

**LIFE INTERRUPTED, BUT PERFORMANCE IMPROVED:
RETHINKING THE INFLUENCE OF TECHNOLOGY-MEDIATED
INTERRUPTIONS AT WORK AND PERSONAL LIFE**

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ARTICLE INFO	ABSTRACT
Article history:	Purpose: This paper aims to analyze the effects of the technology-mediated interruptions on the conflicts and the performance of individuals during their work and non-work time.
Received 06 September 2021	Theoretical framework: This work is based on the Conservation of Resources Theory, focusing on conflict and quality of life in the digital age.
Accepted 22 November 2021	Design/methodology/approach: To evaluate the influence of technology interruptions on conflicts and performance, we applied a survey to management and accounting professionals and obtained 399 valid questionnaires. We analyzed the data through Partial Least Squares structural equation modeling (PLS-SEM).
Keywords: Conservation of Resources Theory, Mobile Technology, Interruptions, Conflicts, Individual Performance.	Findings: The data analysis demonstrates that interruptions – as expected – contribute to increasing conflicts both at work and at non-work. However, contrary to previous research, interruptions can also increase performance in both instances.
	Research, Practical & Social implications: The proposed approach has a practical value for teachers and students of human-computer interaction and IT practitioners in any other professional environment where the technology represents a channel between personal and professional life.
	Originality/value: This research measured and analyzed the effects of technology-mediated interruptions on conflict and individual performance in Brazil. The results showed that technology-mediated interruptions are related to the quality of life and leisure time, showing that conflicts due to technology are not a buzzword. Also, research findings present a new research path as interruptions that positively influence the individual's performance are not fully understood.
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VIDA INTERROMPIDA, MAS DESEMPENHO MELHORADO: REPENSANDO A INFLUÊNCIA DAS INTERRUPTÕES MEDIADAS PELA TECNOLOGIA NO TRABALHO E NA VIDA PESSOAL

Objetivo: Este artigo tem por objetivo analisar os efeitos das interrupções mediadas pela tecnologia nos conflitos e no desempenho dos indivíduos durante o seu trabalho e o tempo em que não trabalham

Método: Para avaliar a influência das interrupções tecnológicas nos conflitos e no desempenho, aplicou-se uma survey aos profissionais de gestão e contabilidade e obtivemos 399 questionários válidos. Analisou-se os dados através da modelação da equação estrutural *Partial Least Squares* (PLS-SEM).

Originalidade/Relevância: Esta investigação mediu e analisou os efeitos das interrupções mediadas pela tecnologia no conflito e no desempenho individual no Brasil. Os resultados mostraram que as interrupções mediadas pela tecnologia estão relacionadas com a qualidade de vida e o tempo de lazer, mostrando que os conflitos devidos à tecnologia não são predominantes. Além disso, os resultados da investigação apresentam um novo caminho de investigação, uma vez que as interrupções que influenciam positivamente o desempenho do indivíduo não são totalmente compreendidas.

Resultados: A análise dos dados demonstra que as interrupções - como esperado - contribuem para aumentar os conflitos, tanto no trabalho como no não-trabalho. No entanto, ao contrário de investigações anteriores, as interrupções também podem aumentar o desempenho em ambas as instâncias.

Contribuições teóricas/metodológicas: A abordagem proposta tem um valor prático para professores e estudantes de interação homem-computador e profissionais de TI em qualquer outro ambiente profissional onde a tecnologia representa um canal entre a vida pessoal e profissional.

Palavras-chave: Teoria da Conservação de Recursos, Tecnologia Móvel, Interrupções, Conflitos, Desempenho Individual.

VIDA INTERRUMPIDA, PERO RENDIMIENTO MEJORADO: REPENSAR LA INFLUENCIA DE LAS INTERRUPTIONES MEDIADAS POR LA TECNOLOGÍA EN EL TRABAJO Y LA VIDA PERSONAL

Objetivo: Este artículo tiene como objetivo analizar los efectos de las interrupciones mediadas por la tecnología en los conflictos y el desempeño de las personas durante su trabajo y el tiempo que no están trabajando.

Método: Para evaluar la influencia de las interrupciones tecnológicas en los conflictos y el desempeño, se aplicó una encuesta a profesionales de la administración y la contabilidad y se obtuvieron 399 cuestionarios válidos. Los datos se analizaron modelando la ecuación estructural de mínimos cuadrados parciales (PLS-SEM).

Originalidad / Relevancia (obligatorio): Esta investigación midió y analizó los efectos de las interrupciones mediadas por la tecnología sobre los conflictos y el desempeño individual en Brasil. Los resultados mostraron que las interrupciones mediadas por la tecnología están relacionadas con la calidad de vida y el tiempo libre, mostrando que los conflictos por tecnología no son predominantes. Además, los resultados de la investigación presentan un nuevo camino de investigación, ya que no se comprenden del todo las interrupciones que influyen positivamente en el desempeño del individuo.

Resultados: El análisis de datos demuestra que las interrupciones, como se esperaba, contribuyen a aumentar los conflictos, tanto en el trabajo como fuera del trabajo. Sin embargo, a diferencia de las investigaciones anteriores, las interrupciones también pueden aumentar el rendimiento en ambos casos.

Contribuciones teóricas / metodológicas: El enfoque propuesto tiene un valor práctico para profesores y estudiantes de interacción humano-computadora y profesionales de TI en cualquier otro entorno profesional donde la tecnología representa un canal entre la vida personal y profesional.

Palabras clave: teoría de la conservación de recursos, tecnología móvil, interrupciones, conflictos, desempeño individual.

1. INTRODUCTION

The evolution of information technology has brought profound changes in individuals' lives, either in the workplace or in their private domain (Johnson, 2019; Pielot et al., 2018). On the one hand, new technologies can offer advantages to employees and organizations regarding cost reduction and greater flexibility in implementing professional activities. On the other hand, they can insulate stress, exhaustion, and intentions to change (Tams *et al.*, 2018; Mayer *et al.*, 2018; Salo *et al.*, 2019). The adverse effects occur when employees use information technology for work-related tasks more frequently during their spare time and vice versa. These interferences — known as technology-mediated interruptions (TMI) —, can occur in both directions: home-to-work and work-to-home. This situation can cause nocive results in these two domains of life, such as dissatisfaction at work, stress, burnout, among others (Kossek and Lautsch, 2012; Wright *et al.*, 2014; Kossek, 2016; Chen and Karahanna, 2018; Bardhan, Chen and Karahanna, 2020). On the other hand, the capacity to execute several tasks with these devices may improve individuals' cognitive performance quality (Levy *et al.*, 2016).

Interruptions refer to any distraction that shifts individuals' attention away from a current task and requires conscious effort to return to the primary task (Galluch *et al.*, 2015). In that regard, Addas and Pinsonneault (2015) point out that despite the growing importance of information technology (IT) interruptions for individual work, there is scant knowledge about their nature and its consequences.

Among the key technologies that have profoundly changed how we communicate and fulfill our personal and professional tasks, the Mobile Information Technologies (MIT) have also blurred the boundaries between work and personal life. Although mobile devices are known to be convenient and efficient, they may also bring unexpected consequences insofar its externally generated interruptions may cause conflicts in both directions, from work to personal life and vice-versa (Butts *et al.*, 2015; Olson-Buchanan *et al.*, 2016).

According to Addas and Pinsonneault (2018), work interruptions are temporary suspensions of an individual's primary task activities to process

information delivered by different domains than when the task is being executed. Specifically, about MIT's originated interruptions, they may occur in different forms. For example, face-to-face (F2F), telephone, and Information and Communication Technologies (ICT). With the rise of MIT, communication by e-mail, texting, instant messaging, video conferencing, and social media became more intense and ubiquitous. In that regard, this research focuses on the effects of these technologies-mediated interruptions on work-life conflict and individual performance in both domains.

Extant research on interruptions has primarily focused on the effects of work-related interruptions in the work domain and mostly ignored their impact beyond the workplace (Chen and Karahanna, 2014). In this respect, this research can improve the understanding of this phenomenon, bringing theoretical and practical knowledge about the influence of interruptions in work performance and quality of life.

This research was conducted in Brazil, where the mobile devices market is fully expanding (Freitas Junior *et al.*, 2015). Researchers like Addas and Pinsonneault (2015), Galluch *et al.* (2015), and Chen and Karahanna (2018) remark on the growth potential of this market throughout the world. However, it also warns that the interruptions generated by these devices in daily life have consequences that need to be more fully understood.

In this regard, technology-mediated interruptions may influence different aspects of personal and professional life. In both situations, such interruptions affect the individual's concentration on the current task and may result in performance degradation (Srivastava *et al.*, 2015; Kossek, 2016; Tams *et al.*, 2018; Addas and Pinsonneault, 2018). For instance, when outside the work domain, a work message may interrupt the individual's leisure time with family and friends and bring consequences for the family's well-being (Levy *et al.*, 2016). Conversely, family or friends' messages at work may result in concerns about private life's aspects, loss of concentration, and ultimately, organizational performance (Salo *et al.*, 2019; Tams *et al.*, 2018). Hemp (2009) remarks that the time spent handling unnecessary e-mails and recovering from interruptions translates into a high annual cost for organizations.

Therefore, this research aims to analyze and compare the effects of technology-mediated interruptions on Brazilian professionals during their work

and non-work time on potential conflicts and an individual's performance. We analyzed the responses of 399 professionals in Brazil in accounting and business management through partial least squares structural equation modeling (PLS-SEM) and the path comparison method proposed by Cohen *et al.* (2003).

The data analysis demonstrates that interruptions – as expected – contribute to increasing conflicts both at work and at non-work. However, contrary to previous research, interruptions can also increase performance in both instances.

Next, this study starts with the literature review, followed by the research model and hypotheses development to define constructs and develop the research model. Subsequently, the method, analysis and discussion of the results, and final considerations are presented.

2. RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

Our study is based on the Conservation of Resources Theory (COR) tenets, which describes that stress is triggered in three situations: (i) when occurs resources losses, (ii) when resources are threatened, or (iii) when individuals invest resources without occurring subsequent gains (Krohne, 2002). The stress-recovery area research indicates that merely dealing with the cause of a stressful event is not effective for the individual to be prepared for the next time it occurs. To learn how to deal with the event, individuals must adopt a proactive stance to cope with stressors that even have been detected (Rogelberg, 2007). The Conservation of Resources Theory (Hobfoll, 1989) emerged as a new strand of studies about stress during the '80s (Dudek et al., 2007) and has the focus on the maintenance of resources in the face of stressors factors (Scheier and Carver, 1992; Schwarzer and Leppin, 1991). Under this aspect, the perception of the benefit that the individual has about the effect of interaction with a particular artifact can minimize or even revert possible stressors effects arising from its use (Leung, 2013).

The perceived benefit consists of the awareness that certain positive consequences are caused by a specific action (Leung, 2013). In this regard, the perceived benefit has an inverse relationship with the perceived risk (Alhakami and Slovic, 1994). Therefore, the perception that something can decrease the

chances of resource losses is interpreted by individuals as a perceived benefit (Lee et al., 2014), reducing or even neutralizing the effects of stressors (Dudek et al., 2007; Hobfoll, 1989).

The present study focused on the intersection between mobile technologies and the human-computer interface among several potential stressors. Mainly because of the ubiquitous connectivity allowed by mobile applications, the levels of intrusiveness and pervasiveness in our lives has grown like never seen before, changing our routines and the way we fulfill our tasks (Kim and Seo, 2016; Qin et al., 2018; Keith et al., 2016; Qin et al., 2016).

In this regard, Mobile Information Technologies' literature presents studies in different organizational contexts. These wired and wireless technologies include smartphones, tablets, laptops, ultra-books, and the various types of wireless networks, GPS (Global Positioning Systems), and other devices that can be easily carried, enabling persistent individual connection (Klein et al., 2015).

The mobile phone, and more specifically, smartphones, are the main ones responsible for this modern phenomenon as it consists of a hybrid device that allows individuals to solve computing-dependent tasks in almost every geographical location (Pielot et al., 2018; Carter et al., 2016). Formerly capable of handling one single function, now, mobile phones can support several functions like computing, digital photography, video, word processing, GPS, and others. Moreover, the wireless digital networks and multi-networks, such as Bluetooth and infrared, for short-distance connections with other devices are expanding our productivity drastically and our hedonic device use (Lemos, 2007; Brooks, 2015; Li et al., 2013).

The consequences of the evolution of these technologies include the transformation in the way people execute their functions in organizations and teams and the reduction of the temporal and physical distance between work and home (Freeman et al., 2017; Stanciu, 2017). According to Belfort and Martens (2014, p.33), "Internet access, the virtualization of processes and work activities, and the mobility of organizations, teams, and individuals arising from the use of Mobile Information Technologies have contributed to these changes in work." Insofar individuals are ubiquitously connected, the work and non-work frontiers are becoming blurred, increasing task interruptions and conflicts (Tams et al., 2018; Addas and Pinsonneault, 2018, 2015; Freitas Junior et al., 2015). Although

most of the effects of the interruptions are associated with adverse outcomes, the portable device's flexibility stands out as their benefits as technology-mediated interruptions also encourage individuals to engage themselves in the fulfillment of work and non-work tasks (Chen and Karahanna, 2018). Concerning the adverse effects, these technologies may lead to psychological conflicts (Olson-Buchanan et al., 2016), resulting in information and communication overload (Harris et al., 2015) and contributing to increasing an individual's stress (Galluch et al., 2015).

2.1 Conflict and quality of life in the digital age

Jehn and Mannix (2001) define conflict as the stakeholder awareness of the discrepancies or irreconcilable desires about a specific situation. The term is also defined as a process that begins when one party perceives that the other is about to be negatively affected by a particular action or event, for instance, a message, or something that the receiving party will not handle properly (de Jong *et al.*, 2008; Kossek, 2016; Tams *et al.*, 2018).

Strictly speaking, a conflict occurs when expectations received through the other life domain are incompatible. When individuals perceive an incongruence between the demand requirements and the received messages, they experience the inter sender role conflict (Galluch *et al.*, 2015).

The rise in connectivity has increased conflicts deriving from interruptions at home originating from work or at work from home. This combination may increase the conflicts in both domains, reducing the capacity to closure their tasks and finally leading to performance losses (Wright *et al.*, 2014; Addas and Pinsonneault, 2018, 2015).

More specifically, about the personal life domain, França (1996) explains that the concept of life quality has its origin in psychosomatic medicine. The workplace studies had their origins in the 18th century, approximately in the same period of the first Industrial Revolution. The primary objective of this research area is to describe real situations and provide a further understanding of the human relationships throughout life's domains to understand the factors that lead to achieving greater harmony and balance between work and personal life.

Nowadays, life quality and time management concerns have increased, trespassing work-home boundaries (Kossek, 2016; Kossek and Lautsch, 2012). Kossek and Lautsch (2012) mentioned that the borders between work and family life are narrowing drastically. In this regard, professionals are allocating more work time during their leisure moments. One of the main responsible for this current landscape is mobile technology, more precisely by the interruptions through e-mails, text messages, or callings during their spare time.

Olson-Buchanan *et al.* (2016) and Perlow (1998) corroborates the statement above by highlighting that the use of Blackberries, laptops and other devices has increased the connectivity between employee and employer as it narrows the borders between work and home more, leading to a reduction in quality of life and potentially generating conflicts either at work or home.

Up-to-date, mobile phones use (MPU) is one of the leading causes of task interruptions. The positive relationship between the frequency of MPU and negative consequences could be explained by the distractions and interruptions of ongoing tasks associated with frequent MPU, which could lead to reduced performance on the ongoing tasks, which generates conflict at home and work (Soror *et al.*, 2015).

In this regard, Chen and Karahanna (2014) state that interruptions may occur in both domains, as in work and personal life. For instance, when one individual answer a phone call from a customer during his leisure time at the weekend, an interruption occurs in the personal life's domain. Considering that this research focuses on cross-domain interruptions, i.e., the interrupting task and the interrupted task, the pair of interruptions occurs in both directions (home-to-work or work-to-home). According to Latorella (1998), cross-domain interruptions can present several implications for work and personal life. Notwithstanding in which domain the interruption occurs.

Technology-mediated interruptions refer to unforeseen events enabled by technology. When it occurs within the work domain, the technology devices' interruptions may interfere with the cognitive focus as individuals need to shift their attention to handle tasks from another domain (Wang *et al.*, 2016). Butts *et al.* (2015) mentioned that the advances in communication technologies had made organizations more easily connected to their workforce beyond the regular work time. Among its consequences is a growing concern about increasing the work-

nonwork conflicts in an individual's personal life (Freitas Junior *et al.*, 2015; Wright *et al.*, 2014; Wang, 2009).

2.2 The frequency of TMI and performance at work and outside of work

According to Greenhaus and Beutell (1985), the conflict between work and personal life is an inter-role conflict due to the opposite demands of an individual's professional and personal lives. It implies that greater participation in one sphere translates into less availability to close the tasks in the other. The conflicts arise throughout the process in which the individuals need to choose between the domains in what will put most of their attention (Brooks *et al.*, 2017; Liu *et al.*, 2015).

Interruptions mediated by technology outside work (IOW) are unforeseen occurrences generated externally from the work domain and presented to an individual through technologies, thereby disrupting his or her cognitive focus on a continuous task in the personal life domain. One example would be to receive a work-related phone call while eating dinner at home. Interruptions mediated by technology at work (IAW) referred to occurrences generated externally from personal life and presented through technologies. Therefore, disturbing the cognitive focus on a continuous task in the work domain. For example, an individual uses a device to chat with friends during a working meeting (Butts *et al.*, 2015).

Chen and Karahanna (2014) stated that technology-mediated interruptions in this setting are an indispensable element in technology-mediated collaborative work and are often related to the ongoing task. However, given the distinct nature of work and personal life activities, when interruptions occur in cross domains, the individuals must shift their focus and ultimately may have more difficulty enclosure the tasks of these tasks' domain. Conversely, Cameron and Webster (2013) state that although such interruptions can produce counterproductive effects, they can also benefit the performance of the ongoing task by providing relevant information in a fast manner.

In the opinion of Butts *et al.* (2015), the effects of technology-mediated interruptions from work to the non-work domain can influence family events, job satisfaction, and performance through work mood. The electronic

communications from work during non-work time represent work-related events that occur in the non-work realm. In this regard, the emotional responses may impact experiences outside the work domain (Stein *et al.*, 2015).

On the other hand, Chen and Karahanna (2014) pointed out that MIT's interruptions' adverse consequences have received more scholarly attention than positive consequences. Most studies have focused on one or another without juxtaposing both *positive and negative* effects on *work and non-work* domains to provide a more holistic view of the relative magnitudes of such effects and the net relationship of after-hours work-related technology use. Therefore, the following hypotheses will be tested empirically.

H1a: The frequency of interruptions mediated by technology at work, originating from personal life, is positively related to the performance at work.

H1b: The frequency of interruptions mediated by technology outside work, originating from work, is positively related to the performance at work.

H1c: The frequency of interruptions mediated by technology at work will have a higher effect on performance at work than the frequency of interruptions mediated by technology outside work.

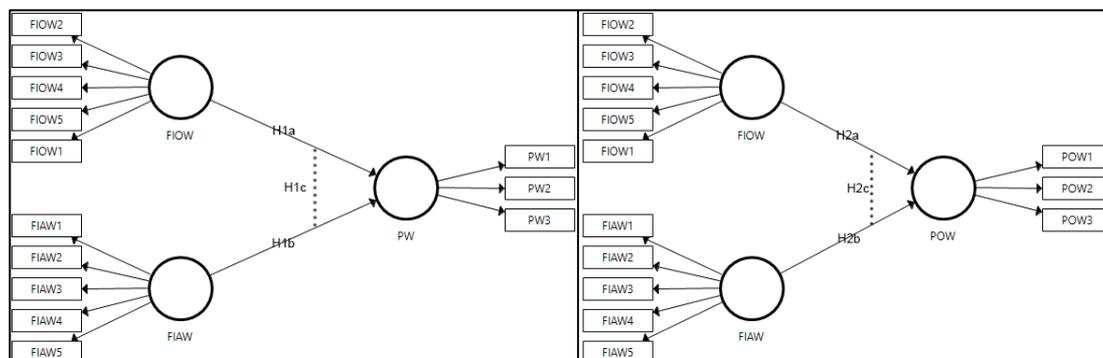
H2a: The frequency of interruptions mediated by technology at work, originating from personal life, is positively related to performance outside work.

H2b: The frequency of interruptions mediated by technology outside work, originating from work, is positively related to performance outside work.

H2c: The frequency of interruptions mediated by technology at work will have a higher effect on performance outside work than the frequency of interruptions mediated by technology outside work.

Based on the hypotheses above, Figure 1 refers to the influence of frequency of interruptions at work and outside work, respectively, on the individual's performance (PW and POW).

Figure 1. The frequency of technology-mediated interruptions to performance at work and outside of work



Source: Research data

2.3 The frequency of TMI and conflicts at work and outside of work

Kossek and Ozeki (1998) have argued that work-life conflicts usually occur in two different forms: (a) work tasks interfering with family responsibilities and (b) family responsibilities interfering with work tasks. These conflicts result from competing demands between work and home that become more relevant to employees due to changes in the workplace (Wright *et al.*, 2014). This situation would be akin to Cohen and Bailey's (1997) argument that conflicts will hurt performance at the workplace and home. Furthermore, interruptions originating from crossed domains can interfere with the performance of the individual in the domain where the interruption occurred.

The two most critical underlying sources for conflicts between work and personal life are issues related to the time taken and stress caused by work, which directly consumes personal resources, such as time, attention, and (mental and physical) energy. Both IOW and IAW may also promote conflicts based on time. IOW may extend working hours, thus invading personal life. They force employees to devote their leisure time to work, making it harder to engage and closure their tasks outside the work domain (Chen and Karahanna, 2018). Therefore, extended working hours due to the use of mobile devices are associated with higher work-life conflicts. Considering this scenario and the arguments above, we present the following hypotheses:

H3a: The frequency of interruptions mediated by technology at work, originating from personal life, is positively related to the conflicts at work.

H3b: The frequency of interruptions mediated by technology outside work, originating from work, is positively related to the conflicts at work.

H3c: The frequency of interruptions mediated by technology at work will have a higher effect on conflicts at work than the frequency of interruptions mediated by technology outside work.

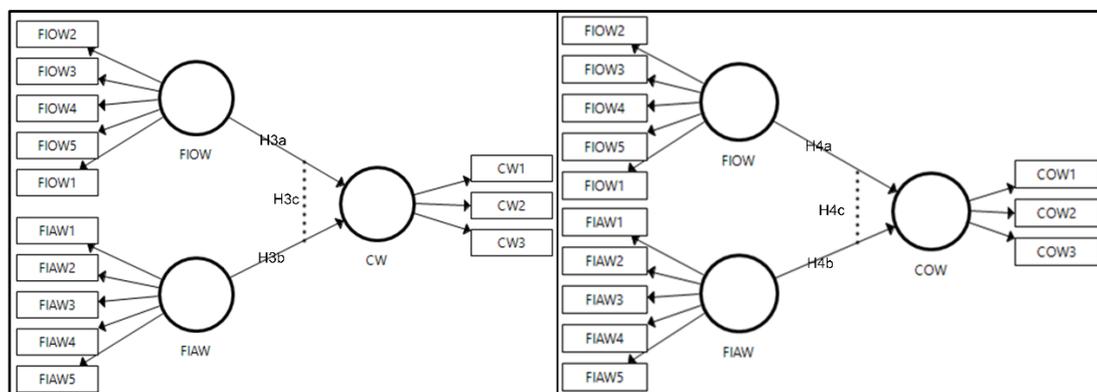
H4a: The frequency of interruptions mediated by technology at work, originating from personal life, is positively related to conflicts in life outside work.

H4b: The frequency of interruptions mediated by technology outside work, originating from work, is positively related to the conflicts in life outside work.

H4c: The frequency of interruptions mediated by technology at work will have a higher effect on conflicts in life outside work; than the frequency of interruptions mediated by technology outside work.

Figure 2 refers to the influence of interruptions' frequency on conflicts at work and outside of work and their relationships.

Figure 2. The frequency of the Technology-Mediated Interruptions on the Conflicts at Work and Outside of Work



Source: Research data

3. RESEARCH DESIGN

3.1 Measurement Development

According to Collis and Hussey (2014), this study follows the positivist paradigm, strongly related to the quantitative approach. The methodology

employed was the survey, which, according to Scheuren (2004), is most often used to describe a method of gathering information from a sample of individuals. The questionnaire utilized was validated in the study by Chen and Karahanna (2014).

We adapted the instrument to the context of new technologies and interactive platforms like Facebook, WhatsApp, and others and translated it with the back-translation technique. The questionnaire was re-submitted to two experts in the mobility area and fluent in the English language. Along with the questionnaire, the English version was submitted for new validation into the Portuguese language. Then, the adjustments were made and applied. The survey items were measured according to a Likert scale. For questions 1 to 10, the parameters ranged from never (1) to always (7). Moreover, for questions 11 to 24, the parameters ranged from strongly disagree (1) to totally agree (7). The measurement items of this research are placed in the Appendix.

3.2 Data collection

The initial sample resulted in 423 business administration and accounting students from two universities located in southern Brazil through an online survey. The development of the study and the pre-test started in November 2017. It is worth mentioning that the pre-test respondents were not included in the final data. The period of survey application occurred from July to August of 2018. Before proceeding with the sample analysis, the following cases were removed: (i) outliers, (ii) incomplete answers, and (iii) cases where the respondents were no longer working. After this procedure, 399 (three hundred ninety-nine) valid questionnaires were obtained.

The respondents' position within their organization was spread in different hierarchical functions, from entry-level positions, such as trainees and analysts, to managers and directors. Moreover, the respondents were fairly distributed across social-demographic groups like gender and age. Concerning the respondent's ages, most of them were between 20 and 33, as can be seen below in Table 1:

Table 1. Sample by age

Age (years)	Number of respondents
20 - 26	154
27 - 33	145
34 - 40	84
41 - 47	16
Total	399

Source: Research data

3.3 Validation of the measurement model

Data validation was performed using descriptive statistics and exploratory factor analysis to identify and validate the items of each construct in the model. The primary analysis was executed with the SPSS® software. Subsequently, the Smart PLS was used in order to test the hypotheses. We evaluated the validity and reliability of constructs by analyzing the loadings of the items within their respective variables.

The items' loadings values were significant within their respective construct. The results indicate the reliability of the individual item since Hair et al. (2011) recommend indexes ideally above 0.708. However, according to the same author, exploratory research indicators with values below this reference can be accepted, removing the values below 0.40. In this study, the indicator PW 18 was excluded as its loading was below this value.

Also, indicators with loadings between 0.40 and 0.70 should only be considered for removal from the scale if excluding this indicator leads to an increase in composite reliability (CR) (Hair et al., 2011), which was not the case in this study.

Tables 2, 3, 4, and 5 below present the Average Variances Extracted (AVEs), CR, Cronbach's Alpha (AC), and convergent validity correction matrix of each research model.

Table 2. Reliability, Convergent Validity and Discriminant Validity (RM1)

Construct	CR	rho_A	AVE	AC	FAIW	FLOW	PW
FAIW	0.763	0.800	0.839	0.517	0.719		
FLOW	0.797	0.803	0.860	0.551	0.357	0.742	
PW	0.857	0.858	0.913	0.778	0.278	0.370	0.882

Source: Research data

Table 3. Reliability, Convergent Validity and Discriminant Validity (RM2)

Construct	CR	rho_A	AVE	AC	FAIW	FIOW	POW
FAIW	0.763	0.767	0.837	0.509	0.713		
FIOW	0.797	0.813	0.858	0.548	0.389	0.740	
POW	0.898	0.929	0.935	0.828	0.208	0.259	0.910

Source: Research data

The next aspect examined in the measurement models was the convergent validities, obtained through the observations from the Average Variances Extracted (AVEs). For these, Fornell and Larcker's (1981) criteria were utilized, with the AVE for each construct exceeding the minimum threshold of 0.50 (Hair *et al.*, 2017; Hair Jr *et al.*, 2016). Cronbach's Alpha values above 0.60 and 0.70 thresholds are considered adequate in exploratory research (Hair Jr *et al.*, 2016). Both the AVEs and the ACs presented higher values than the limit suggested by the literature for all indicators.

The reliability of the scales was analyzed using composite reliability. CR is preferable to Cronbach's Alpha as it provides a better estimate of the variance shared by the indicators. In consonance with Hair Jr *et al.* (2016), composite reliability also provides a more appropriate measure of internal consistency for at least two reasons. First, contrary to Cronbach's Alpha, composite reliability does not assume that all the loads of the indicators are equal in the population, which agrees with the principle of operation of the PLS-SEM algorithm, which prioritizes indicators based on their reliabilities during model estimation. Secondly, Cronbach's Alpha is also sensitive to the number of items in the scale and generally tends to underestimate internal consistency. Tables 4 and 5 illustrate that CR was obtained for all scales and exceeded the minimum threshold of 0.70, underscoring the scale's reliability in this study.

Table 4. Reliability, Convergent Validity and Discriminant Validity (RM3)

Construct	CR	rho_A	AVE	AC	CW	FAIW	FIOW
CW	0.828	0.833	0.897	0.743	0.862		
FAIW	0.763	0.758	0.836	0.505	0.322	0.711	
FIOW	0.797	0.814	0.857	0.546	0.233	0.390	0.739

Source: Research data

Table 5. Reliability, Convergent Validity and Discriminant Validity (RM4)

Construct	CR	rho_A	AVE	AC	COW	FIAW	FIOW
COW	0.866	0.866	0.918	0.789	0.888		
FIAW	0.763	0.766	0.842	0.518	0.224	0.720	
FIOW	0.797	0.828	0.857	0.548	0.350	0.374	0.740

Source: Research data

We also evaluated the discriminant validity (DV), which indicates if the constructs or latent variables are independents between them (Hair et al., 2014). The analysis indicates that the Average Variance Extracted (AVE) square roots are more significant than the correlations between the constructs. Therefore, attending the Fornell and Larcker (1981) criterion. Upon the conclusion of this section, it was possible to ascertain the fit of the measurement models.

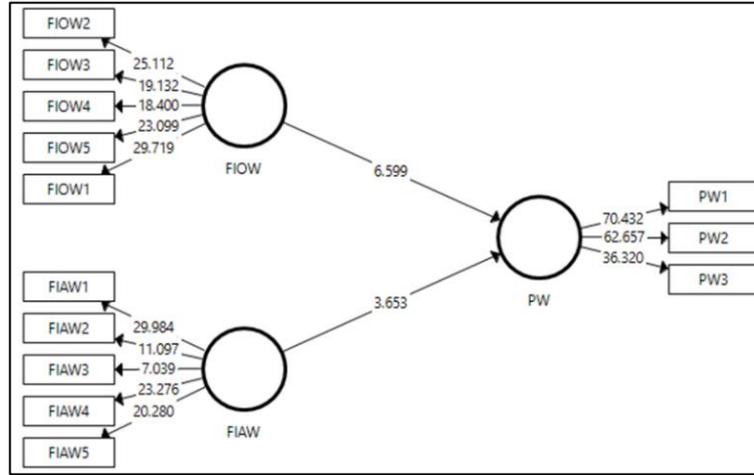
The rho_A is another reliability measure that provides a more accurate estimation of data consistency (Hair Jr *et al.*, 2017). Dijkstra and Henseler (2015) suggest that convergent validity can be assumed when rho_A surpasses 0.7. As shown in Tables 2, 3, 4, and 5, this criterion was fully met, suggesting that the measurement model also attends to the convergent validity criterion.

Therefore, the common method bias is a possible problem (Podsakoff et al., 2003). So, to anticipate this problem, we have done a common method bias test using Harman's single factor method. Hence, we found that the data were free from common method bias because the total variance for a single factor was 27.43 percent (<40 percent).

4. ANALYSIS AND DISCUSSION OF THE RESULTS

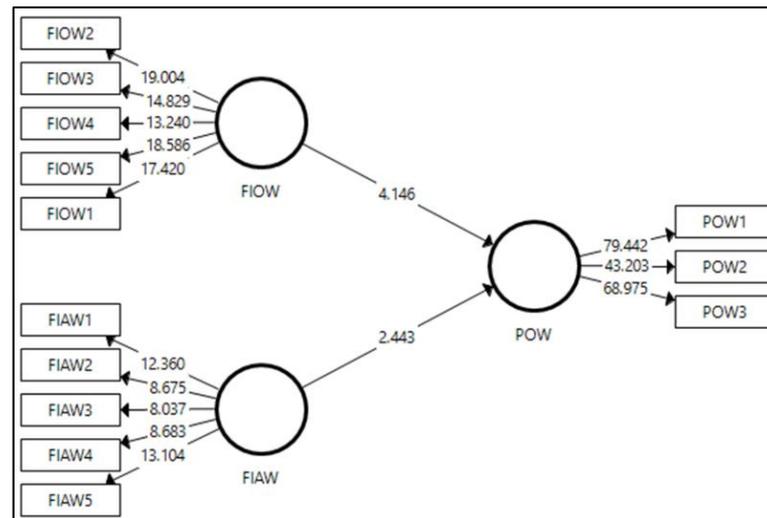
This section presents the study results and the hypotheses analysis through the re-sampling technique of the "Bootstrapping" using the recommended number of 5000 samples. Concerning the significance level, the p-value associated with a 95% confidence level is 0.05, which means that the correlations and the regression coefficients are significant (Hair Jr *et al.*, 2016).

Figure 3. The influence of the frequency of interruptions on performance at work



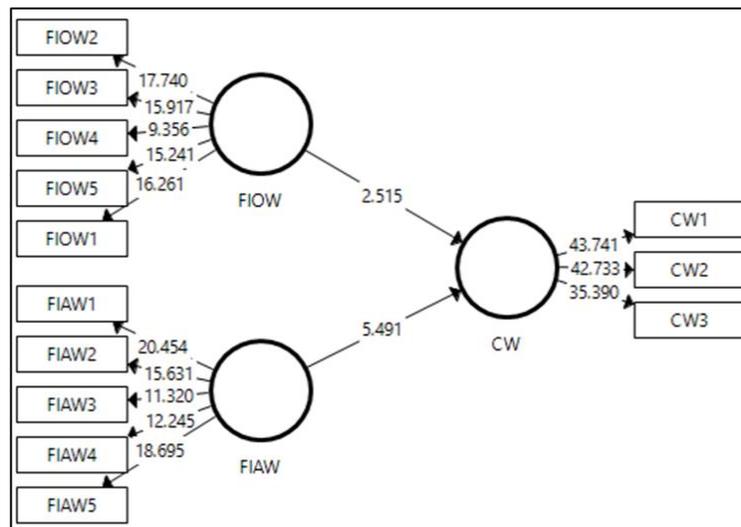
Source: Research data

Figure 4. The influence of the frequency of interruptions on performance outside of work



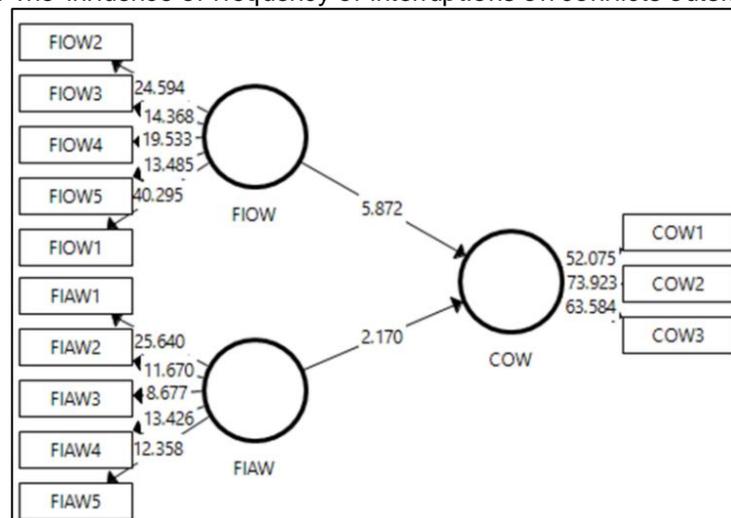
Source: Research data

Figure 5. The influence of frequency of interruptions on conflicts at work



Source: Research data

Figure 6. The influence of frequency of interruptions on conflicts outside the work



Source: Research data

4.1 The frequency of technology-mediated interruptions

In Model 1, the frequency of Interruptions mediated by technology Outside work originating from work (FIOW) is positively related to Conflict Outside Work (COW) since the value of $t=2.170$ is higher than the reference value of 1.96 suggested by Hair et al. (2014). Hence, hypothesis H1a is supported.

In Model 2, the Frequency of Interruptions mediated by technology At work originating from personal life (FIAW) is positively related to Conflict at Work (CW), presenting a value of $t= 5,491$. Therefore, Hypothesis H1b is also supported.

These results suggest that technology-mediated interruptions caused by crossed domains, i.e., work interfering with personal life and vice versa, affect

both personal and work life and are related to the conflicts in both domains. However, this study's objective is not to highlight the similarities and differences with Chen and Karahanna's (2014) research results, hoping to contribute to the theoretical advancement of interruptions literature.

Researchers like Perlow (2011) reinforce the adverse effects of the technology-mediated interruptions by noting that the use of iPhones, Blackberries, laptops, and other devices has increased the connectivity between employees and employers, blurring the boundaries between work and home, leading to a reduction in quality of life and potentially generating conflicts. On the other hand, researchers like Levy et al. (2016) and Hobfoll (1989) present empirical and theoretical arguments for rethinking how individuals deal and overcome the conflicts generated by the technology in both domains of their lives to improve their performance.

4.2 Technology-mediated conflicts at work and personal life

Conflicts Outside Work (COW) caused by work were observed to mediate the adverse effect of the frequency of interruptions on Performance Outside Work (POW). Conflicts at Work (CW) caused by life outside work do not mediate the adverse effect of the frequency of interruptions on Performance at Work (PW). In both cases, the corresponding t-values are smaller than the reference index of 1.96, which means Hypotheses H2a and H2b are not supported.

In Chen and Karahanna's (2014) research, only H2a is supported, demonstrating that Conflicts in life Outside work caused by work mediates the adverse effect of the frequency of interruptions on Performance Outside Work, in that case. In the present study, the result indicates that conflicts occur—as noted in the previous subsection—but such conflicts do not interfere with performance in their respective domains. In this way, it is possible to infer that the conflicts generated by interruptions are not fully responsible for performance losses in both instances.

4.3 Influence of interruptions on individual's performance

Regarding the relationship between the Frequency of Interruptions mediated by technology Outside Work (FIOW) and the Performance in life Outside Work (POW), FLOW was negatively related to POW, supporting hypothesis H3a.

The Frequency of Interruptions mediated by technology At Work (FIAW) originating from personal life also is positively related to Performance at Work (PW). As a result, hypothesis H3b is supported. In Chen and Karahanna's (2014) research, both hypotheses are supported but evidence the adverse effect of Frequency of Interruptions on both the work and home environments.

This result shows that changes in the work environment are absorbed more rapidly than changes in personal life because technology-mediated interruptions at work — even when they have a different origin from that of the task being performed — are better received. In other words, they are not negatively related to performance at work. The same is not true when the interruption is at home. Even though the increase in connectivity has narrowed the boundaries between work and home, as Perlow (1998) points out, it appears that there is more resistance in understanding the interruption, as depicted by COW's negative relation to POW. Table 6 below illustrates the results presented above.

Table 6. Effects on endogenous variables (direct effects)

	Paths (Hypotheses)	β	T Statistics (a)	p Value	Status
H1a	FIAW -> PW	0,167	3,653***	0.000	Supported
H1b	FIOW -> PW	0,310	6,599***	0.000	Supported
H2a	FIAW -> POW	0,127	2,443***	0.000	Supported
H2b	FIOW -> POW	0,210	4,165***	0.000	Supported
H3a	FIAW -> CW	0,273	5,491***	0,000	Supported
H3b	FIOW-> CW	0,127	2,515**	0,011	Supported
H4a	FIAW -> COW	0,108	2,170**	0,033	Supported
H4b	FIOW-> COW	0,310	5,872***	0,000	Supported

Notes: (a) t-values for a two-tailed test: *** t-value 2.58 (significance level = 1 %). bootstrapping results (n= 5000) ** p <0.05, ***p <0.001.

Moreover, it is worth noting that conflict can be defined in several ways, focusing on factors such as objective conditions, emotions, perceptions, and specific behaviors associated with it (de Jong *et al.*, 2008). This study tends to

corroborate this statement because the frequencies of interruptions are related to conflicts in both domains.

One other result to observe regards the main types of interruptions considered in the study. The major interruptions pointed out by the respondents, both at home and work, were, in the first place, instant messages (text messages, WhatsApp), followed by web messages (Facebook, MSN, Twitter). The difference lies in the third and fourth places. The telephone's interruptions at home are in third place, while interruptions by e-mail assume the last place. At work, precisely the opposite occurs. This result is in line with the tendency to increase Mobile Information Technologies' use, as Belfort and Martens (2014) emphasized. Consequently, we consider this crucial for clarifying such interruptions and making possible further analyses possible.

This result shows that technology-mediated interruptions likely have an impact on the quality of life. Considering that at work, this quality of life may be defined as the set of actions within the company that involves the deployment and maintenance of management, technological and structural improvements, and innovations in the work environment (França, 1996), it indicates the need to find new ways to mitigate conflicts arising from technology-mediated interruptions from outside work.

4.4 Path coefficients comparison and differences

In this section, we show the unstandardized and standardized path coefficients comparison. As stated by Cohen *et al.* (2003), standardized path coefficients, on the one hand, can simplify the interpretation of the effects. On the other hand, they can hide the effects as they increase or decrease standard deviation terms. Therefore, we followed the recommendations and calculated unstandardized path coefficients. First, we assessed the unstandardized latent variable scores for all the constructs and then calculated the unstandardized path coefficients using multiple regression analysis. Table 7 compares the path coefficients (standardized as unstandardized) and presents the four-path difference significance t-values.

Table 7. Path Coefficients Comparison

Research model and path comparison	Standardized Path coefficients	Unstandardized path coefficients	Path difference significance (t)
FIAW/FIOW →PW	0.167*** vs 0.310***	0.158** vs 0.278***	1.565 n.s.
FIAW/FIOW→ POW	0.127** vs 0.210***	0.140 ** vs 0.220***	0.828 n.s.
FIAW/FIOW→CW	0.273*** vs 0.127**	0.314*** vs 0.138**	1.774*
FIAW/FIOW→COW	0.108*** vs 0.310**	0.141** vs 0.382***	2.012*

Note. Two-tailed tests were executed to assess standardized path coefficients significance. one-tailed tests were performed to assess the unstandardized path coefficients directional differences. bootstrapping results (n= 5000) ** p <0.05, ***p <0.001, n.s: not significant.

Table 8 presents the three hypothesis results comparing the unstandardized path coefficients. Also, Table 8 depicts the explained variance of the dependent variables (PW, POW, CW, and COW) by the independent variables (FIAW, FLOW).

Table 8. Results of Path Coefficients Comparison Hypothesis TE

STS	Unstandardized Path Coefficients	R ²	Conclusion
H1C	BFAW→PW vs BFLOW→PW = 0.158** vs 0.278***	0.161	Not-significant differences
H2C	BFAW→POW vs BFLOW→POW=0,140 **vs 0,220**	0,081	Not-significant differences
H3C	BFAW→CW vs BFLOW→CW =0.314*** vs 0,138**	0.118	BFAW→CW > βBFLOW→CW
H4C	BFAW→COW vs BFLOW→COW=0.141** vs 0.382**	0.133	BFAW→COW < βBFLOW→COW

Notes: one-tailed tests were performed to assess the unstandardized path coefficients directional differences. bootstrapping results (n = 5000) ** p <0.05, ***p <0.001, n.s: not significant.

As can be perceived, the effects of the frequency of interruptions in PW or POW are positive. However, interruption's influence (either at work or in personal life) in the performance is not statistically distinct. I.e., there is no difference to the individual's performance where the interruption occurs. They are positively related to performance in both instances but are not significantly higher than the other.

4.5 Contributions to research and practice

4.5.1 Theoretical implications

According to Feenberg (2002), technologies are tools that provide us unprecedented autonomy. However, their effects on social life and an individual's health still are being studied (Salo *et al.*, 2019; Whelan *et al.*, 2017; Brooks *et al.*, 2017). Therefore, a re-contextualizing critique is needed to bring the objects-artifacts to the historical socio-cultural environments in which they were

conceived. In this context, this paper aimed to study the effects of technology-mediated interruptions at work and personal life on the potential conflicts arising from these relationships and individuals' performance.

The results indicate that the frequency of interruptions mediated by technology originating from different domains is positively related to conflicts in their respective areas. However, contrary to previous research, both interruptions' frequency (at work and personal life) is positively related to an individual's performance. Although we are aware that other variables interfere in this relationship, like flexibility, information overload, and psychological transition (Chen and Karahanna, 2018), this research scope is limited to analyzing and comparing the direct interruptions' effects on conflicts and individuals' individual's performance. These findings present a new research path as the interruptions are positively related to the individual's performance, still needs further studies (Chen and Karahanna, 2018; Addas and Pinsonneault, 2018; Levy *et al.*, 2016). In a recent research paper, Chen and Karahanna (2018) used Hobfoll's Conservation of Resources Theory (COR) to investigate the relationship between technological stressors and how individual's cope with them (Hobfoll, 1989).

In that regard, this research results demonstrate that technology-mediated interruptions have both negative (increasing the conflicts) and positive effects (influencing the individual's performance positively), maybe in concordance with the COR theory premise as the flexibility, speed, and media richness allowed by the MIT can save time to fulfill tasks both at work and in personal life. (Tan *et al.*, 2011; Kim and Miranda, 2013). According to Hobfoll's COR tenets, stress occurs when individuals invest resources without subsequent gains (Krohne, 2002). Therefore, when they face the interruptions in crossed domains, this single act translates into resources investment (deal with the conflicts against solving crossed domain's tasks). However, the capacity to solve work's tasks in the personal domain and deal with personal tasks in the work domain may be perceived as a well-rewarded investment. Therefore, reducing the stress generated by conflicts. Moreover, the research findings are aligned with Levy *et al.* (2016) findings that individuals choose the preferred medium to communicate based on their familiarity with the medium and social influences. These twofold arguments may explain in part why, despite generating conflicts, the technology-mediated interruptions may also improve the individual's performance.

4.5.2 Practical implications

The proposed approach has a practical value not only for teachers and students of human-computer interaction, IT practitioners in any other professional environment where the technology represents a channel between personal and professional life. The research results allow practitioners to rethink organizations' policies and propose alternatives concerning technology appliances to improve individuals' performance in both domains of life.

4.5.3 Limitations and future research

The main limitation of this research concerns its respondents' sample. In this way, the results cannot be generalized. Also, a few respondents might have misunderstood the items questionnaire and therefore may have introduced bias on the research analysis. We suggest testing this effect by considering external measures of the individual's conflicts and performance at work and outside of work for future research. Another particularity of the study is that the research models only examined interruptions in crossed domains. Longitudinal studies have been suggested for future research since they may bring further contributions to academic knowledge. Another recommendation is to apply this study to professionals of different maturity levels and proceed with a multigroup analysis, For example, with professionals in higher management positions and the newcomers at the market. They may have a different relationship with the conflicts (in comparison with this study sample). Moreover, a comparative study of this investigation with the results found by Chen and Karahanna (2018, 2014) may bring more conclusive results about our relationship with the ubiquitous technology solutions that continually defy our attention throughout the day (and night).

5. CONCLUSION

This paper proposed four research models to analyze and compare the technology-mediated interruptions' influence on conflicts and individual performance. To achieve this objective, we prepared a literature review and surveyed a sample of 399 Brazilian administration and accounting workers. The

research results revealed that interruptions are negatively and positively related to individuals' lives in both domains (at work and personal life). This study results may stimulate future researchers further to understand the role of interruption in the human-computer interaction and improve the quality of life as the individual's performance in every instance of their lives.

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Appendix

RESEARCH INSTRUMENT

Construct	Items	References
Frequency of Interruptions Outside of Work (FIOW)	(FIOW- Overall) overall through technologies such as phone calls, e-mail, instant messaging (IM) texting, etc.? Composite: composite index created by the following items:	Chen and Karahanna (2014)
	(FIOW- Phone) via phone call or cell phone only?	
	(FIOW- E-mail) via e-mail only?	
	(FIOW- IM) Via instant messaging (IM) only (text messages, WhatsApp, etc.)?	
	(FIOW- texting) Via contacts through messages via the web (Facebook, MSN, Twitter, etc.)?	
Frequency of Interruptions At Work mediated by technology (FIAW)	(FIAW-overall) overall through technologies such as phone calls, e-mail, IM, texting, etc.? Composite: composite index created by the following items	Chen and Karahanna (2014)
	(FIAW-Phone) via phone call or cell phone only?	
	(FIAW- E-mail) via e-mail only?	
	(FIAW- IM) Via instant messaging (IM) only (text messages, WhatsApp, etc.)?	
	(FIAW- texting) Via contacts through messages via the web (Facebook, MSN, Twitter, etc.)?	
Conflicts Outside of Work (COW)	(COW1) The demands of my work interfere with my personal life.	Netemeyer <i>et al.</i> (1996)
	(COW2) My work produces strains that make it difficult to fulfill my non-work responsibilities.	
	(COW3) The amount of time my work takes up makes it difficult to fulfill non-work responsibilities.	
Conflicts at Work (CW)	(CW1) The demands of my personal life interfere with my work.	Netemeyer <i>et al.</i> (1996)
	(CW2) My personal life interferes with my work responsibilities, such as getting to work on time and accomplishing daily tasks.	
	(CW3) Due to the demands in my personal life, I frequently must make changes to my work plans.	
Performance at Work (PW)	(PW1) I am perceived by my supervisor as an exceptional worker.	Frone <i>et al.</i> (1997)
	(PW2) I am perceived as an exceptional worker within my organization.	
	(PW3) I have a reputation within my organization for executing my functions very well.	
	(PW4) My colleagues think my work is outstanding.	
Performance Outside of Work (POW)	(POW1) My family thinks that I fulfill my family responsibilities very well.	Ashford <i>et al.</i> (1998); Kossek (2016); Kossek and Lautsch (2012); Kossek <i>et al.</i> (2001)
	(POW2) My friends think that I fulfill the demands of my personal life very well.	
	(POW3) My family thinks that I fulfill my family demands very well.	
	(POW4) I am viewed by my family/friends as fulfilling the responsibilities in my personal life very well.	

Contribution of authors

Every author should account for at least one component of the work. Paper approved for publication needs to specify the contribution of every single author.

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]
1. Definition of the research problem	√		√	
2. Development of hypotheses or research questions (empirical studies)	√		√	
3. Development of theoretical propositions (theoretical work)	√	√	√	
4. Theoretical foundation / Literature review	√	√		
5. Definition of methodological procedures		√	√	
6. Data collection	√	√		
7. Statistical analysis	√	√		
8. Analysis and interpretation of data			√	√
9. Critical revision of the manuscript				√
10. Manuscript writing	√	√	√	√
11. Final revision		√		√