Ellington, 2012; Gevers et al., 2009; Panadero et al., 2015). The central research question of our study was whether team coaching based on self-regulation theories (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000) can effectively improve team regulation. Moreover, we examined whether team regulation is distinct from team members' aggregated self-regulation to explore how these constructs are related, thus contributing to emerging efforts to evaluate regulation processes at the team level (cf. Van Hooft & Van Mierlo, 2018). Further, we examined whether enhancing team regulation can foster FWD-specific social support and psychological safety, and improve team members' awareness and capability to change the psychosocial work environment (i.e., psychosocial management) as an indicator of collaboration in hybrid teams. In this article, we evaluate the effectiveness of this team regulation coaching in a randomized controlled trial with 84 work teams.

This study contributes to the literature in several ways. First, this study aims to expand the understanding of team regulation. This extends research on action regulation which has traditionally focused on individual self-regulation that occurs within persons (Zacher & Frese, 2018), missing a focus on team regulation which involves the coordination of each other's actions. This furthers theory building on team regulation and its outcomes. In building our theoretical framework and evaluating whether a team coaching can specifically target team regulation, we draw on process models of self-regulation (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000) and adapt processes to the team level. We contribute to the stream of research testing the theory that individual and team-level goal-related processes are similar (Chen & Kanfer, 2006). In doing so, this research goes a step further in understanding the relationship between team and individual regulation (Chen et al., 2005; DeShon et al., 2004; Dierdorff & Ellington, 2012; Van Hooft & Van Mierlo, 2018) by explicitly measuring both self- and team regulation and, thus, examining whether a team coaching designed to enhance team regulation similarly affects aggregated individual regulation.

Second, we aim to extend research on team coaching by developing a theory-based team coaching for hybrid teams to promote their team regulation. We build on the notion that developing a high-quality intervention requires a strong theory or reasonable evidence that strengthening a particular resource can have meaningful effects (Briner & Walshe, 2015). We extend this idea by also using theory as a framework for the coaching process, that is, how to enhance the resource of team regulation. Research on self-regulation has shown, both theoretically and empirically, that self-regulation is required to adjust and change behavior (Inzlicht et al., 2021; Michie et al., 2008). Given the broad evidence that self-regulation models can serve as a theoretical foundation for effective individual coaching (e.g., Ebner et al., 2018; Unsworth & Mason, 2016; Yeow & Martin, 2013), we believe that it can also serve

as a theoretical basis for designing a team regulation coaching. By adapting individual self-regulation process models to the team level, we aim to provide evidence that regulation process models can be used as a framework for designing an effective team regulation coaching.

Third, we aim to extend research on team regulation which has predominantly focused on performance-related outcomes (Gevers et al., 2009; Gurtner et al., 2007; Konradt et al., 2009; Schlaegel et al., 2023) by theorizing that team regulation coaching holds the potential to foster psychological safety and FWD-specific social support and to improve collaboration in hybrid teams. This also provides an empirical test of the theoretical assumption based on conservation of resources (COR) theory (Hobfoll et al., 2018) that team regulation as a team resource can increase further team resources such as FWD-specific social support and psychological safety within teams and improve team collaboration. A more thorough investigation of team regulation processes and their effects on team collaboration and resources is particularly important for practitioners who want to improve teamwork in hybrid teams. This is even more important when there is less social interaction in the workplace, as people increasingly work in different locations and social support is an important resource to overcome social isolation (Bentley et al., 2016). As we conduct this evaluation as a randomized controlled trial with a sample of employees, we respond to the call for more high-quality randomized controlled trials of work-specific interventions (Michel et al., 2015; O'Shea et al., 2016).

Team Regulation and Self-Regulation

In their integrative theoretical model of individual and team goal-related processes, Chen and Kanfer (2006) have suggested that self-regulation processes traditionally studied at the individual level are functionally similar to regulation processes at the team-level. Self-regulation describes the ability to steer thoughts, feelings, and actions to attain individual

goals (Bandura, 1991). According to process models of self-regulation, people engage in self-regulatory strategies to achieve their goals (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000). First, they formulate objectives and performance standards (*self-goal setting*); then they observe their behavior (*self-monitoring*); then they reflect on the consistency of their behavior with their self-set goals (*self-evaluation*); then they reinforce themselves with treats or positive affective responses (*self-reward*), whose anticipation motivates them. These strategies form the basis for purposeful action (Bandura, 1991).

Hence, based on previous definitions of similar constructs (Chen & Kanfer, 2006; Van Hooft & Van Mierlo, 2018), we define team regulation as the ability to steer team-level actions to attain collective team goals. As such, it is a team-level construct referring to collective behavior of a team (cf. Van Hooft & Van Mierlo, 2018). Similar to individuals, work teams generate collective goals toward which they work. Teams then achieve their goals through collective and coordinated activities of team members. Analogous to self-regulation, team regulation should be organized sequentially (McGrath & Tschan, 2004). Corresponding to process models of self-regulation, we propose that teams engage in team-regulatory strategies of team-goal setting, team-monitoring, team-evaluating, and team-rewarding to achieve their collective goals. Previous research has postulated similar individual- and team-level regulatory processes, and has demonstrated the existence of team-level analogs of individual-level regulatory constructs such as team-goal setting (DeShon et al., 2004; Gevers et al., 2009; Panadero et al., 2015), team self-monitoring (Chen et al., 2005), or team-evaluating (Bandura, 1977; Panadero et al., 2015).

The team coaching evaluated in this study was designed to promote team regulation strategies in hybrid work teams and to help teams improve their collaboration in the context of FWD. They learn how to engage in team-regulatory strategies (team-goal setting, team-monitoring, team-evaluating, and team-rewarding) based on the process phases of self-

regulation models (Bandura, 1977, 1991; Kanfer, 1977; Zacher & Frese, 2018; Zimmerman, 2000) regarding a collective goal for teamwork in the FWD context. During coaching, team members and their supervisors set a goal for their collaboration in the context of FWD by implementing team regulation strategies. That is, they agreed on a goal for improving teamwork in the context FWD and planned how they would monitor, evaluate, and reward themselves as a team regarding goal achievement.

Previous research has shown that individual self-regulation is malleable through self-regulation trainings, with positive effects on self-efficacy (Ebner et al., 2018; Unsworth & Mason, 2012), well-being (Mrazek et al., 2021; Müller et al., 2016; Unsworth & Mason, 2012), adaptive performance and job satisfaction (Marques-Quinteiro et al., 2019), and time management and decision-making (Oettingen et al., 2010). However, there have been few attempts to train team regulation, and previous interventions have not been successful in improving regulation at the group level (e.g., Panadero et al., 2015). Analogous to interventions that aim to train individual self-regulation capacity with self-regulation strategies (Ebner et al., 2018; Marques-Quinteiro et al., 2019; Mrazek et al., 2021), we expect coaching to enhance team regulation by promoting team-regulatory strategies:

Hypothesis 1: Participants of the team coaching will report more team regulation compared to participants in the control group.

As processes of individual and collective regulation are related (DeShon et al., 2004; Dierdorff & Ellington, 2012; Panadero et al., 2015), we aimed to explore whether team regulation is conceptually different from the average of individual self-regulation within a team. In other words (cf. Van Hooft & Van Mierlo, 2018), we wanted to investigate whether team regulation refers to self-regulation of teams (i.e., team-level regulation) rather than self-regulation in teams (i.e., individual-level self-regulation in a team context). Therefore, we

posed the research question whether team regulation is distinct from aggregated individual self-regulation of team members.

Research Question: Will the evaluation yield similar results for aggregated self-regulation as for team regulation?

Effectiveness of a Team Regulation Coaching

We expect the implementation of team regulation strategies (e.g., openly communicate expectations for working together in the context of FWD, set clear goals for improving collaborative work practices, strive to achieve goals by tracking and reviewing progress, and appreciate achievement of goals) to improve FWD-specific social support, psychological safety, and psychosocial management of FWD. This would also be in line with COR theory, which states that people strive to acquire, preserve, foster, and protect their resources (Hobfoll et al., 2018). To do so, they need to invest resources. Because team regulation (i.e., the ability to jointly steer team-level actions) facilitates attainment of team goals and thus helps teams invest and manage their resources efficiently, we propose that it can function as a resource, defined as anything perceived as helpful in achieving resources and goals (Halbesleben et al., 2014; Hobfoll, 1989). COR theory proposes a spiraling nature of both resource loss and resource gain. The upward spiral of COR theory would predict that training team regulation as a resource should foster the building of more resources such as FWD-specific social support, psychological safety, and thus improve collaboration. That is, coaching of team regulation processes is likely to initiate communication processes in teams as they agree on collective goals and strategies to achieve them. This enhanced team regulation is likely to create an environment where team members will provide support to each other and feel psychologically safe to share their ideas and knowledge, which will improve team collaboration, indicated by increased awareness and ability of teams to address and manage issues related to psychosocial aspects of FWD.

Social support describes the extent to which employees perceive that supervisors and colleagues care about their well-being through social interactions or provision of resources (e.g., practical or emotional aid), and can be perceived either in general or in a specific context (French et al., 2018; Kossek et al., 2011; ten Brummelhuis & Bakker, 2012). Social support is a critical contextual resource (i.e., a resource located outside the self; Hobfoll et al., 2018; ten Brummelhuis & Bakker, 2012). It plays a pivotal role in the context of FWD, as it can act as a job resource, helping employees cope with remote work challenges such as social isolation and positively impacting their well-being and performance (Wang et al., 2021).

We examine FWD-specific social support, referring to the perception that supervisors and colleagues care about whether team collaboration in the FWD context is experienced as positive. This includes whether employees feel that they receive help from colleagues and supervisors regarding collaboration in the FWD context (*social support*), whether employees share personal challenges regarding FWD with others (*experiential knowledge provided*), and whether employees feel that others listen to them regarding how to manage work in the FWD context (*emotional support received*). Based on social identity theory, social interactions and a sense of belonging to a group can enhance social support (Haslam et al., 2019). As team members develop a sense of shared identity because they belong to the same team, but also because they are participating in a coaching together and work toward a common goal, their mutual social support should increase (Haslam et al., 2019; Nielsen, 2013):

Hypothesis 2: Participants of the team coaching will report more FWD-specific social support compared to participants in the control group.

Psychological safety is a shared belief that a work group is safe for interpersonal risk taking (Edmondson, 1999). It is positively related to work engagement, satisfaction, commitment, task performance, information sharing, and learning behaviors (Frazier et al., 2017; Newman et al., 2017). We expect that enhanced team regulation can strengthen

psychological safety beliefs. Clear communication of expectations and goals is likely to lead to perceived psychological safety because team members then have a better understanding of what they should be doing (Frazier et al., 2017). In the team coaching, guided by a professional coach, team members openly discuss their expectations of teamwork in the context of FWD (e.g., prevent extended availability during leisure time). They then debate what and how they can improve and set a goal for doing so (e.g., respecting business hours when communicating with each other), and they discuss the roles everyone plays in the process. Moreover, they decide how they will monitor and evaluate how well the team has met its goal and how they will appreciate goal achievement (i.e., team regulation strategies). As team members then know exactly what is expected of them, perceived psychological safety should increase:

Hypothesis 3: Participants of the team coaching will report higher psychological safety compared to participants in the control group.

We expect the team coaching to increase awareness of the psychosocial work environment regarding FWD within the team, as well as team members' capability to manage their psychosocial work environment in the FWD context. We refer to this construct as psychosocial management of FWD (previous studies have addressed the psychosocial work environment in general rather than in a specific context, cf. Abildgaard et al., 2020; von Thiele Schwarz et al., 2017). During the coaching, team members may for the first time engage in difficult discussions about how to change their work practices and procedures in the FWD context, such as how to organize hybrid meetings or how to deal with team members' different needs for segmentation of work-private life boundaries. They set common goals for the design of their hybrid teamwork. Moreover, they work toward implementing these changes by monitoring and evaluating their progress and rewarding their achievements (i.e., team regulation strategies). Hence, we expect participants to perceive an increased focus

and ability as a team to successfully address and manage issues related to psychosocial aspects of FWD, such as team members' work organization, well-being, recovery, and work-life balance. Hence:

Hypothesis 4: Participants of the team coaching will report higher psychosocial management of FWD compared to participants in the control group.

Last, with reference to the above rationale for coaching effectiveness, this study focuses on team regulation as a potential mechanism. Because teams are coached to use team regulation strategies to achieve their collective goals, we expect team regulation to be the key mechanism explaining the relationship between coaching participation and outcomes. That is, we expect enhanced team regulation to explain proposed effects on outcomes:

Hypothesis 5: Team regulation mediates positive effects of coaching participation on (a) FWD-specific social support, (b) psychological safety, and (c) psychosocial management.

Method

Study Design and Procedure

To recruit participants, we used snowball sampling, newsletters, and online professional networking sites. We advertised the study as a free coaching for teams (i.e., at least three people working together) in which all or some members had some flexibility (e.g., teleworking, remote working) to develop agreements for future teamwork in the face of FWD challenges. Team members confirmed that they were of age and willing to participate in the coaching and all questionnaires. Participants took part in a cluster-randomized waitlist-control design from November 2021 to January 2023. To register for the study, individual team members were required to sign an informed consent and data protection form. Teams were randomly assigned to one of three conditions, with 28 teams in each condition: a waitlist control group and two intervention groups. Both intervention groups received a baseline questionnaire (T0) three weeks before participating in the team coaching. One week before

coaching, teams received a preparation document. After intervention groups had attended the team coaching, we sent the post-questionnaire (T1) to all study participants. One intervention group (IG1) received access to additional online training¹ immediately after T1 and then completed a follow-up questionnaire (T2). The other intervention group (IG2) filled in a follow-up questionnaire (T2) 9 weeks after T1 and then received access to the online training. The waitlist control group (CG) completed the baseline questionnaire, then the post- (five weeks after T0) and follow-up questionnaire (9 weeks after T1), then participated in the team coaching and directly afterwards the online training. Teams were blind to their experimental conditions. We invited all participants to complete post- and follow-up questionnaires, regardless of whether they had completed the baseline questionnaire. We gave participants two weeks to complete questionnaires and excluded from analyses those who completed questionnaires afterwards. As an incentive for active participation, we offered online training participation certificates and information about project results.

Intervention

Coaching sessions followed a standardized procedure and were facilitated by eight professional external coaches with certified coaching education and at least 10 years of coaching experience. Eleven coachings were co-facilitated by a member of the author team to ensure consistency across teams and coaches. Prior to the first session, participants received a preparation document in which they were invited to reflect both their personal situation and team collaboration in the context of FWD. They were asked how they dealt individually and as a team with four key challenges of FWD (i.e., effective work organization, boundary

¹ The online training provided participants with individual self-regulation strategies to cope with challenges of FWD. The present study focuses on the evaluation of the team coaching, thus participation in the online training was not of interest and will not be described in detail. To evaluate effectiveness of the team coaching, we compared both intervention groups with the CG at baseline and post-questionnaire, and IG2 with CG at follow-up.

management between work and private life, detaching mentally from work during leisure time, recovery during work breaks and leisure time), based on their perceptions of the previous working week. In particular, we asked them what went well, and what they would like to change. In addition, coaches conducted semi-standardized interviews with supervisors prior to the first session, asking about their expectations of coaching and current working conditions in the organization.

Team coaching consisted of two sessions: Session 1 was a 4-hour session in which teams were introduced to the concept of team regulation based on self-regulation theories, shared their views on current challenges in the context of FWD, and agreed on a goal for change in teamwork. Specifically, they set a SMART goal (Doran, 1981) and used mental contrasting with implementation intentions (Gollwitzer & Oettingen, 2013) to bolster goal striving. They then planned how they would monitor (i.e., track progress), evaluate (i.e., review progress), and reward themselves (i.e., celebrate achievements) as a team. In Session 2, which took place two to three weeks later, teams reviewed their progress toward their goal and identified areas for improvement regarding their team goal. Moreover, they reflected the implementation of their team regulation strategies and selected another challenge to apply their team regulation strategies to. A detailed overview of the coaching sessions can be found in Table 1.

Participants

A total of 750 employees from 84 work teams participated in the study ($n_{IG1} = 272$, $n_{IG2} = 229$, $n_{CG} = 249$). Team sizes varied from three to 24 members ($M = 8.93$, $SD = 3.88$). Participants were 21 to 64 years old ($M = 42.48$, $SD = 10.30$); 67.3% were women; 76.8% held a university degree. Participants worked on average 37.99 ($SD = 10.01$) hours per week.

Participants reported to have on average high temporal flexibility² ($M = 4.03$, $SD = 0.79$). Regarding spatial flexibility, participants had the possibility to decide where to work on an average of 3.46 days ($SD = 1.84$) per week, and worked from home or other locations on an average of 3.09 days ($SD = 1.61$). On 3.77 days per week on average ($SD = 1.51$), team members with whom they collaborated closely usually worked in different locations than they did. Participants worked in various sectors such as business, administration, IT, and science. More than a third of participants (36.6%) was employed in the public sector. The study was conducted during the COVID-19 pandemic; 46.6% reported working from home just as often before the pandemic; 25.5% reported working from home more frequently in response to the pandemic; 13.0% had not worked from home before the pandemic. The proportion of gender was uneven across intervention and control groups, $\chi^2(4, 719) = 10.78$, $p < .05$ ³. More people in IG2 held a PhD, $\chi^2(14, 698) = 27.42$, $p < .05$. IG2 participants worked longer hours, $F(2, 712) = 3.41$, $p < .05$, and reported less temporal flexibility than IG1 participants, $F(2, 716) = 4.06$, $p < .05$. In both intervention groups, team members worked in different locations more often, $F(2, 716) = 6.00$, $p < .05$. Univariate ANOVAs revealed no significant differences regarding study variables between control and intervention groups at T0, except that IG2 participants reported higher baseline team regulation than IG1 participants, $F(2, 713) = 3.92$, $p < .05$. Participants who dropped out at T1 (Figure 1) reported less temporal flexibility, $F(1, 717) = 3.89$, $p < .05$, and higher team regulation, $F(1, 714) = 6.06$, $p < .05$, compared to non-dropouts. Participants who dropped out at T2 were younger, $F(1, 717) = 11.22$, $p < .001$, and showed differences in professional qualifications³.

² We asked participants how much influence they had when to start or end each workday, when to take a break, and when to take a few hours off. Participants answered on a scale from 1 = very little influence to 5 = very high influence.

³ The omnibus chi-square test was significant, but post-hoc tests revealed no pairwise proportion difference to be significant.

Measures

We assessed all variables except demographics at all measurement points. We included evaluation questions about coaching content and process in the post-questionnaire. All online questionnaires were in German. We used translation/back-translation procedures for scales available only in other languages (Brislin, 1980; Graham & Naglieri, 2003). Unless otherwise stated, participants answered items on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) referring to the previous two weeks.

For team regulation, psychological safety, FWD-specific social support, and psychosocial management of FWD, we used the team as a referent (i.e., referent-shift composition model; Chan, 1998). This approach allows team-level constructs to be assessed in terms of shared perceptions (cf. DeShon et al., 2004; Dierdorff & Ellington, 2012; Gevers et al., 2009; Van Hooft & Van Mierlo, 2018), as the constructs are conceptually meaningful at the team level. Individual team members responded to team-referent items, asking them to reflect on the team's position. We then averaged these individual-level questionnaire responses across teams. To justify aggregated team-level scores, we report the intraclass correlation ICC(1).

Team regulation. The items were based on subscales of the German version (Andreßen & Konradt, 2007) of the revised self-leadership questionnaire (Houghton & Neck, 2002), originally an individual-level self-regulation measure, adapted to focus on collective actions in general, rather than task-based actions. Consistent with the reference-shift approach, items were framed as referring to the individual team member's perceptions of regulatory behavior of the team. We measured *team-goal setting* (e.g., "We establish specific goals"), *team-observation* (e.g., "We make a point to keep track of how well we are accomplishing our goals"), *team-reward* (e.g., "When we have successfully completed something, we reward ourselves with something we like"), and *team-visualizing successful*

performance (e.g., “We visualize ourselves successfully achieving a goal before we implement it”) with three items each. Individual-level coefficient alphas for this scale were $\alpha_{T0} = .89$, $\alpha_{T1} = .90$, $\alpha_{T2} = .91$, indicating very good reliability. Team-level scores were calculated by averaging scores of individual team members per team. The ICC(1) was 0.24, thus supporting aggregation to the team level.

FWD-specific social support was operationalized with three measures. *Social support* from colleagues and supervisors was measured with the German version of the 4-item social support subscale of the Copenhagen Psychosocial Questionnaire (Lincke et al., 2021), adapted to focus on the context of FWD. For example, “In terms of how we work together in the context of FWD, I get help and support from my colleagues, if needed.” Items were rated on a 5-point frequency scale (1 = rarely or never; 5 = often or always). The subscales showed very good reliabilities ($\alpha_{T1} = .87$, $\alpha_{T1} = .86$, $\alpha_{T2} = .88$). The ICC(1) was 0.14, justifying aggregating team-member’s scores to the team level. Moreover, we measured FWD-specific social support with the three-item subscales *Experiential Knowledge Provided* (e.g., “I shared my feelings regarding my temporal and spatial flexibility”) and *Emotional Support Received* (e.g., “Other people listened carefully when I talked about managing my temporal and spatial flexibility”) of the Self-Help Support Group Social Exchange Scales (Brown et al., 2014), also adapted to focus on the context of FWD. Items were rated on a 5-point frequency scale (1 = rarely or never; 5 = often or always). The subscales showed very good reliabilities (Experiential Knowledge Provided: $\alpha_{T0} = .89$, $\alpha_{T1} = .90$, $\alpha_{T2} = .91$; Emotional Support Received: $\alpha_{T0} = .86$, $\alpha_{T1} = .89$, $\alpha_{T2} = .90$).

Psychological safety was assessed with the respective 7-item scale (Edmondson, 1999). For example, “Members of this team are able to bring up problems and tough issues.” This scale showed acceptable reliabilities at all time points ($\alpha_{T0} = .72$; $\alpha_{T1} = .74$; $\alpha_{T2} = .74$). The ICC(1) was 0.23, justifying aggregation to the team level.

Psychosocial management of FWD was assessed with a tailored 5-item scale, following the example of previous studies assessing psychosocial risk management (Abildgaard et al., 2020; von Thiele Schwarz et al., 2017). We measured generic changes in working conditions, the extent to which participants had experienced an increased focus on issues related to the area of FWD, their well-being in this context, as well as the extent to which they felt there had been changes in their ability as a team to manage such issues successfully. Items were “During the past two weeks, I have had an influence on implementing change in my team.”, “During the past two weeks the dialogue concerning collaboration in the context of FWD has improved.”, “During the past two weeks we have had good opportunity to improve work organization, well-being, recovery and work-life balance in the context of FWD in the team.”, “During the past two weeks my workplace has, all in all, become better.”, and “During the past two weeks we have had more focus on work organization, well-being, recovery and work-life balance in the context of FWD in the team.” This scale showed good reliabilities at all time points ($\alpha_{T0} = .83$; $\alpha_{T1} = .88$; $\alpha_{T2} = .89$). The ICC(1) was 0.13, which justifies aggregating this measure to the team level.

We assessed *individual self-regulation* with four subscales of the German version (Andreßen & Konradt, 2007) of the revised self-leadership questionnaire (Houghton & Neck, 2002), adapted to focus on goals in general. This scale showed good reliabilities at all time points ($\alpha_{T0} = .83$; $\alpha_{T1} = .85$; $\alpha_{T2} = .88$). We aggregated individual-level responses to a team-level average score, which is justified by an ICC(1) of 0.12.

Analysis Strategy

Since the data were collected from different work teams, multilevel analysis should be conducted, if suitable (Hox et al., 2010). To test hypotheses regarding coaching effectiveness, we conducted multilevel regression analyses with measurement occasions (Level 1) nested within participants (Level 2), who are nested in work teams (Level 3). The calculation of

intra-class correlation coefficients (ICC(1)) suggested that substantial amounts of variance could be attributed at the between-person level of analysis in all outcome variables (team regulation: 69.1%; FWD-specific social support: 56.1%, experiential knowledge provided: 38.2%; emotional support received: 41.9%; psychological safety: 68.8%; psychosocial management of FWD: 40.0%). Moreover, substantial percentages of outcome variance depended on belonging to a certain work team (team regulation: 23.8%; FWD-specific social support: 13.7%; experiential knowledge provided: 9.5%; emotional support received: 9.3%; psychological safety: 23.1%; psychosocial management of FWD: 12.8%) justifying the use of multilevel analyses. We performed analyses in R (R Core Team, 2023), using the R package lme4 (Bates et al., 2015).

To evaluate coaching effectiveness, we analyzed changes across intervention and control groups. Our linear mixed models included fixed effects of group, time, and their interaction effect, and a random effect of teams⁴. Time was dummy coded (pre vs. post, pre vs. follow-up; Lischetzke et al., 2015). Group was contrast coded (control group vs. both intervention groups, intervention group with vs. without immediate access to online training; Hox et al., 2010). Mean centering was not necessary because the multilevel model only contained dummy variables as independent variables (Ohly et al., 2010). To examine whether team regulation acted as the mechanism of change for outcome variables (Hypothesis 5), we conducted a mediation analysis with the intervention group without immediate access to the online training (IG2) and the control group (CG). We used bootstrap confidence intervals for indirect effects (Hayes, 2017) using the R package lavaan (Rosseel, 2012). In our bootstrap analysis, we specified 10,000 resamples and 95% confidence intervals with confidence

⁴ We also conducted all multilevel analyses with an additional random effect of participants as well. Model fit was best for models with a random effect of teams. However, results were similar for all models.

intervals including zero indicating a null effect. We included T0 values as covariates when predicting T1 values of mediators and T2 values of outcomes (i.e., ANCOVA model; Valente & MacKinnon, 2017) and used non-aggregated individual scores. The dataset generated and analyzed during this study is available in the OSF repository (BLINDED).

Results

Table 2 presents means, standard deviations, and intercorrelations for all study variables. Table 3 provides descriptive information for the intervention and control groups. Figure 2 shows mean scores of all groups.

Coaching Effectiveness

Hypothesis 1 proposed that coaching participants would report more team regulation compared to control group participants. The results showed a significant intervention effect at Time 1 (i.e., group IG vs CG X time Pre vs Post interaction), $b = 0.10$, $SE = 0.03$, $t = 4.06$, 95% CI [0.05; 0.15]. To answer the research question of whether aggregating individual self-regulation at the team level would yield similar results to analyses using the team-referent regulation scale, we examined whether coaching participants reported more aggregated individual self-regulation than the control group (i.e., group IG vs CG X time Pre vs Post interaction). The results showed no significant intervention effect at Time 1, $b = -0.02$, $SE = 0.02$, $t = -1.19$, 95% CI [-0.06; 0.02]. Hence, our coaching effectively improved team regulation and did not affect aggregated individual self-regulation.

Hypothesis 2 proposed that coaching participants would report more FWD-specific social support compared to control group participants. The results showed a significant intervention effect at Time 1 for the group IG vs CG X time Pre vs Post interaction for social support, $b = 0.08$, $SE = 0.03$, $t = 2.69$, 95% CI [0.02; 0.15], experiential knowledge provided, $b = 0.34$, $SE = 0.07$, $t = 5.00$, 95% CI [0.21; 0.47], and emotional support received, $b = 0.29$, $SE = 0.07$, $t = 4.33$, 95% CI [0.16; 0.42]. These results support Hypothesis 2.

Hypothesis 3 proposed that coaching participants would report higher psychological safety compared to control group participants. The results showed a significant intervention effect at Time 1 (group IG vs CG X time Pre vs Post interaction: $b = 0.05$, $SE = 0.02$, $t = 2.64$, 95% CI [0.01; 0.09]), supporting Hypothesis 3.

Hypothesis 4 proposed that coaching participants would report higher psychosocial management of FWD compared to control group participants. The results showed a significant intervention effect at Time 1 (group IG vs CG X time Pre vs Post interaction: $b = 0.49$, $SE = 0.04$, $t = 11.96$, 95% CI [0.41; 0.57]), supporting Hypothesis 4.

Mediation Analysis

Hypotheses 5 predicted the intervention to affect the outcome variables positively via increases in team regulation. Table 4 shows that the indirect effects of the intervention on FWD-specific social support, experiential knowledge provided, emotional support received, psychological safety, and psychosocial management of FWD via team regulation were significant, as the confidence intervals did not include zero. This supports Hypotheses 5. Increased team regulation fully mediated intervention effects on FWD-specific social support, emotional support received, and psychological safety, as direct effects on outcomes became insignificant when the mediator was included in the model. Increased team regulation partially mediated effects on experiential knowledge provided and psychosocial management of FWD (i.e., influenced outcomes independently of its effect on team regulation) because direct pathways remained significant with the mediator in the model.

Additional Analyses

To explore long-term effectiveness of the coaching, we analyzed the interaction effect of group and time for the intervention group without immediate access to the online training (IG2), with dummy coded time (pre vs. post, pre vs. follow-up) and group (control group vs. IG2). The effects at Time 2 were significant for team regulation ($b = 0.33$, $SE = 0.08$, $t = 4.12$,

95% CI [0.17; 0.48]), psychological safety ($b = 0.13$, $SE = 0.06$, $t = 2.24$, 95% CI [0.02; 0.25]), and psychosocial management of FWD ($b = 0.36$, $SE = 0.11$, $t = 3.24$, 95% CI [0.15; 0.58]). Results were not significant for FWD-specific social support ($b = 0.08$, $SE = 0.10$, $t = 0.84$, 95% CI [-0.11; 0.27]), experiential knowledge provided ($b = 0.23$, $SE = 0.13$, $t = 1.69$, 95% CI [-0.04; 0.49]), and emotional support received ($b = 0.06$, $SE = 0.14$, $t = 0.44$, 95% CI [-0.21; 0.33]). Thus, the effects on team regulation, psychological safety, and psychosocial management of FWD sustained over 9 weeks compared to a control group.

Discussion

As FWD such as flextime, teleworking, and remote working increase, working in hybrid work teams seems to be the new normal. As a result, work teams need to adapt to these changing demands to continue to attain their team collaboration goals. The aim of this study was to examine the effectiveness of a team coaching in promoting team regulation, defined as the ability to steer team-level actions to attain collective team goals. We expected that coaching team regulation strategies would enhance FWD-specific social support and psychological safety, and improve team collaboration. Multilevel analyses supported the effectiveness of the coaching approach in promoting team regulation and improving FWD-specific social support, psychological safety, and psychosocial management of FWD. Team regulation mediated coaching effects.

This study contributes to the literature in three ways. First, this study contributes to research on team regulation by showing that individual self-regulation processes models (Bandura, 1977, 1991; Kanfer, 1977; Kanfer & Karoly, 1972; Zimmerman, 2000) can be adapted to the team-level. In the coaching, hybrid work teams learnt about and practiced team regulation strategies based on the self-regulation process (i.e., team-goal setting, team-monitoring, team-evaluating, and team-rewarding). The results revealed that this coaching improved team regulation compared to a control group immediately after coaching ended and

9 weeks later. Thereby, we tested and added evidence to the proposition that self-regulation processes are functionally similar to team regulation processes (Chen & Kanfer, 2006). By emphasizing the focus on team regulation, we extend research on action regulation traditionally focused on individual self-regulation (Zacher & Frese, 2018). Further, our results indicated that aggregated team regulation (i.e., a consensus across teams about the extent to which they perceive that they regulate their team actions) changed significantly after coaching participation, whereas aggregated self-regulation (i.e., an average indicating whether some people self-regulate a lot and other do not) did not. This adds to research showing that team regulation is conceptually different from aggregated self-regulation at the team-level (Van Hooft & Van Mierlo, 2018). That is, with regard to regulatory processes, team processes do not equal the sum of individual processes.

Second, we extend research on team coaching by providing evidence that self-regulation models (Bandura, 1977, 1991; Kanfer, 1977; Zacher & Frese, 2018; Zimmerman, 2000) adapted to the team level can serve as a theoretical framework for designing effective team coaching. Our findings showed that team regulation is malleable, and that team coaching could strengthen a team's ability to regulate its actions to achieve its team goals. This finding highlights that when developing theory-based team coaching, it is useful to have a strong theory or reasonable evidence that strengthening a particular resource can have considerable effects (Briner & Walshe, 2015), and in addition, theory can be used as a rationale for the coaching process itself. In particular, it was effective to build the coaching process around strategies based on self-regulation models adapted to the team level: team-goal setting, team-monitoring, team-evaluating, and team-rewarding. This approach may be useful for developing coaching concepts beyond the context of FWD.

Third, we extend research on team regulation, which has predominantly focused on performance-related outcomes (Gevers et al., 2009; Gurtner et al., 2007; Konradt et al., 2009;

Schlaegel et al., 2023), by showing that team regulation coaching fosters FWD-specific social support and psychological safety, and improves collaboration in hybrid teams. The results showed that team regulation coaching effectively improved FWD-specific social support. Specifically, in terms of coping with FWD challenges, participants perceived their colleagues and supervisors as more supportive, and they reported sharing more experiences and experiencing more emotional support. These findings are also in line with social identity theory, proposing that a sense of shared identity through belonging to a work team can increase social support (Haslam et al., 2019; Nielsen, 2013). This is particularly important as social support is a critical job resource (Hobfoll et al., 2018; ten Brummelhuis & Bakker, 2012), particularly when team members see each other less face-to-face (Bentley et al., 2016). Moreover, results showed that the coaching increased perceptions of psychological safety. This is consistent with psychological safety research, which suggests that clear communication of mutual expectations and shared collaboration goals promote perceptions of safety (Frazier et al., 2017), which teams experienced during team coaching. Furthermore, research suggests a supportive work context to influence psychological safety (Frazier et al., 2017; Newman et al., 2017), thus these processes may be mutually reinforcing. Finally, coaching also improved collaboration of team members. Specifically, psychosocial management of FWD, describing that team members were more aware of and more capable to change the psychosocial working environment within the team regarding FWD, improved. This includes, for example, their working practices and procedures in the FWD context (e.g., time slots for availability, structure of hybrid meetings), which affect team members' work organization, well-being, recovery, and work-life balance. The effects on team regulation, psychological safety, and psychosocial management of FWD sustained over 9 weeks. Hence, the coaching appeared to initiate team processes that maintained or unfolded over time. However, effects on FWD-specific social support did not sustain. A possible explanation is

that FWD-specific social support is more strongly influenced in the long term by other variables such as FWD-related work climate.

Coaching participation improved FWD-specific social support, psychological safety, and psychosocial management of FWD. As effects of coaching participation were mediated by increases in team regulation, this indicates that enhanced team regulation elicited coaching effects. That is, implementing team regulation strategies (e.g., discussing expectations of collaboration in the context of FWD, deciding which work practices to improve, setting a goal for doing so, working toward this common goal by tracking and reviewing progress, rewarding each other for achieving the goal) improved FWD-specific social support, psychological safety, and psychosocial management of FWD. This highlights the relevance of team regulation for hybrid work teams. These findings are also consistent with COR theory, which proposes that people must invest resources to gain resources, or to protect against or recover from resource loss. Moreover, these results provide an empirical test of the upward spiral proposition of COR theory, which predicts a spiraling nature of resource loss and resource gain, as they show that enhancing team regulation as a resource can foster the building of more resources within a team, such as FWD-specific social support and psychological safety, and improve psychosocial management. In addition, this study had several methodological strengths, such as the cluster-randomized controlled trial design with a sample of hybrid work teams of different sizes and a longer-term follow-up questionnaire. This provides robust evidence for our research questions and responds to calls for more randomized controlled trials of work-specific interventions (Michel et al., 2015; O'Shea et al., 2016).

Limitations and Implications for Future Research

There are several limitations to this study. We measured numerous team resources and teamwork outcomes, namely different aspects of FWD-specific social support,

psychological safety, and psychosocial management, and given our interest subjective perceptions of team members, self-reports were in general reasonable (Spector, 2006). Thus, we did not measure aspects of team effectiveness and did not include objective measures. Future research could extend our research by investigating whether enhancing team regulation can improve performance-related team outcomes such as meeting deadlines and coordinating actions, team members' self-rated performance and motivation, or peer-rated performance evaluations (Gevers et al., 2009; Konradt et al., 2009; Schlaegel et al., 2023). We would expect high levels of shared understanding of collective team goals to improve team performance because, for example, teams are more likely to meet deadlines when they have high levels of early shared understanding of the temporal aspects of their collective tasks, such as the timing of task activities (Gevers et al., 2009).

This study was conducted with a focus on FWD, that is, teams were asked to set their goals in this context, and all questionnaires referred to this context. Moreover, a substantial proportion of over a third of the work teams in our sample worked in the public sector and almost all participants were knowledge workers. Future research should attempt to replicate our findings in different contexts (i.e., not related to FWD) and with different types of work teams (e.g., production or management teams). For instance, it would be interesting to test whether regulation processes and coaching outcomes account for team resources in similar ways in contexts other than FWD.

This study compared the team coaching with a waitlist control group. To examine whether alternative coaching programs are similarly or more effective, and whether participation expectations served as a demand characteristic that evoked hypothesis-conforming behavior (Nichols & Maner, 2008), future research could add another control group receiving an alternative or placebo team coaching (O'Shea et al., 2016). Our measure of team regulation is newly developed. Although it is carefully based on individual-level

measures of self-regulatory behavior and internal consistency was very good, future research could further investigate and validate measures of team regulation. Furthermore, to shed more light on how teams implemented team regulation strategies, future research could systematically assess both quantitative and qualitative process measures, for example using the Integrative Process Evaluation Framework (IPEF), which provides guidance on what data to collect, when, and how (Nielsen et al., 2022).

Practical Implications

Hybrid work teams, in which some members have FWD, face specific challenges, such as dealing with social isolation, ways of conducting hybrid or virtual meetings, coordinating each other's availability, and other novel collaborative processes. In this study, we showed that team coaching can teach regulatory strategies, namely team-goal setting, team-monitoring, team-evaluating, and team-rewarding. Hence, this study can provide guidelines on how to increase team regulation. We recommend that coaching programs for work teams teach such team regulation strategies, as they can help teams set a goal for improving collaborative work practices, work toward this common goal by tracking and reviewing progress, and appreciate the team's success when the goal is achieved. This can improve FWD-specific social support and psychological safety, and improve their perceptions of how they manage their collaboration in the context of FWD. Therefore, occupational health managers or supervisors can offer such team regulation coachings to support hybrid work teams. This also addresses the risk of social isolation; when people work in different locations they have less social interactions and perceive less social support, and thus, social isolation is one of the greatest disadvantages employees perceive in remote work (Mann et al., 2000).

Conclusion

In this study, we show that a team regulation coaching for hybrid teams is effective: In a cluster-randomized controlled trial, multilevel analyses showed that participation in team regulation coaching enhanced team regulation, which improved FWD-specific social support, psychological safety, and collaboration in hybrid work teams. The share of hybrid teams in which team members collaborate both virtually and face-to-face is expected to remain at a high level in the future. Thus, team regulation coaching can be a helpful tool to support teams in achieving their common goals in the context of FWD challenges. The findings of this study contribute to the understanding of regulatory processes of teams and highlight the practical importance of enhancing team regulation.

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Figure 1

CONSORT Flow Diagram

CONSORT Flow Diagram

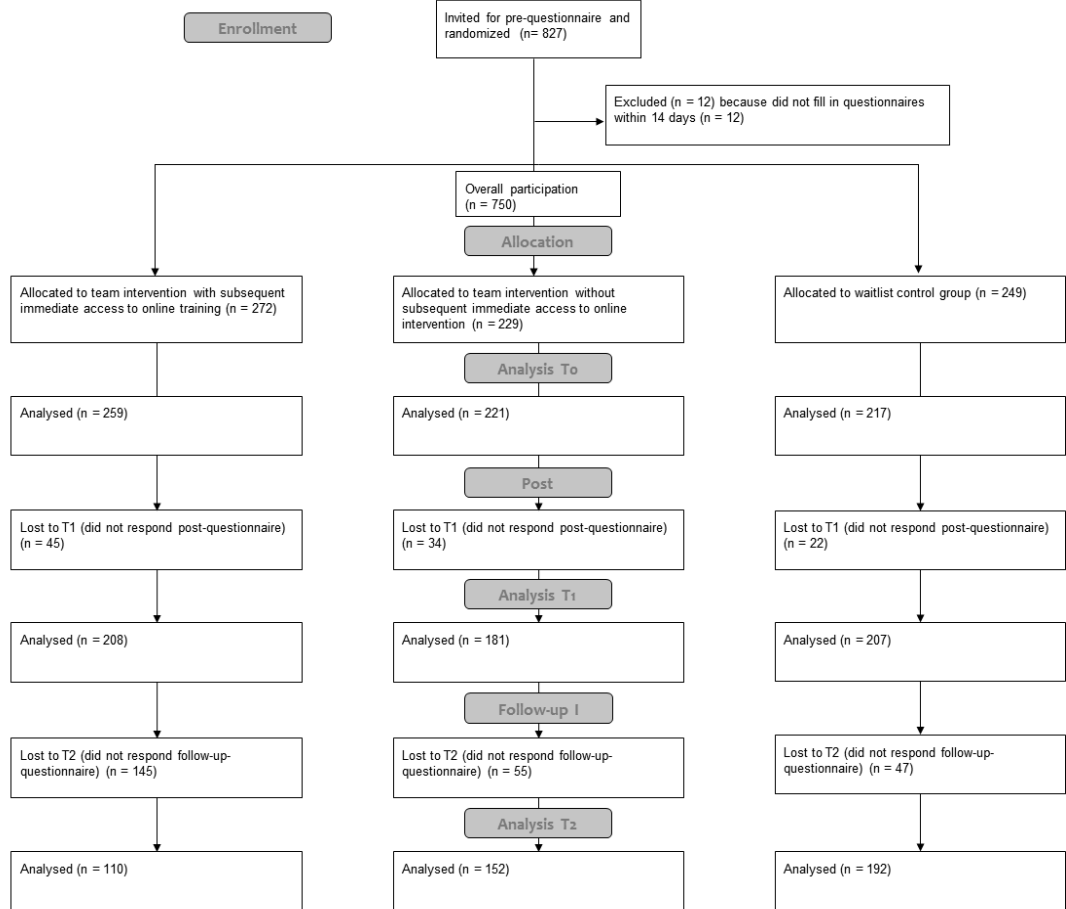


Figure 2

Means of Outcome Variables for Intervention Group (IG1 and IG2) and Control Group (CG) Before (T0) and After Training Completion (T1) and at 9-Week Follow-Up (T2)

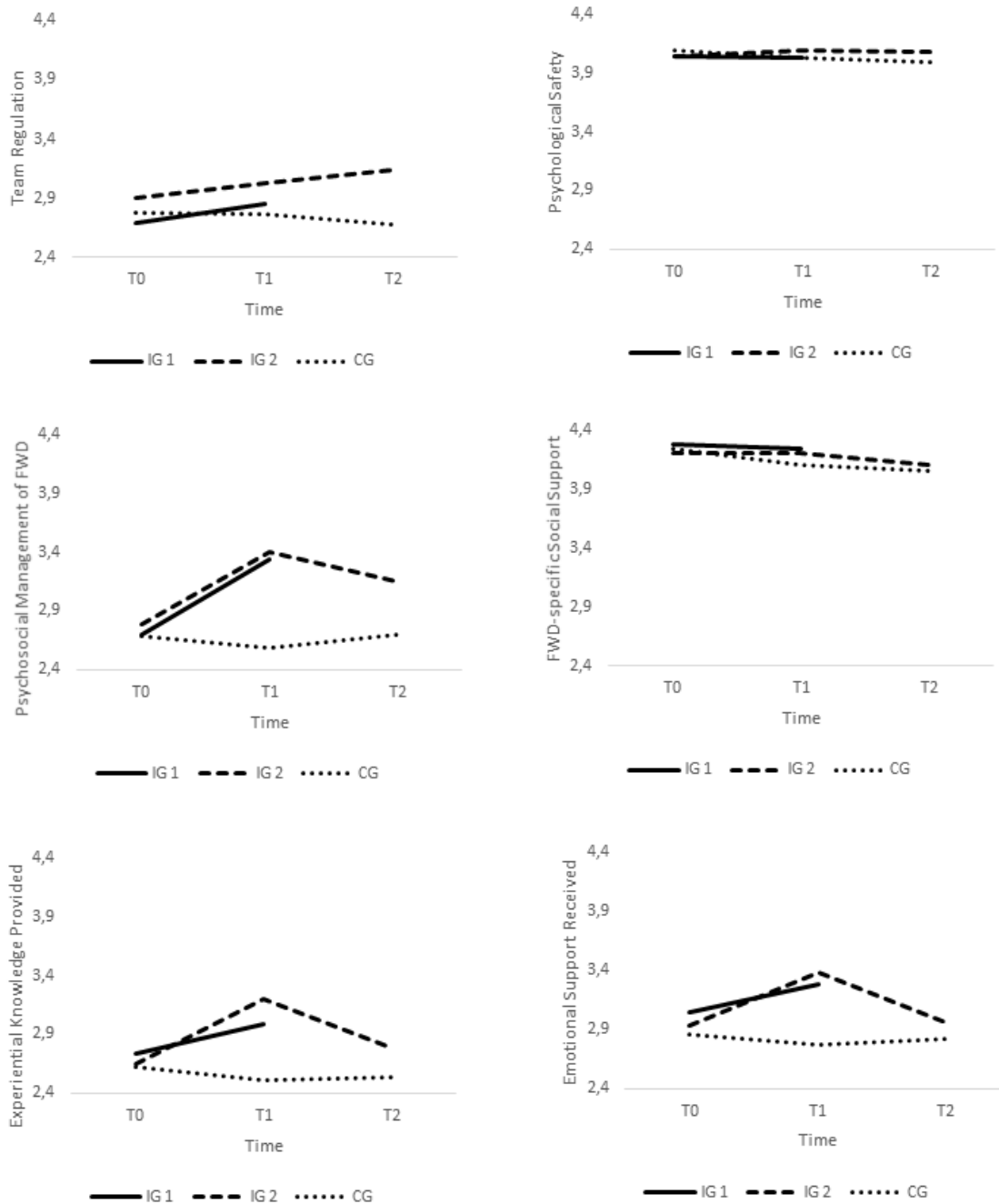


Table 1*Team Coaching Overview*

Session	Coaching Elements
Session 1 (4 hours)	<ul style="list-style-type: none"> • Small group sharing to listen to each other's individual positive experiences and challenges with FWD (as a starting point for identifying team issues) • Introduction to the concept and process of self- and team regulation (Bandura, 1991; Kanfer & Karoly, 1972; Zimmerman, 2000) • Collecting positive aspects and challenges regarding teamwork in the FWD context • Applying the self-regulation process at the team level: <i>team-goal setting</i> <ul style="list-style-type: none"> ○ Identifying a key challenge (realistic to work on until the booster session and noticeable, i.e., behavior is demonstrated several times during that time) ○ Setting a Specific, Measurable, Achievable, Relevant, Time-bound (SMART) (Doran, 1981) collective goal how to change collaborative working practices during the next two weeks (until the booster session) ○ Reflecting the team's motivation and potential obstacles using mental contrasting with implementation intentions (Gollwitzer & Oettingen, 2013) to strengthen goal striving • Applying the self-regulation process at the team level: <i>team-monitoring, team-evaluating, and team-rewarding</i> <ul style="list-style-type: none"> ○ In three small groups, team members discuss how they can monitor (reflect team behavior, remind themselves of their goal), evaluate (review progress), and reward (celebrate small steps, motivate and support each other) themselves, and present their ideas to each other
Session 2 (1,5 hours)	<ul style="list-style-type: none"> • Adapted version of the 54321 exercise (Dolan, 1991) to focus on the session • Reviewing the team goal team members set for themselves • Reflecting and evaluating progress toward the team goal since Session 1 • Team-rewarding for success (whether the goal is achieved or first steps are taken) with mutual congratulations • Collecting additional actions to attain the goal, reflecting anticipated and actual obstacles • Reviewing measures for team-monitoring, team-evaluating, and team-rewarding teams set for themselves • In small groups, reflecting and evaluating the implementation of the team regulation process (what was successful and helpful, what do we want to improve next time) and summarizing the results • Focus on team-rewarding (why is it relevant, how can we as a team remind each other to reward ourselves) • Reviewing challenges in the context of FWD at the team level and identify the next challenge the team wants to address

Table 2*Means, Standard Deviations, and Correlations Over Both Groups*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. TR.t0	2.77	0.70																				
2. SR.t0	3.25	0.64	.40**																			
3. SS.t0	4.21	0.74	.20**	.14**																		
4. EKP.t0	2.67	1.05	.24**	.19**	.12**																	
5. ESR.t0	2.94	1.05	.26**	.17**	.25**	.72**																
6. PS.t0	4.02	0.62	.28**	.14**	.49**	.08*	.20**															
7. PSM.t0	2.71	0.86	.38**	.14**	.26**	.36**	.37**	.17**														
8. TR.t1	2.84	0.72	.68**	.37**	.16**	.25**	.27**	.22**	.34**													
9. SR.t1	3.20	0.65	.37**	.71**	.05	.20**	.14**	.10*	.16**	.43**												
10. SS.t1	4.16	0.69	.16**	.18**	.59**	.14**	.22**	.41**	.24**	.25**	.16**											
11. EKP.t1	2.90	1.05	.23**	.15**	.16**	.36**	.29**	.09*	.29**	.31**	.18**	.21**										
12. ESR.t1	3.16	1.06	.22**	.19**	.26**	.35**	.40**	.18**	.32**	.32**	.24**	.34**	.73**									
13. PS.t1	4.01	0.63	.19**	.14**	.37**	.10**	.18**	.68**	.12**	.22**	.10*	.48**	.14**	.24**								
14. PSM.t1	3.06	0.94	.25**	.23**	.23**	.20**	.22**	.19**	.37**	.39**	.25**	.33**	.49**	.53**	.25**							
15. TR.t2	2.85	0.76	.65**	.33**	.19**	.24**	.27**	.24**	.42**	.73**	.35**	.27**	.35**	.39**	.24**	.46**						
16. SR.t2	3.19	0.69	.36**	.71**	.10*	.19**	.14**	.08	.20**	.47**	.77**	.21**	.22**	.26**	.06	.32**	.45**					
17. SS.t2	4.08	0.76	.22**	.14**	.51**	.17**	.21**	.39**	.29**	.27**	.16**	.59**	.22**	.30**	.37**	.32**	.33**	.26**				
18. EKP.t2	2.65	1.05	.22**	.20**	.13**	.40**	.33**	.08	.32**	.26**	.18**	.13**	.42**	.35**	.03	.30**	.35**	.25**	.21**			
19. ESR.t2	2.88	1.06	.30**	.22**	.24**	.35**	.38**	.19**	.38**	.35**	.20**	.27**	.37**	.51**	.17**	.35**	.43**	.26**	.32**	.77**		
20. PS.t2	3.99	0.64	.26**	.09*	.38**	.10*	.24**	.68**	.21**	.31**	.06	.41**	.16**	.29**	.71**	.25**	.32**	.12**	.46**	.11*	.26**	
21. SS.t2	2.86	0.94	.31**	.20**	.14**	.27**	.30**	.13**	.44**	.44**	.24**	.23**	.37**	.40**	.18**	.55**	.55**	.34**	.35**	.43**	.45**	.28**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$. t0 = Pre, t1 = Post, t2 = Follow-up, TR = Team Regulation, SR = Self-Regulation, SS = Social Support, EKP = Experiential Knowledge Provided, ESR = Emotional Support Received, PS = Psychological Safety, PSM = Psychosocial Management of FWD. $N = 750$.

Table 3

Means and Standard Deviations for the Outcome Variables at Time 0 (Pre-Questionnaire), Time 1 (Post-Questionnaire), and Time 2 (9-Week Follow-Up)

Variable			TR	SR	SS	EKP	ESR	PS	PSM
T0 (n = 697)	IG1	<i>M</i>	2.70	3.22	4.26	2.73	3.04	4.01	2.69
		<i>SD</i>	0.69	0.64	0.78	1.06	1.05	0.64	0.86
	IG2	<i>M</i>	2.87	3.30	4.14	2.66	2.93	4.02	2.74
		<i>SD</i>	0.70	0.62	0.73	1.03	1.01	0.63	0.87
	CG	<i>M</i>	2.74	3.23	4.23	2.60	2.84	4.04	2.69
		<i>SD</i>	0.69	0.64	0.70	1.05	1.09	0.60	0.86
T1 (n = 596)	IG1	<i>M</i>	2.83	3.16	4.23	2.99	3.31	4.00	3.32
		<i>SD</i>	0.70	0.64	0.68	1.03	1.05	0.62	0.87
	IG2	<i>M</i>	3.00	3.25	4.17	3.20	3.38	4.04	3.34
		<i>SD</i>	0.73	0.69	0.64	0.95	0.86	0.63	0.85
	CG	<i>M</i>	2.71	3.19	4.09	2.54	2.81	4.00	2.57
		<i>SD</i>	0.70	0.62	0.74	1.05	1.14	0.65	0.88
T2 (n = 454)	IG2	<i>M</i>	3.08	3.30	4.11	2.88	3.04	4.03	3.14
		<i>SD</i>	0.73	0.69	0.72	1.01	1.07	0.63	0.94
	CG	<i>M</i>	2.65	3.10	4.07	2.54	2.82	3.97	2.60
		<i>SD</i>	0.71	0.66	0.77	1.00	1.01	0.63	0.91

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. TR = Team Regulation, SR = Self-Regulation, SS = Social Support, EKP = Experiential Knowledge Provided, ESR = Emotional Support Received, PS = Psychological Safety, PSM = Psychosocial Management of FWD.

Table 4*Regression Table for the Mediation Analysis*

Outcome Variables	<i>b</i>	<i>c</i>	<i>c'</i>	<i>ab</i>	95% CI	
					Lower	Upper
Social Support	0.19 (0.05)***	0.04 (0.07)	0.01 (0.08)	0.028 (0.02)**	0.02	0.08
Experiential Knowledge Provided	-0.08 (0.08)**	0.13 (0.10)*	0.11 (0.10)*	0.027 (0.02)*	0.02	0.10
Emotional Support Received	0.18 (0.08)***	0.08 (0.11)	0.03 (0.11)	0.044 (0.03)**	0.04	0.15
Psychological Safety	0.30 (0.04)*	0.03 (0.05)	0.01(0.05)	0.018 (0.01)*	0.00	0.05
Psychosocial Management of FWD	0.24 (0.08)***	0.29 (0.09)***	0.25 (0.09)***	0.036 (0.02)**	0.03	0.12

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$. The effect of the coaching on team regulation (*a* path) was $b = 0.15$, $SE = 0.05$, $p < .001$. All coefficients reported for paths *b* (unique effect of team regulation), *c* (total direct effect), *c'* (direct effect), and *ab* (indirect effect) are standardized slopes with the corresponding standard error of the slope in parentheses. Bias-corrected CIs of each indirect effect are based on 10,000 resamples. Zero is not included in the reported confidence intervals if the lower and upper bound of the confidence interval have the same sign. In these reported confidence intervals, numbers not equal to zero would appear if more decimal places were reported.