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Cognitive flexibility and the work context: Integrative literature review

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Abstract

Transformations in the work context demand new skills from workers, such as cognitive flexibility (CF). This study analyzed publications that investigated CF in the context of work. An integrative review of the literature was conducted in the Latin American and Caribbean Health Sciences Literature (Literatura Latino-Americana e do Caribe em Ciências da Saúde [Lilacs]), Scientific Electronic Library Online (SciELO), Web of Science, and Scopus databases. An analysis of 24 articles allowed a picture of the scientific production on the subject. The studies are recent and from several countries. Most of them used a quantitative design and investigated workers from different industries. CF has often been defined as an executive function that encompasses awareness that there are alternative behaviors, willingness, and self-efficacy in flexible behavior. CF has been linked to other phenomena, such as the ability to adapt and plan, interpersonal relationships, and sleep deprivation. This study brings contributions and subsidies for organizational psychology professionals, considering the insertion of CF as an essential skill for work.

Keywords: flexibility, work, organizational psychology, work psychology, integrative review

FLEXIBILIDADE COGNITIVA E O CONTEXTO DE TRABALHO: REVISÃO INTEGRATIVA DA LITERATURA

Resumo

As transformações no contexto do trabalho exigem novas competências dos trabalhadores, como a flexibilidade cognitiva (FC). Este estudo analisou publicações que investigaram a FC no contexto do trabalho. Foi realizada uma revisão integrativa da literatura nas bases de dados LILACS, SciELO, Web of Science e Scopus. A análise de 24 artigos permitiu um retrato da produção científica sobre a temática. Os estudos são recentes, oriundos de diversos países, e, em sua maioria, adotaram delineamento quantitativo e investigaram trabalhadores de segmentos variados. A FC foi frequentemente definida como uma função executiva que engloba a consciência de que há alternativas de comportamentos, a vontade e autoeficácia no comportamento flexível. A FC foi associada a outros fenômenos, como capacidade de adaptação e planejamento, relacionamentos interpessoais e privação de sono. Este trabalho traz contribuições e subsídios para profissionais da psicologia organizacional, haja vista a inserção da FC como competência essencial no trabalho.

Palavras-chave: flexibilidade, trabalho, psicologia organizacional, psicologia do trabalho, revisão integrativa

FLEXIBILIDAD COGNITIVA Y CONTEXTO LABORAL: REVISIÓN INTEGRADORA DE LA LITERATURA

Resumen

Las transformaciones en el contexto laboral demandan de los trabajadores nuevas habilidades, entre ellas, la flexibilidad cognitiva (FC). Este estudio analizó publicaciones que investigaron la FC en el contexto laboral. Se realizó una revisión integrativa en las bases de datos Literatura Latinoamericana y del

Caribe en Ciencias de la Salud (Lilacs), Scientific Electronic Library Online (SciELO), Web of Science y Scopus. El análisis de 24 estudios permitió un retrato de la producción científica sobre el tema. Son estudios recientes, de diferentes países. La mayoría ha adoptado diseño cuantitativo e investigado a trabajadores de diferentes segmentos. La FC se definió como una función ejecutiva que abarca la conciencia de que existen comportamientos alternativos, voluntad y autoeficacia para ser flexible. La FC se relacionó con otros fenómenos, como la capacidad de adaptación y planificación, las relaciones interpersonales y la privación del sueño. Este estudio trae aportes para los profesionales de la psicología organizacional, considerando la inserción de la FC como una competencia imprescindible para el trabajo.

Palabras clave: flexibilidad, trabajo, psicología organizacional, psicología del trabajo, revisión integradora

In recent decades, humankind has witnessed transformations in all spheres of life, and such changes demand rapid adaptation. Workers, for instance, are specifically required to improve professional training and education to keep pace with the new world of work (Athayde & Souza, 2015). Hence, researchers seek to identify and develop competencies to meet the needs of this context (Castro et al., 2011; Salas et al., 2012). In this study, competence, one of the concepts most frequently discussed by scholars and people management professionals (Athayde & Souza, 2015), is considered a set of cognitive, physical, social, and technical skills and aptitudes necessary to perform work tasks (World Economic Forum [WEF], 2016).

The ability to be adaptable and flexible is a recent challenge that has been increasingly relevant in the current professional context because it enables workers to cope with changes while keeping the skills needed to perform current tasks (Salas et al., 2012; WEF, 2016). Despite its contemporaneity, the term "flexibility" was mentioned in 1950 as essential for functioning and learning through experience. In 1962, William Scott, one of the first authors addressing this phenomenon, conceptualized it as a person's readiness to change selectively in response to environmental stimuli. Scott noted that flexibility enables individuals to change images, selecting their characteristics and changing the relationships among images to consider them from new perspectives; cognitive rigidity is considered the opposite of cognitive flexibility (CF) (Scott, 1962).

Specifically, CF – or mental/thought flexibility – was considered for a long time an exclusive phenomenon of neuropsychology – measured and used in psychological assessments and clinical contexts. It was included as one of the three central executive functions, which enable planning and performing efficiently complex behaviors that involve other cognitive functions, such as attention and memory. Executive functions facilitate adapting and changing behavior and cognitive patterns according to the environment (Hamdan & Pereira, 2009; Rocha, 2018). CF within neuropsychology is frequently described and assessed as the ability to change the focus of attention and/or tasks, which is essential for daily functional performance. However, despite its importance for an efficient performance of daily tasks (Rocha, 2018), it is commonly assessed with executive functions instead of having its specificities considered.

In turn, the cognitive flexibility theory (CFT) proposed by Spiro et al. (1991), defines CF as the ability to represent and use knowledge from different perspectives within different contexts, that is, the ability to construct a new set of knowledge and behaviors adapted to a given environment's conditions. This theory has been used in studies in the educational field, grounding teaching-learning processes and reinforcing the importance of CF to study and work (Rocha, 2018).

CF can also be understood as a metacompetence – that is, it combines cognitive and situational aspects –, and is defined as sensitivity, a tendency and ability to perceive, select and implement the most appropriate solution to every situation, in addition to awareness and ability to adapt the cognitive and behavioral pattern to the environment and specific situation

(Yu et al., 2019). In this study, CF is considered a critical competence essential for organizations and workers in the 21st century's digital age (Roy, 2001; Soares et al., 2018; WEF, 2016; Yu et al., 2019). This understanding is based on a behavioral and observable perspective, recognizing that CF can be trained and developed within organizations (Soares, 2017; Yu et al., 2019). Studies conducted in varied contexts report that CF is associated with other phenomena, such as creative and rational behavior (Bloom et al., 2014; Guerra et al., 2014), because it enables new psychological and behavioral responses (Sung et al., 2019), re-planning, problem-solving (Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009), and the performance of complex tasks that require changing objectives (Spiro et al., 1991; Yu et al., 2019).

One of the first studies addressing CF specifically in the work environment was developed by Hilgert (1998), who investigated CF associated with corporate education. The studies associating CF with the field of industrial and organizational psychology include those relating it to stress (Phillips, 2011; Sung et al., 2019), resilience (Belancieri & Kahhale, 2011; Niquerito, 2009), the effects of shift work (Cheng et al., 2017; Maltese et al., 2016), and workers' age (Gajewski et al., 2010; Maltese et al., 2016). Hence, this study's general objective was to analyze studies investigating CF in the work environment, and, specifically, to describe the characteristics of studies, methodological resources, conceptual definitions, and associations with other phenomena reported by studies from Brazilian and international databases.

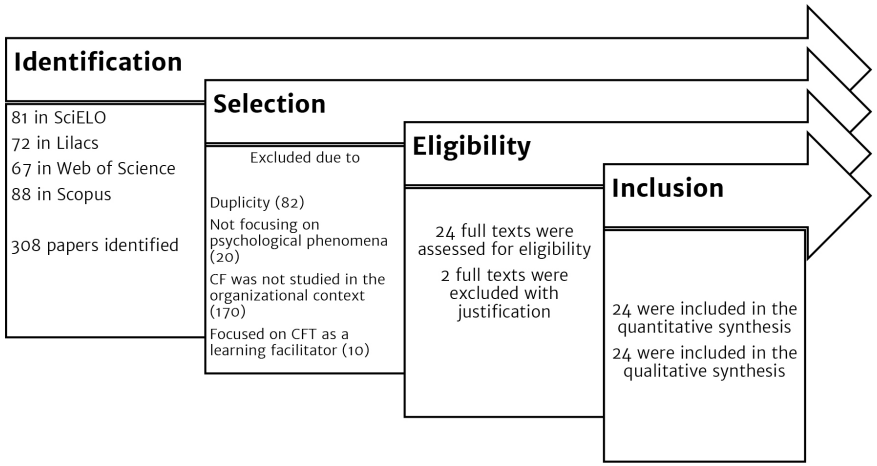
Method

In this integrative literature review, Brazilian and international databases were consulted, and studies that adopted different methodological strategies to investigate CF in the workplace were analyzed. To structure, perform and write this review, the preferred reporting items for systematic reviews and meta-analyses (PRISMA) was used as a guide (Galvão et al., 2015).

Not all items of the PRISMA's checklist were fully complied with, considering that some items concern the review of clinical trials and interventions assessment, and this study is an integrative literature review. The items provided in this model and not complied with concern the clarification of the review objectives, referencing the studies' participants, interventions, comparisons, outcomes, and study design (PICOS). The reason is that this review was intended to perform a broader analysis of studies addressing the previously mentioned topic, including different methods. Other elements concern the method's specific aspects: electronic availability of the review protocol, clarification of the method used to extract data from the studies included in the analysis, a description of assessment of the risk of bias, and measures used to summarize data. The PRISMA flowchart model is presented in Figure 1.

Figure 1

Flowchart with information on the different phases of the review according to the Prisma model



Source. Adapted from Galvão et al. (2015).

The databases include the freely accessible Latin American and Caribbean Health Sciences Literature (Literatura Latino-Americana e do Caribe em Ciências da Saúde [Lilacs]) database, which presents studies on health sciences published in Latin America and the Caribbean; multidisciplinary databases, such as Scientific Electronic Library Online (SciELO), which is also freely accessible and comprises periodicals from Brazil, Latin American countries and the Caribbean; Web of Science, which indexes the periodicals most frequently cited in their respective fields; and Scopus, which presents a large number of abstracts and academic resources (Costa & Zoltowski, 2014). The terms were based on the Health Sciences Descriptors (Descritores em Ciências da Saúde [Decs]) and, since it did not provide all terms appropriate for this review, some keywords included in the papers used to ground this review theoretically were also used. All the terms were in English, considering it is the universal language for scientific publications. The following terms were used in Lilacs and SciELO together with the Boolean operators: ("cognitive flexibility") OR ("mental flexibility") AND NOT (child*). More specific terms were needed for Web of Science and Scopus due to the amount of studies found. Hence, the string ("cognitive flexibility" OR "mental flexibility") AND (Worker OR competenc*) AND NOT (child*) was used. The exclusion descriptor (child*) was used in all the databases because many documents were identified in the initial search with this term, which was not this review's objective.

The following inclusion criteria were adopted: only articles were included, not considering videos, abstracts, or patents; written in English, Spanish or Portuguese, languages

in which the authors are fluent – especially English, which is the science reference language; papers that included the descriptors in the title, abstract, and/or keywords. The objective was to perform a more comprehensive search considering that the descriptors could be present in any of these parts. The search addressed all the studies identified and published up to June 4th, 2020 – the day when the search was conducted –, not determining a specific period for the start of publications. Initially, 308 papers were identified (81 in SciELO, 72 in Lilacs, 67 in the Web of Science, and 88 in Scopus). Exclusion criteria were duplicated papers (n = 82); papers that did not focus on psychological phenomena (n = 20); not performed within the workplace or with workers (n = 170); and addressing CFT as a learning facilitator rather than measuring it as a correlate of this function in the work environment (n = 10). Two judges independently conducted the review and compared the results afterward. Divergences were resolved through consensus.

Two of the 26 papers selected were excluded after reading and analyzing the full texts, as they did not investigate CF, only mentioned it. A spreadsheet was developed in Excel Microsoft containing the following information of the 24 papers included in the final sample: database, title, author(s), the number of authors, year of publication, journal, language, the country where the study was conducted, author's country of origin, design, participants, instruments used, CF definition and the CF correlates. Two strategies were used to analyze the studies: first, objective data were quantified (regarding year of publications, number of authors, and country of origin); and the data were qualitatively described, seeking to analyze agreements and divergences regarding the CF conceptualizations and associations with other phenomena. This analysis resulted in an overview of the scientific production in the field and a survey of approximations in definitions and associated phenomena.

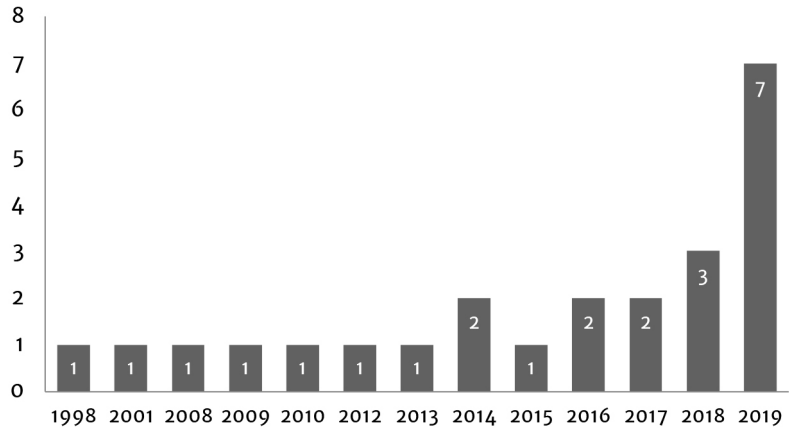
Results

An overview of scientific production and the methodological resources adopted

The oldest study included in this review was published in 1998. It addressed executive women who participated in an educational program – a Master in Business Administration (MBA) –, reporting that the participants showed greater CF in personal and professional aspects (Hilgert, 1998). The findings of the mentioned study are opposed to the results of the only study in the sample conducted with Brazilian individuals, in which no CF changes were associated with taking part in an educational program. The program addressed entrepreneurship content (Vignochi et al., 2019). Even though the first study was published at the end of the 19th century, most studies were conducted in 2019 (n = 7) and 2018 (n = 3), as shown in Figure 2.

Figure 2

Graph of studies addressing cognitive flexibility (CF) in the workplace according to the year of publication



None of the journals concentrated publications on this topic. However, two periodicals presented two studies each: *Military Psychology* from the American Psychological Association, which publishes studies or practices of psychological principles in the military environment, and *Frontiers in Psychology*, a journal comprising studies addressing major psychological sciences subjects. Most papers were published in English (*n* = 19), followed by Spanish (*n* = 3), and Portuguese (*n* = 1). Additionally, one study conducted in Australia was published in two languages (English and Spanish). It proposes a reflection on the concept of CF associated with constructs such as intelligence and creativity (Yu et al., 2019).

Groups of researchers conducted the studies, most with four (*n* = 7), three (*n* = 5), or five (*n* = 4) authors. One paper, written by 14 authors, stood out. It reports that the cognitive performance of professionals working in intensive care units (ICUs) decreases after working the night shift (Maltese et al., 2016).

Table 1 presents the authors' country of origin – seven studies resulted from the partnership among researchers from different countries – and shows the country where the study was conducted (where the data were collected, so two theoretical studies were excluded). Authors from 17 countries investigated the relationship of CF with factors or phenomena from the work environment. Researchers from the United States (*n* = 4) and Spain (*n* = 3) stood out. The United States (*n* = 4) were also the country with the highest number of studies conducted, followed by France, the Netherlands, Chile, and England, with two studies each.

Table 1

Authors and studies' countries of origin

Authors' country of origin	No. of studies	Study's country of origin	No. of studies
Not identified	1	Germany	1
Germany	2	Brazil	1
Australia	2	South Korea	1
Brazil	1	Spain	1
Chile	2	Finland	1
South Korea	1	England	2
Spain	3	Ireland	1
United States	4	Italy	1
Finland	1	Mexico	1
France	2	Singapore	1
Greece	1	Australia	1
Ireland	1	Chile	2
Italy	2	France	2
Mexico	1	The Netherlands	2
The Netherlands	2	United States	4
England	2		
Romania	1		
Singapore	1		

Two of the 24 papers were literature reviews (Sanchez et al., 2017; Yu et al., 2019). Of the 22 empirical studies, only two presented a qualitative design (Hilgert, 1998; Ong et al., 2019), while the remaining were quantitative empirical studies (n = 20) using different instruments to measure CF, such as neuropsychological tests, scales, inventories, and simulation tests.

The Cognitive Flexibility Scale, developed by Martin and Rubin (1995), was the instrument most frequently used (n = 5) to assess CF (Déprez et al., 2019; Mazur et al., 2014; Oprins et al., 2018; Swanson, 2015; Vignochi et al., 2019). It is a one-dimension instrument (α = 0.83), composed of 12 items on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Other instruments were also used to measure CF, such as the *Boundary Questionnaire* (n = 1) (Roy, 2001) and the *Cognitive Flexibility Inventory* (n = 2) (Sung et al., 2019; Cropley et al., 2016). In addition, three studies used simulation tests, such as the task-switching paradigm (Cheng et al., 2017; Gajewski et al., 2010; Montuori et al., 2019), and other three studies used their instruments or instruments based on items presented in other scales

or inventories (Bloom et al., 2014; Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009).

As CF is a phenomenon mainly investigated in the fields of neuropsychology and psychological assessment, different studies used neuropsychological tests to collect data, among which the *Stroop Word Test* (Grip et al., 2007; O'Hagan et al., 2018); *Wisconsin Card Sorting Test* (Wykes et al., 2012); *Trail Making Test* (TMT), from the *Halstead-Reitan Neuropsychological Battery* (Rincón-Campos et al., 2019; Fernández-Sánchez et al., 2018); and *Wechsler Adult Intelligence Scale – fourth edition* (Wais-IV) (Maltese et al., 2016).

Some professions were more frequently investigated in the empirical studies, specifically leadership positions, such as managers and directors (Mazur et al., 2014; Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009; Hilgert, 1998). Three studies addressed health workers (Fernández-Sánchez et al., 2018; Maltese et al., 2016; Wykes et al., 2012), while three other studies addressed undergraduate and graduate students (O'Hagan et al., 2018; Roy, 2001; Vignochi et al., 2019). Additionally, two studies investigated educators (Ong et al., 2019; Swanson, 2015); two addressed professional athletes, such as soccer and volleyball players (Montuori et al., 2019; Rincón-Campos et al., 2019); and two other, military personnel (Oprins et al., 2018; Sung et al., 2019). Finally, six studies addressed professionals working in the industry, maintenance, social work, administration positions, among others (Bloom et al., 2014; Cheng et al., 2017; Cropley et al., 2016; Déprez et al., 2019; Gajewski et al., 2010; Grip et al., 2007).

Definitions of cognitive flexibility and associations with other phenomena

The concept of CF may include the ability to alternate and select behaviors (Bloom et al., 2014; Gajewski et al., 2010; Grip et al., 2007; Montuori et al., 2019; Yu et al., 2019) and cognitive processes (Bloom et al., 2014; Déprez et al., 2019; Oprins et al., 2018). Three studies adopt one definition (Mazur et al., 2014; Oprins et al., 2018; Swanson, 2015). According to Martin and Rubin (1995), CF is based on three characteristics: 1. an awareness that there are always alternative ways to behave; 2. a desire to be flexible and adapt to situations; and 3. self-efficacy to be flexible. It is noteworthy that seven of the studies did not explicitly describe the CF definition or conception adopted (Cropley et al., 2016; Fernández-Sánchez et al., 2018; Hilgert, 1998; Maltese et al., 2016; Rincón-Campos et al., 2019; Roy, 2001; Wykes et al., 2012).

In addition to being a competence, CF is an executive function that includes a set of capabilities and complex behaviors (Hamdan & Pereira, 2009), essential for: 1. creativity and creative behaviors (Bloom et al., 2014; Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009; Sung et al., 2019; Yu et al., 2019); 2. adapting to the environment and its changes (Cheng et al., 2017; Déprez et al., 2019; Montuori et al., 2019; Ong et al., 2019; Oprins et al., 2018; Sanchez et al., 2017; Vignochi et al., 2019; Yu et al., 2019); 3. strategic

planning (Sanchez et al., 2017); 4. decision-making (Mazur et al., 2014; O'Hagan et al., 2018; Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009); and 5. problem-solving (Sung et al., 2019).

The relationship of some factors, phenomena, and variables with CF was more extensively investigated. For example, some papers report that CF is positively correlated with planning skills (Rincón-Campos et al., 2019; Sanchez et al., 2017; Vignochi et al., 2019; Wykes et al., 2012), the ability to act rationally when making a strategic decision (Mazur et al., 2014; Rodríguez-Ponce et al., 2013; Rodríguez-Ponce & Pedraja-Rejas, 2009), problem-solving capacity (Hilgert, 1998; Ong et al., 2019; Sung et al., 2019), and better performing when alternating tasks (Montuori et al., 2019; Ong et al., 2019).

CF was positively associated with phenomena that integrate the set of social skills necessary for competent performance in the workplace. Additionally, higher levels of CF were associated with higher adaptability (Oprins et al., 2018; Rincón-Campos et al., 2019) and, in general, greater ability to establish interpersonal relationships (Mazur et al., 2014; Oprins et al., 2018; Swanson, 2015). CF was also positively related to greater adaptive capacity in organizations – according to the CF of the companies' managers and board of directors (Sanchez et al., 2017) –, tolerance to disagreement, and student performance. Also, the more cognitively flexible a professor/communicator is, the better the students' performance and the greater their tolerance in the face of disagreement (Swanson, 2015). In these cases, CF was investigated as an independent variable and an essential factor for the development of these abilities. CF is considered an important mediator in the inter-relationship between work roles and individuals' identities (Ong et al., 2019), though the social environment plays a crucial role in individuals' CF (Oprins et al., 2018).

Studies in which CF was considered the dependent variable reported high levels of CF positively related to 1. high levels of emotional intelligence (Mazur et al., 2014); 2. improved cognitive functions promoted by physical and technical-tactical training (Rincón-Campos et al., 2019); and 3. level of specialization among elite athletes, mainly among players who need to adapt their role within a game (Montuori et al., 2019). No direct correlations were found between project managers' CF and successful projects (Mazur et al., 2014), and, even though recreational vacation from work increased CF levels, such levels decreased when returning to the work environment (Bloom et al., 2014).

A significant and recurrent result found in the papers is that CF was negatively associated with sleep deprivation. The studies agree that the longer an individual remains awake, the lower their CF levels will be (Cheng et al., 2017; Maltese et al., 2016; O'Hagan et al., 2018), being lower than average of the general population (Cheng et al., 2017). These studies highlight that sleeping for an appropriate number of hours is determinant for preserving cognitive functions such as CF, and consequently, the workers' ability to perform work tasks and general performance.

The other negative correlations reported are the relationship between CF and: 1. psychological symptoms of work-related stress (Fernández-Sánchez et al., 2018; Sung et al., 2019), with CF being a protective factor against it (Sung et al., 2019); 2. burnout syndrome (BS), considering that workers with BS obtained significantly lower scores in CF assessments (Fernández-Sánchez et al., 2018); 3. impulsiveness, as it is negatively correlated with planning capacity (Rincón-Campos et al., 2019); 4. tendency to conformity, because cognitively flexible people tend to have innovative and deviant behaviors (Déprez et al., 2019); 5. work-related rumination (Cropley et al., 2016); 6. workers' age (Gajewski et al., 2010); 7. Over-educated workers (Gajewski et al., 2010; Grip et al., 2007); and 8. verbal aggressiveness (Swanson, 2015).

Discussion

The results reported here show that interest in the topic is recent, and the investigation of FC in the work environment is emergent. Most papers included in this review were published in the recent years (between 2015 and 2019). Furthermore, CF in the workplace has been mainly investigated from a quantitative perspective, reinforcing the studies' contemporaneity. Studies addressing this methodological approach usually seek to explore phenomena, associations, and relationships from an experimental perspective to confirm or refute the study's initial hypotheses (Gray, 2012).

Three to five researchers conducted most studies. In some cases, all the researchers belonged to the same country, but, in others, they did not. This aspect minimizes the concentration of knowledge and improves the quality of studies due to the exchange of experiences and knowledge (Mancebo et al., 2015). There are few Brazilian studies: only two studies were conducted in Brazil, while no other studies were found with the participation of Brazilian authors. Although we believe the predominance of papers in English may also be due to our decision to adopt only terms (descriptors) in this language, as it is the most frequent in international databases – such as Scopus and Web of Science –, we do not disregard the hypothesis that this research topic is still little explored in the Brazilian context.

The many studies focusing on workers in leadership positions suggest a need to investigate the relationship between these two constructs, which is still in the exploratory stage. Studies addressing health workers, military personnel, and professional athletes were the most frequently found. Qualitative studies investigated CF using various instruments (scales, inventories, neuropsychological and simulation tests). The instrument most used was the *Cognitive Flexibility Scale* (Martin & Rubin, 1995). Even though it is a self-report scale presenting one of the most precise and objective definitions of the phenomenon, it has not been adapted or validated for the Brazilian context.

The aspect concerning the CF definition draws attention and deserves to be discussed. Even though neuropsychology considers CF an essential construct in daily life (Hamdan

& Pereira, 2009; Rocha, 2018), it is more broadly defined and often little precise. This difficulty in conceptualizing it is also apparent among the studies included here and reported in the historical review conducted by Rocha (2018). The author mentions the difficulty in understanding how the CF concept is developed. Researchers tend to define it as a set of skills related to an efficient or flexible behavior instead of describing it as a competence that can be trained and is essential in the workplace. Based on the analysis of concepts and definitions most adopted, the following understanding of CF was established: the awareness, and the ability itself, that an individual has to choose behaviors and ways of thinking based on an analysis of the alternatives a given situation presents them. Additionally, the studies show that, as a metacompetence Yu et al., 2019), CF directly influences the development of other competencies, such as creativity, adaptability, planning capacity, decision-making, and problem-solving.

CF was also related to other executive functions, such as reasoning, problem-solving capacity, decision-making, and planning skills, while the assessment of these skills and functions predicted professional performance (Montuori et al., 2019; Roy, 2001). High levels of these functions directly influence CF, making workers more efficient (Cheng et al., 2017; Cropley et al., 2016; Roy, 2001; Wykes et al., 2012) even when other cognitive functions such as memory, are compromised (Wykes et al., 2012).

Regarding correlations, we highlight studies that report that the performance in tasks that need CF is significantly and negatively affected by sleep deprivation (Cheng et al., 2017; Maltese et al., 2016; O'Hagan et al., 2018). Other studies corroborate this finding, reporting that sleep deprivation or poor sleep regulation negatively impacted cognitive functions and work performance (Santos-Coelho, 2020; Silva et al., 2019). Regarding positive associations with adaptability and personal relationships, even though one of the studies concluded that CF does not influence competent communication (Roy, 2001), there is a research that reports that it is an essential factor for a competent communicator, associating it with assertiveness and responsiveness (Swanson, 2015).

Some results stood out and reinforced the importance of developing studies to acquire greater knowledge of this psychological phenomenon (or essential competence) to ground interventions intended to improve CF levels among workers. High CF levels among workers, for instance, were related to lower impulsiveness (Rincón-Campos et al., 2019), more deviant behaviors (Déprez et al., 2019), and fewer verbal aggressions (Swanson, 2015), as corroborated by Roy (2001) and Swanson (2015). Additionally, these workers presented fewer work-related ruminating thoughts (Cropley et al., 2016) and stress symptoms (Fernández-Sánchez et al., 2018; Sung et al., 2019).

Final considerations

This study's general objective was to analyze studies, indexed in Brazilian and international databases, that investigated CF in the work environment. Hence, the full texts of

24 papers were selected according to previously established criteria. This review presents relevant contributions to the fields of knowledge dedicated to understanding phenomena in the workplace, considering the emergent inclusion of CF as an essential competence for the work environment. Additionally, considering the current coronavirus disease 2019 (Covid-19) pandemic, a situation imposed since March 2020, we encourage reflections on how CF can be generalized to different contexts, possibly a relevant construct for developing the adaptive ability of workers in a context of changing labor relations, accelerated by the pandemic.

This study enabled verifying that, in general, investigating CF was not the studies' central objective, and it appears related or associated with the studies' primary phenomena. Besides, as interest in it is incipient, research is still exploratory. The construct was broadly defined with little precision, while CF was explained as a set of skills that include, among others, flexibility, adaptation, and creativity, instead of a single competence or specific construct. CF is strongly related to reasoning, problem-solving, decision-making, planning, and other competencies currently demanded in the professional context.

The choice of languages restricted this study and possibly led to publication bias, considering that the databases in which the studies were identified were international. Finally, we also suggest that further research address CF in the workplace, investigating the relationship between this competence and organizational factors, such as performance, leadership, and occupational diseases. Furthermore, there is a need to design interventions intended to promote CF, especially among people working in the night shift. The literature has extensively reported the various repercussions of the night shift on workers' health due to poor quality sleep.

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