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ORIGINAL RESEARCH

Composite Indicators to Measure Quality of Working Life in Europe: A Systematic Review

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Abstract
In the last two decades, Quality of Working Life (QWL) has become a core element of the European social model and the European Employment Strategy. "More and better jobs" is a strategic goal promoted within Europe for emphasising the attention in QWL. However, there is a large debate in the literature on the definition of QWL, its dimensions, and consequently on the methods to use for its measurement. To the best of our knowledge, the systematic reviews currently available in the literature on QWL measurement in European organisations investigate only a particular industry and/or working population. Moreover, they do not focus specifically on composite indicators, although they appear promising in facilitating QWL understanding and comparisons for supporting decision-makers and policy makers. To overcome these gaps, we conducted a systematic review to identify composite indicators for measuring QWL in European organisations. The review returned 19 studies that are analysed based on a set of factors related to QWL locutions, index name, geographical area, industry or population, level of analysis, dimensions, type of data, inputs, outputs, and test and/or validation. The results highlight a significant heterogeneity among the indicators, confirming the lack of an agreed upon QWL composite indicator for Europe. Such heterogeneity concerns also QWL dimensions. A critical comparison of the different composite indicators is provided, along with a unifying proposal of QWL macro-dimensions. Several gaps in the literature are pointed out suggesting directions for future research.

Keywords Job quality · Good job · Decent work · Employment · European Union · Composite indicator

1 Introduction

Quality of Working Life (QWL) has become subject of growing interest within the economic, social, sociological, and psychological research (Boccuzzo & Gianecchini, 2015; Díaz-Chao et al., 2016; Simões et al., 2015). An enhancement in QWL can bring benefits

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to workers and companies, improving working conditions, fostering workers' health and well-being, increasing work motivation, developing workers' skills, promoting sustainable work, growing productivity and competitiveness, and reducing unemployment (e.g. Díaz-Chao et al., 2017; Muñoz de Bustillo et al., 2009, 2011a; Santero-Sanchez et al., 2015; Šverko & Galić, 2014).

The literature has not reached a general agreement neither on a comprehensive QWL definition, nor on its measurement (e.g. Bäck-Wiklund et al., 2011; Barroso, 2018; Hurley et al., 2012; Jones et al., 2017; Leschke & Watt, 2014; Muñoz de Bustillo et al., 2011b; Schokkaert et al., 2011). QWL measurement is currently performed through a wide variety of indicators and methods (e.g. Boccuzzo & Gianecchini, 2015; Crespo et al., 2017; Muñoz de Bustillo et al., 2009). Some reviews investigating QWL measurements in a specific work sector or geographical area and/or focusing on a particular scientific database are available in the literature. For example, Muñoz de Bustillo et al. (2011b) provide a critical survey of 19 job quality indicators or systems of indicators developed for different scopes or contexts (e.g. European Union, developed and developing countries, USA). Phan and Vo (2016) analyse studies about specific tools and scales to assess QWL in medical organisations. Barroso (2018) has recently performed a methodological review of the most-cited articles indexed in the Scopus database to assess progress in the harmonisation of QWL concepts and measurement. However, these reviews do not focus specifically on composite indicators as a possible methodology for QWL measurement, although such approach appears particularly effective. A composite indicator for QWL measurement is "a single aggregate measure synthesizing the information of all the different attributes of job quality" (Muñoz de Bustillo et al., 2011b), and "the mathematical combination of individual indicators, each of which is related to a particular dimension of the phenomena to be analysed" (Santero-Sanchez et al., 2015). A composite indicator allows a univocal and unidirectional understanding of what QWL is, positioning and ranking the studied subjects or groups within a one-dimensional axis going from bad to good, as underlined by Muñoz de Bustillo et al. (2011b). The interest in composite indicators is largely acknowledged, since they are useful to: summarise complex or multi-dimensional issues for supporting decision-makers; enable users to compare complex dimensions effectively; reduce the size of a list of indicators; plan targets and control their achievement; attract public interest; and provide a transparent way for policy makers and public opinion (e.g. OECD and JRC European Commission, 2008; Saltelli, 2006; Tangian, 2005). Composite indicators have gained astounding popularity in all research areas, and can reflect a complex system consisting of numerous components, making it easier to understand in full rather than reducing it back to its spare parts (Greco et al., 2019).

Based on these arguments, the aim of this article is to carry out a systematic review to identify the composite indicators available in the literature for measuring QWL at the individual worker, job, or company level.

We decided to narrow the scope of our analysis to European organisations. Although the sense of a good job, working conditions, and rights could be slightly different across countries (Burgess & Connell, 2008; Sojka, 2014), through the Community Charter of the Fundamental Social Rights of Workers adopted in 1989 all the European Member States have committed to establish a shared social policy and shape the development of the European social model, thus fostering a common understanding also of QWL concept. In the last two decades, QWL has become a core element of the European social model and the European Employment Strategy (e.g. Bothfeld & Leschke, 2012; Dahl et al., 2009; Pena-Casas, 2009; Smith et al., 2008). Indeed, a strategic pillar of the European Employment Strategy and the Lisbon Strategy has been to promote more and better jobs within Europe

(European Commission 2001b), and the improvement of working conditions and job quality continues to be a significant goal in European policies, underpinning Europe's capacity to compete (Eurofound, 2017).

The results of our review will allow: (1) summarising the state of the art of the scientific literature concerning the various composite indicators for measuring QWL; (2) identifying similarities and differences among the several approaches; (3) comparing them for supporting the selection of the most suitable composite indicator for the QWL measurement in a specific European organisation; and (4) revealing possible gaps in the literature that should be addressed thanks to future research for reaching a consensual QWL measure.

2 Theoretical Background

The first important attempts to define QWL were by both Boisvert and Morton in 1977. The former states that QWL is a "set of beneficial consequences of working life for the individual, the organization and society" (Boisvert, 1977), while the latter refers to this concept as "every conceivable aspect of the work ethic and working conditions", including objective measures of working conditions, workers' expressions of satisfaction and dissatisfaction, and broader considerations of social cohesion and stability (Morton, 1977). Over the decades, several researches have emphasised different elements of this topic: according to Efraty and Sirgy (1990), and Sirgy et al. (2001), QWL is a conceptualisation related to satisfaction of various needs, whereas recently it has been linked to workers' own evaluations of job (Burchell et al., 2014) and individuals' subjective perception of their jobs (Santero-Sanchez et al., 2015).

Besides QWL, a plethora of related terms are used in the literature: "job quality", "employment quality", "quality of work", "quality in work", "good job", "quality of life at work", or "decent work".

Job quality is related to the set of work-and employment-related factors that have a positive and direct effect on the worker's well-being (Boccuzzo & Gianecchini, 2015). According to Eurofound (2012), it is the utility that a worker derives from his/her job, depending on job features (according to the subjective tradition), and is constituted by the job features and attributes that meet workers' needs from work (in the objective tradition). All these aspects are well summarised by Díaz-Chao et al. (2016, 2017), and Ficapal-Cusí et al. (2018), who describe job quality as an overall state of satisfaction that includes objective aspects of material well-being, satisfactory relationships with the physical and social environment, and objectively perceived health; and subjective aspects of physical, psychological and social well-being. Muñoz de Bustillo et al. (2009, 2011b) consider job quality as a set of employment quality and work quality. The former indicates all the elements potentially affecting workers' well-being related to the employment relation (e.g. type of contract, working hours, distribution of working hours, wage, social benefits), while the latter the ways that the activity of work itself and the conditions under which it is undertaken can affect the well-being of workers (e.g. work autonomy, physical working conditions, risk of accidents, social working environment). Steffgen et al. (2015) agree with these definitions, highlighting that quality of work is a concept that bridges the gap between job quality and employment quality. Other authors (Burchell et al., 2014; Santero-Sanchez et al., 2015) quote the terms "job quality" and "quality of work", referring as a concept focusing on the (objective) job content and work environment.

European Commission (2001a) defines quality in work (better jobs) as a relative and multi-dimensional concept taking into account objective characteristics of employment, worker characteristics, the match between worker characteristics and job requirements, and the subjective evaluation (job satisfaction) of these characteristics by the individual worker. Job satisfaction is contained also in the good job definition provided by Bang and Lee (2006): a good job is a concept related to wages as an economic compensation, to job status as a social status, and to job satisfaction as a subjective psychological criterion.

Job satisfaction can be characterised as "a global feeling about the job or as a related constellation of attitudes about various aspects or facets of the job" (Spector, 1997). Although some researchers (e.g. Diaz-Serrano & Vieira, 2005; Hurley et al., 2012; Simões et al., 2015) propose job satisfaction as a possible proxy of QWL, it is one of many possible outcomes of QWL not sufficient by itself for its complete description, and thus QWL is considered a much broader concept than job satisfaction (Carpita & Golia, 2012; Lawler, 1975; Sirgy et al., 2001; Sojka, 2014).

Another locution frequently mentioned in the literature related to QWL is "decent work", which refers to the converging focus of all the four strategic objectives of the International Labour Organization (ILO): promotion of rights at work, employment, social protection, and social dialogue (ILO, 1999). Ferraro et al. (2018) describe it as a concept created for promoting economic and social human development in the formal and informal economy. In other words, decent work is related to meaningful work and ethics that ensure fundamental values and principles at work through social dialogue among those involved in the decision-making processes regarding that work (Ferraro et al., 2017). The European Foundation for the Improvement of Living and Working Conditions (Eurofound) states that the decent work concept is similar in spirit but broader in the scope of needs that it addresses than job quality (Eurofound, 2012).

The above concise overview highlights the several differences and overlaps among all the QWL-related terms, which are often used interchangeably and indistinctively. For instance, Burchell et al. (2014) point out that expressions such as "quality of working life", "job quality", "quality of job", "quality of employment", and "decent work" are often used interchangeably and without clear definitions; Steffgen et al. (2015) remark that the terms "job quality", "quality of job", and "employment quality" are often used interchangeably, and clearly defining them remains a challenge; and Barroso (2018) states that the concept of "quality of work" is often used indistinctively from notions of "quality of working life" or "job quality".

The difficulties related to a shared QWL definition arise mainly from its multidimensional nature (Schnalzenberger et al., 2014; Schokkaert et al., 2011). This multidimensional nature should be captured by any indicator for the QWL measurement: the various dimensions affecting the work and employment should be defined, considered, and aggregated based on their impact on QWL (Muñoz de Bustillo et al., 2009, 2011a). Therefore, QWL should be evaluated by means of a multidimensional approach by using a combination of objective and subjective data and information (Díaz-Chao et al., 2016, 2017; Hurley et al., 2012). Indeed, two perspectives can be identified in the literature: (1) an objective one, linked to working environment characteristics and objective features of the job, such as security, ergonomics, technology, management systems, organisation processes, and salary, and (2) a subjective one, relating to employee work preferences and their perceived fulfilment, e.g. satisfaction, attitudes, motivation, commitment, and pride (Díaz-Chao et al., 2016; Holman, 2013). As a consequence, the QWL measurement methods can adopt an objectivist approach, a subjectivist approach, or a multi-faceted approach. Multi-faceted

approaches represent a mix of the two, including both objective facets of the job and subjective perceptions of the worker (Boccuzzo & Gianecchini, 2015).

In addition, a combination of dynamic and static interpretations should be adopted (Díaz-Chao et al., 2016, 2017), since the dimensions and conditions establishing QWL may change and evolve over time, varying across locations, countries, organisations, and industries, and among individuals, in terms of preferences and priorities (Burgess & Connell, 2008; Jones et al., 2017; Sojka, 2014). In particular, individuals' evaluations of job quality evolve over time, as an individual's work experience at any one time determines his/her expectations about future work activities and affect his/her work-related behaviours (Boccuzzo & Gianecchini, 2015).

Consequently, the required wide-ranging data and information, the numerous sets of possible dimensions, and the actual multidimensional nature of QWL make the definition of a QWL indicator a debated topic (Muñoz de Bustillo et al., 2009, 2011a).

To capture all these concepts in their broadest sense, we refer mainly to "quality of working life" locution in this paper, using all the previous locutions (with the exception of job satisfaction) as synonyms in our literature selection and review. We consider "working life" as the employees' experience of working conditions and work-life balancing issues that can impact their lives. Consequently, QWL is the set of characteristics of work, characteristics of working and non-working life balance, and employees' evaluation of these characteristics. Our aim is to obtain the widest spectrum of composite indicators for measuring QWL, including both objectivist and subjectivist approaches, both static and dynamic interpretations, in order to characterise the state of the art of the literature and correlate the several existing locutions with the main features and dimensions of the different composite indicators. Indeed, the provision of a comprehensive overview could allow researchers and practitioners to select the indicator that best suits their needs and/or give them useful information to build a new indicator.

3 Methods

A systematic review allows identifying key scientific contributions to a field, and exploring a clearly specified question (Denyer & Tranfield, 2009; Tranfield et al., 2003). Since our systematic review fits the management and organisation studies, we conducted it according to the principles and guidelines defined by Briner and Denyer (2012), Denyer and Tranfield (2009), Denyer et al. (2008), and Tranfield et al. (2003), following the steps shown in Fig. 1 and described in the next paragraphs.

3.1 Research Question and Eligibility Criteria

The systematic review begins with the research question formulation to establish its focus. Our research question is: "Which composite indicators can be used to measure QWL in European organisations?". For our review, we adopted the framework based on CIMO logic and concepts (Denyer et al., 2008). In particular, the CIMO keywords have been defined as follows:

- Context (C): Europe;
- Interventions (I): QWL;
- Mechanisms (M): not present in this review;

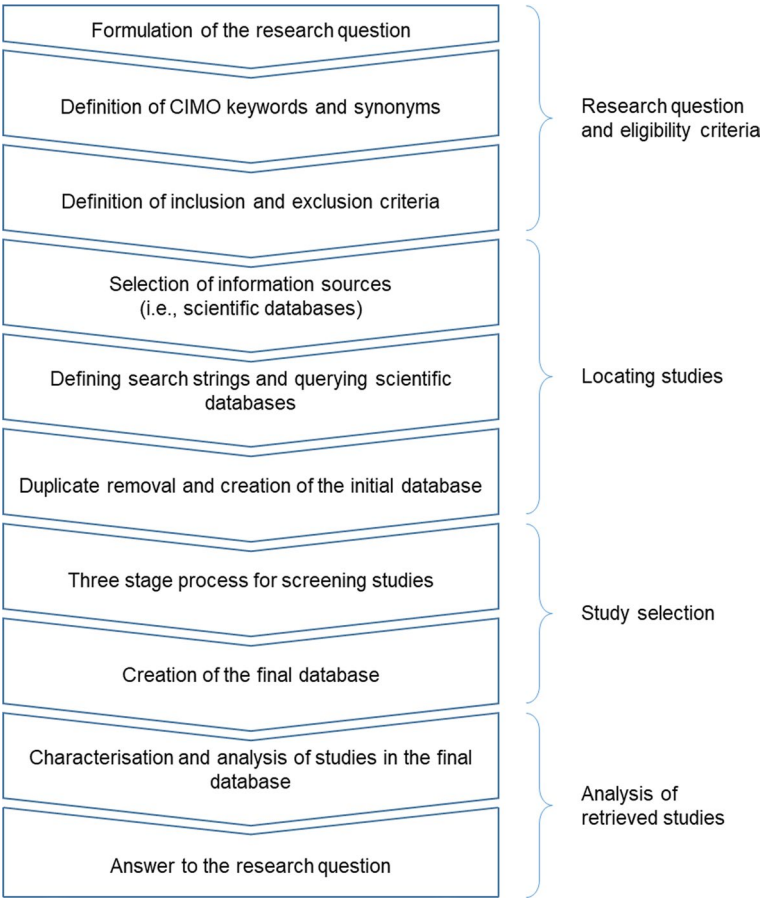

Fig. 1 Search strategy and analysis of the selected studies

- Outcome (O): indicator.

To capture all relevant studies and produce a comprehensive review, we defined a set of synonyms and related terms for each CIMO keyword thanks to the conduction of scoping studies. We expressed the Context concept through nouns and adjectives of Europe (politico-economic union), European regions and/or countries: we did not specify more detailed geographical areas (e.g. cities or districts). The defined synonyms are listed in Table 1.

The relevance of each study to the research question was assessed based on the inclusion (or eligibility) and exclusion criteria listed in Table 2.

3.2 Locating Studies

By means of synonyms and related terms of each CIMO keyword, Boolean operators, and simple operators (e.g. truncation characters), we constructed several search strings to adhere to the different search conventions of each database. The following key databases within the field of management were searched, considering studies published before 31

Table 1 Synonyms of each CIMO keyword

CIMO concept	Keyword	Synonyms
Context	Europe	Austria, Austrian, Balkan, Baltic, Belgium, Belgian, Benelux, British, Bulgaria, Bulgarian, Cyprus, Cypriot, Czechia, Czech, Danish, Denmark, Dutch, English, Estonia, Estonian, European, Finland, Finnish, France, French, German, Germany, Greece, Greek, Holland, Hungary, Hungarian, Iberia, Iberian, Ireland, Irish, Italy, Italian, Latvia, Latvian, Lithuania, Lithuanian, Luxembourg, Luxembourgish, Malta, Maltese, Netherlands, Poland, Polish, Portugal, Portuguese, Romania, Romanian, Rumania, Rumanian, Scandinavia, Scandinavian, Slovak, Slovakia, Slovakian, Slovene, Slovenia, Slovenian, Spain, Spanish, Sweden, Swedish, United Kingdom
Interventions	QWL	Better job, Decent work, Employment quality, Good job, Good work, Job quality, Quality at work, Quality employment, Quality feature of job, Quality feature of work, Quality in work, Quality job, Quality of employment, Quality of life at work, Quality of the employment, Quality of work, Quality of working life, Work life quality, Working life quality, Work quality, Work-related quality
Outcome	Indicator	Analyse, Analysis, Application, Apply, Approach, Assess, Assessment, Audit, Classification, Classify, Compare, Comparison, Correlate, Correlation, Decision, Define, Definition, Demonstrate, Demonstration, Describe, Description, Design; Determine, Determination, Equation, Estimate, Estimation, Evaluate, Evaluation, Exam, Examine, Examination, Explore, Exploration, Framework, Index, Investigate, Investigation, Map, Mean, Measure, Measurement, Method, Methodology, Model, Predict, Prediction, Program, Proposal, Propose, Rank, Relate, Relation, Review, Study, Summarise, Summary, Survey, Technique, Test, Theory, Tool, Valuate, Valuation

Table 2 Inclusion and exclusion criteria

Aspect	Inclusion (eligibility) criterion	Exclusion criterion
Type of document	Journal article, conference paper, book chapter, case study, and magazine article if indexed by the selected databases	Review, editorial, letter, only abstract (e.g. Guglielmi et al., 2010)
Language	English full-text	Other language (e.g. Pusch & Rehm, 2017)
Context	Study proposing a composite indicator specific to, or declared explicitly applicable to, the European context	Study proposing a composite indicator without specifying the geographical context (e.g. Martel & Dupuis, 2006), or only applicable for non-European contexts (e.g. Secapramana & Nugroho, 2017)
Interventions	Study proposing a composite indicator to measure QWL	Study considering job satisfaction as a proxy of QWL (e.g. Leontaridi et al., 2005)
	Study proposing a composite indicator measuring QWL at the individual worker-job or company level	Study proposing a composite indicator measuring QWL at the national or international level (e.g. Weinkopf, 2014), or explicitly declared for cross-country comparison (e.g. Leschke & Watt, 2014)
Outcome	Study proposing a new composite indicator for measuring QWL	Study solely focused on a qualitative discussion of some features of the concept (e.g. Simms, 2017), or presenting measures to improve QWL (e.g. Stepanova et al., 2015)
		Study presenting an application of previously defined composite indicators (e.g. Vinopal, 2012), or referring to other studies for relevant details about the indicator (e.g. Sutherland, 2016)
		Study proposing systems of indicators, considering one or more dimensions without aggregation (e.g. Jones et al., 2017), or measuring the self-evaluated/self-perceived QWL through a single question (e.g. Dolan et al., 2008)

July 2018: EBSCO (all databases, scholarly journals), EMBASE, Emerald, PubMed, Scopus, and Web of Science. A starting date was not defined in order not to exclude potentially relevant papers and to extend the search from the date of the oldest indexed paper of each database.

Scoping studies help to assess the relevance and size of the literature and to delimit the subject area or topic (Tranfield et al., 2003). Based on the outcomes of preliminary scoping studies, we searched for keywords and synonyms of the Context and Interventions concepts only in title, abstract, and keywords fields. On the contrary, terms related to the Outcome concept were searched in all the available fields to maximise the results provided by bibliographic databases.

We employed Endnote® X9 as a reference management software for recording references, storing information accurately, removing multiple records, and creating a unique database of references. The subsequent manual removal of other duplicates allowed obtaining a unique library representing our initial database.

3.3 Study Selection

We performed the study selection through a screening process in a Microsoft® Excel spreadsheet created from the initial database. The screening process consisted of three stages (Stefana et al., 2015): (1) title evaluation, (2) abstract and keywords evaluation, and (3) full-text evaluation. In each stage, three reviewers critically appraised the records in parallel; all the documents selected by at least one reviewer have been promoted to the successive screening stage to minimise the chance to discard relevant papers.

In particular, irrelevant studies were removed during screening stages (1) and (2), as established by Higgins and Green (2008). For example, we discarded the studies related to the quality of products or tasks performed by workers, and documents identified as reviews or editorials.

During the last screening stage, we examined the full-texts of the remaining documents based on all the eligibility criteria listed in Table 2. As a consequence, we collected the included documents in the final database (i.e. the documents that answer the research question), and recorded the primary reason for exclusion of the other papers.

The intermediate and final results of the study selection process are summarised in Fig. 2, as recommended by Moher et al. (2009).

Finally, we characterised and analysed the documents included in the final database. These documents provide the answer to the research question, whose main features are described in detail in the following sections.

4 Results

The systematic review returned 19 documents, each one proposing a different composite indicator to assess QWL. The majority are journal articles (13 out of 19), a few book chapters (5 out of 19) (Clark, 2005; McClelland & Holman, 2015; Muñoz de Bustillo et al., 2011a; Paugam & Zhou, 2008; Ventegodt et al., 2009), and only one is a conference paper (Addabbo et al., 2007). The journal that published the highest number of papers is "Social Indicators Research" with 3 papers, followed by "Work, Employment and Society" with

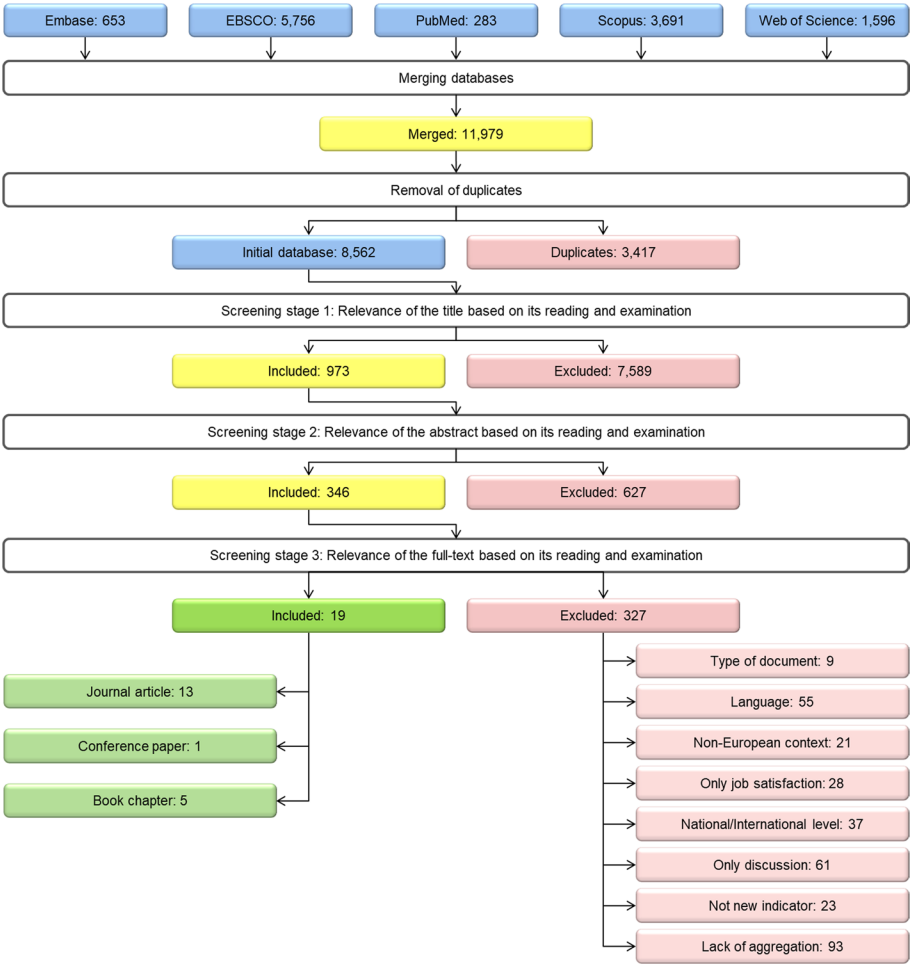

Fig. 2 Flowchart of the systematic review

2 papers. The most recent papers (i.e. Arranz et al., 2018; Warren & Lyonette, 2018) are published in these two journals.

In order to analyse the documents of the final database, we identified a set of factors useful to highlight the distinguishing features of the proposed composite indicators: (1) terms and locutions used for describing the QWL concept; (2) name of the index; (3) geographical area in which the study is carried out; (4) industrial sector or population for which the composite indicator is developed; (5) level of analysis of the QWL composite indicator (individual worker-job/company), (6) QWL dimensions considered by the composite indicator; (7) type of data employed for the study (primary/secondary); (8) type of inputs of the composite indicator (subjective/objective); (9) type of composite indicator outputs (qualitative/quantitative); and (10) composite indicator test and/or validation. Table 3 shows the characterisation and comparison of the 19 documents with respect to such factors.

Table 3 Comparison of QWL composite indicators

Reference	QWL locutions	Index name	Geographical area	Industry or population	Level of analysis	Dimensions					
						Control	Economic	Ergonomic	Complexity	Social	Work life balance
Addabbo et al. (2007)	Quality of work	Quality of work	Italy	Not defined	Individual worker-job	×	×	×	×	×	×
Argentero et al. (2007)	Quality of work life	Quality of work life	Italy	Health organisations	Individual worker-job	×	×	×	×	×	
Arranz et al. (2018)	Job quality, Employment quality (not focus on intrinsic quality of work)	Employment Quality Index (EQI)	Italy, Spain	Not defined	Individual worker-job			×	×		×
Boccuzzo and Gianecchini (2015)	Job quality	Job Quality Composite Indicator (JQCI)	Italy	Young graduates	Individual worker-job	×	×		×		×
Clark (2005)	Job quality, Good job	Job quality index	European countries of OECD	Not defined	Individual worker-job	×	×	×		×	
Crespo et al. (2017)	Job quality, Good job	Job quality index	27 EU Member States	Not defined	Individual worker-job	×	×	×	×	×	×
De Waal et al. (2012)	Quality of work	Quality of work	The Netherlands	Insurance company	Individual worker-job	×		×			
Gorjup et al. (2009)	Job quality	Job quality index	Spain	Call centres	Company		×				
Heiskanen and Jokinen (2014)	Quality of working life	Quality of working life	Finland	Social, health, education, administration sectors	Individual worker-job	×			×	×	

Table 3 (continued)

Reference	QWL locutions	Index name	Geographical area	Industry or population	Level of analysis	Dimensions					
						Control	Economic	Ergonomic	Complexity	Social	Work life balance
Holman (2013)	Job quality	Job quality	Austria, Denmark, France, Germany, Sweden, United Kingdom	Call centres	Company	×	×		×		×
Jones et al. (2014)	Job quality, Good work, Good job	Deutscher Gewerkschaftsbund Good work Index (DGB-Index)	United Kingdom	Bus drivers	Individual worker-job	×	×	×	×	×	×
McClelland and Holman (2015)	Job quality; Quality of job	Total Job Quality Index (TJQI)	27 EU Member States	Not defined	Individual worker-job	×	×	×	×		×

Table 3 (continued)

Reference	QWL locutions	Index name	Geographical area	Industry or population	Level of analysis	Dimensions					
						Control	Economic	Ergonomic	Complexity	Social	Work life balance
Muñoz de Bustillo et al. (2011a)[1]	Job quality	Job quality index	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, The Netherlands, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom	Not defined	Individual worker-job	×	×	×	×	×	×

Table 3 (continued)

Reference	QWL locutions	Index name	Geographical area	Industry or population	Level of analysis	Dimensions					
						Control	Economic	Ergonomic	Complexity	Social	Work life balance
Paugam and Zhou (2008)	Job quality, Quality of job, Quality of work life, Quality of work, Work quality	Job quality	Denmark, France, Germany, Spain, Sweden, United Kingdom	Not defined	Individual worker-job	×	×	×	×	×	×
Santero-Sanchez et al. (2015)	Job quality	Composite Index of Job Quality (CIJQ)	Spain	Hospitality industry	Individual worker-job		×	×	×		×
Simões et al. (2015)	Job quality	Job quality index	27 EU Member States (excluded Luxembourg, Malta, Estonia, Slovenia)	Not defined	Individual worker-job	×	×	×	×	×	×
Sojka (2014)	Quality of work life	Quality of work life	Slovakia	Not defined	Individual worker-job	×	×	×	×	×	
Ventegodt et al. (2009)	Quality of working life, Working life quality	Quality of working life	Denmark	Not defined	Individual worker-job	×	×	×	×	×	
Warren and Lyonette (2018)	Job quality, Good work, Good job	Job quality	Britain	Not defined	Individual worker-job	×	×	×	×		×

Table 3 (continued)

Data		Inputs		Outputs		Test and/or validation
Primary	Secondary	Subjective	Objective	Qualitative	Quantitative	
×		×			0–1	Test on a sample
×(Semi-structured interviews)		×			0–100	Test on a sample
	×(Spanish and Italian Labour Force Survey)		×		0–100	Test on a sample, index tested for robustness
	×(Agorà Survey)	×	×		0–1	Test on a sample, validation
	×(International Social Survey Programme)	×	×		0–7	Test on a sample
	x (European Working Conditions Survey)	×	×		0–1	Test on a sample
×(Internet questionnaire)		×			0–1	Test on a sample, validation
×(Mail survey, face-to-face questionnaire)			×		0–100	Test on a sample, validation
x (Web-based/paper questionnaire)		×		×	1–5	Test on several samples
	×(Mail/online/telephone questionnaire)		×		0–100	Test on several samples
×(Questionnaire)		×		×	0–100	Test on a sample
	×(European Working Conditions Survey)		×		0–100	Test on a sample, validation
	×(European Working Conditions Survey)	×	×		0–100	Test on a sample
	×(Eurobarometer surveys)	×			1–4	Test on a sample
	×(Spanish National Labour Force)		×		Real number	Test on a sample, validation
	×(European Working Conditions Survey)	×	×		0–1	Test on a sample
×		×	×		0–1	Not tested

Table 3 (continued)

Data		Inputs		Outputs		Test and/or validation
Primary	Secondary	Subjective	Objective	Qualitative	Quantitative	
×(Self-administered questionnaire)		×			0–90	Test on a sample, not fully validation
	×(Skills and Employment Survey)	×	×	×	0–12	Test on a sample

The results for Muñoz de Bustillo et al. (2011a) are based on Chapter 5 titled "The construction of a European job quality index"

4.1 Terms and Locutions for the QWL Concept, and Index Name

More than ten phrases are used to express the QWL concept. The majority of the studies (10 out of 19) refer to "job quality" and/or locutions composed by "quality" and "job", while 7 papers use "quality" and "work" terms. The other studies adopt various locutions, e.g. employment quality and good job/work. None paper refers to "decent work", probably because the papers using such wording usually aim to inform policy makers and focus on comparisons among countries using also data on the labour market, which cannot be referred to the individual worker/job or company level. The name of the index usually coincides with the locution used to express the QWL concept. Only three papers make explicit the multidimensional nature of the index including in the name terms such as "composite" (Boccuzzo & Gianecchini, 2015; Santero-Sanchez et al., 2015) or "total" (McClelland & Holman, 2015).

4.2 Geographical Area, Industry or Population, and Level of Analysis

The majority of the documents (11 out of 19) focus on only one European country. Three papers are concentrated only on Italy, but on different populations. Specifically, Argentero et al. (2007) concentrate the attention on health workers in seven different operating units, Boccuzzo and Gianecchini (2015) analyse young graduates, and Addabbo et al. (2007) test their model through a sample of employees working in firms of different sizes and belonging to different industries. Two articles consider only Spain: Gorjup et al. (2009) examine call centre workers, and Santero-Sanchez et al. (2015) pay attention to hospitality industry. Two studies are carried out in the United Kingdom: Jones et al. (2014) investigate bus drivers, while Warren and Lyonette (2018) women workers in part-time jobs in Britain. One document (Ventegodt et al. 2009) concentrates on Denmark, whereas another (Heiskanen & Jokinen, 2014) on Finnish municipalities. Lastly, De Waal et al. (2012) examine workflow management system end users in a social insurance company in the Netherlands, while Sojka (2014) studies QWL in Slovakia.

Other documents propose QWL composite indicators applied in multiple countries. For instance, Arranz et al. (2018) provide an index that serves to measure employment quality both in Spain and in Italy. Holman (2013) focuses on call centre agents in Austria, Denmark, France, Germany, Sweden, and UK, whereas Paugam and Zhou (2008) on industry, and retail and hotels in Denmark, France, Germany, Spain, Sweden, and UK. The remaining five documents (i.e. Clark, 2005; Crespo et al., 2017; McClelland & Holman, 2015; Muñoz de Bustillo et al., 2011a; Simões et al., 2015) refer to a larger set of European countries.

In terms of the level of analysis, only two composite indicators are calculated at the company level (Gorjup et al., 2009; Holman, 2013). Both of them focus on call centres. All the other QWL composite indicators are intended to assess the individual worker or job, and can usually be aggregated to compare types of work, group of workers, or labour markets. For example, Arranz et al. (2018) aggregate individual values of their employment quality index to compare workers that hold an open-ended contract, with workers with temporary contracts hired directly by companies, and those working through a temporary help agency across different countries. McClelland and Holman (2015) consider job quality of vulnerable workers in growing and declining sectors of the European economy by aggregating their Total Job Quality Index by gender, age, and sector for comparison.

4.3 QWL Dimensions

Our review confirms that the number of dimensions considered to calculate QWL is highly variable, ranging from 2 (De Waal et al., 2012) to 22 (Ventegodt et al., 2009). In addition, the different authors refer to dimensions by means of various names, such as dimensions, variables, or components. A list of the dimensions considered in each document is presented in Table 4 located in Appendix. To enable a comparison of the proposed composite indicators we decided to classify the dimensions considered by each indicator into six macro-categories, namely: control, economic, ergonomic, complexity, social, and work life balance. These categories, adapted from the proposals by Addabbo et al. (2007) and McClelland and Holman (2015), have been selected since they appear to be able to accommodate the miscellaneous dimensions included in the 19 QWL composite indicators identified in the literature.

The "control" dimension refers to the degree of freedom or discretion the worker has within his/her job, for example in terms of autonomy in managing working rhythms, possibility of direct agreement with colleagues and management/entrepreneur. We include in this dimension also the features of jobs that allow workers to speak up about work-related issues of importance to them, in terms of representation and voice.

In the "economic" dimension we consider the remuneration of the job and its security, for example in terms of earnings, seniority, job security, social insurance, profit sharing, wage, career perspectives, and protection.

The "ergonomic" dimension refers to working conditions and environment, for example in terms of work environment (e.g. individual space, smokes and fumes, dust), pace and intensity, cognitive effort, and stress.

The "complexity" dimension assesses the requirement for workers to use or develop skills within their job, for instance in terms of acknowledgment of one's capabilities, job variety and richness, effort required, and training.

The "social" dimension deals with the quality of workers' relationships with colleagues, management/entrepreneur, and subordinates, considering also elements connected to others' esteem, acknowledgment of professional abilities, sharing firm's decision, work life satisfaction, and job satisfaction.

The "work life balance" dimension considers the possibility for the workers to balance their work and life commitments, for instance in terms of maternity protection, parental leaves, management and availability of paid holidays, participation of employees in management of working hours distribution and shifts, and availability of family-friendly policies.

The results show that the dimensions considered by the majority (84%) of the QWL composite indicators are "control", "economic", and "complexity". The less considered are "social" and "work life balance", respectively in 11 and 12 indicators out of 19. Only 6 composite indicators integrate all QWL dimensions, while 4 indicators focus only on 3 dimensions or less.

4.4 Data, Inputs, Outputs, and Test and/or Validation

One of the main differences among the QWL composite indicators proposed in the literature concerns the data used for their calculation. In 8 cases out of 19 the study relies on primary data (i.e. data specifically gathered for the purpose of that study), whereas in the remaining 11 cases on secondary data (i.e. data collected for other purposes and then

reused). Unfortunately, only for half of the studies collecting primary data the full set of questions/items used is provided (De Waal et al., 2012; Gorjup et al., 2009; Heiskanen & Jokinen, 2014; Ventegodt et al., 2009). The main source of secondary data appears to be the European Working Condition Survey (EWCS), which is used in 4 cases. Three of them also specify the questions of the EWCS providing the data necessary for calculating the composite indicator (Crespo et al., 2017; Muñoz de Bustillo et al., 2011a; Simões et al., 2015). The EWCS has been run every five years since 1990 in European countries surveying a random sample of workers, both employees and self-employed. Other sources of secondary data are national labour force surveys (e.g. Arranz et al., 2018; Santero-Sanchez et al., 2015; Warren & Lyonette, 2018), European surveys (e.g. Paugam & Zhou, 2008), and the International Social Survey Programme (Clark, 2005).

The three approaches traditionally employed in QWL measurement (i.e. subjectivist, objectivist, multi-faceted) are well represented in the results of our review. Indeed, the majority of QWL composite indicators adopt either a subjectivist (7 out of 19) or multi-faceted approach (7 out of 19), while only 5 a purely objectivist one. The composite indicators adopting a purely objectivist approach mainly use "job quality" locution. Furthermore, it emerges that all the indicators that consider the "social" dimension need to rely on subjective inputs. Indeed, it would be difficult to assess the quality of workers' relationships through objective data. The documents focusing on "work" or "working life" are always subjectivist or multi-faceted, while those focusing on "job" or "employment" are always objectivist or multi-faceted. Among the three documents utilising the terms interchangeably, two are subjectivists and one multi-faceted.

Regardless the type of input data used, and thus of approach, the output of all composite indicators is expressed in a quantitative way, as a single numerical value. The composite indicator is calculated through aggregation of the scores of the single QWL dimensions. The majority of papers employ a weighted arithmetical mean (e.g. Arranz et al., 2018; Boccuzzo & Gianecchini, 2015; Holman, 2013) or sum (e.g. Argentero et al., 2007; Warren & Lyonette, 2018), often followed by normalisation (e.g. McClelland & Holman, 2015). Only Muñoz de Bustillo et al. (2011a) adopt a geometrical mean. In a few cases all dimensions have the same weight (e.g. Crespo et al., 2017; Ventegodt et al., 2009). In other cases, a more complex aggregation approach is adopted. For example, Addabbo et al. (2007) use fuzzy sets and fuzzy rules. The majority of QWL composite indicators range between 0 and 100 (7 out of 19) or are expressed as percentages (6 out of 19). The remaining authors adopt other scales, which in one case (Santero-Sanchez et al., 2015) spans also negative values. Only in 3 cases some qualitative outputs are proposed in addition to a numerical index. For example, Jones et al. (2014) classify jobs into good, medium, or poor, while Heiskanen and Jokinen (2014) rank QWL level as low, medium, and high. For appreciating the wide spectrum of composite indicators, a brief description of each approach is available in Table 4 located in Appendix.

The majority of the proposed composite indicators (12 out of 19) have only been tested on one or more samples. Only five have been fully validated, while in one case (Arrranz et al., 2018) the index has been tested for robustness. One indicator is only defined, but not tested (Sojka, 2014).

5 Discussion

This systematic review retrieved 19 documents proposing a composite indicator to measure QWL in European organisations. These indicators are considerably heterogeneous in terms of all the comparison factors we have taken into consideration in our analysis. This result confirms that the previous widespread statement regarding the absence of an agreed QWL composite indicator (e.g. Bäck-Wiklund et al., 2011; Green, 2006; Hurley et al., 2012; Mitlacher, 2008; Muñoz de Bustillo et al., 2011b; Santero-Sanchez et al., 2015) remains valid also by narrowing the scope of the analysis to Europe. This suggests that the objective to foster a European common understanding of QWL concept is far from being achieved. This calls for further investments on the political level by European institutions.

Our results show that in Europe there is no a unique locution for indicating QWL, and this contributes to increase the confusion about the concept and its measurement. However, it can be observed that terms such as quality of "work" or "working life" are used by those indicators interested at least in the subjective perceptions of the workers. On the contrary, "job" or "employment" are preferred by the indicators that aim to assess at least the objective features of the job. Therefore, authors proposing new QWL composite indicators are recommended to use locutions consistently with this distinction. Similarly, the name of the composite index could provide a hint on the type of approach to organisations selecting the composite indicator most suitable for their needs.

This review highlights that there is no consensus on the dimensions to include in QWL and on their names. An attempt to define a comprehensive set of QWL macro-dimensions has been made in this paper, adapting the work by Addabbo et al. (2007) and McClelland and Holman (2015). The proposed set of dimensions has proven able to accommodate the variety of aspects considered by the different authors, and aims to provide a unifying view of such debated issue. The results show that only 6 composite indicators consider all QWL dimensions. The most neglected is the "social" one. This could partially be explained by the fact that it can be assessed only through subjective inputs, which might be more difficult to collect. Ideally, future proposal of QWL composite indicators should provide a wider coverage of all QWL dimensions, trying at the same time not to increase the complexity and effort required for their implementation.

The majority of QWL composite indicators found in the literature have been developed and tested only in one European country, usually focusing on a specific population. This means that they tend to be tailored to that specific context, hindering their applicability at the European level, in other industries, or for further worker populations. In addition, they almost neglect Eastern European countries, which would particularly benefit from more attention to QWL, as suggested by their poor performance emerging from recent studies (Simões et al., 2015). This calls for additional comparative studies investigating the differences among European countries and industries, not only in terms of QWL level, but also in terms of understanding of the QWL concept.

In terms of the level of analysis, the large majority of composite indicators are assessed at the individual worker or job level, and can usually be aggregated to compare types of work, group of workers, or labour markets. The indicators focusing on the company level are only two, and specific for call centres. The higher the level of investigation, the less the data and the effort required to carry out the analysis. Indeed, it is enough to interview the managers of the call centre, not all the call centre workers, to get a measure of QWL

performance of the entire centre. The other side of the coin is that such indicators are not able to assess all QWL dimensions, and could adopt only an objectivist approach. For instance, they completely neglect the "ergonomic" and "social" dimensions that are better investigated through individual workers' perceptions. Therefore, it appears that the individual worker or job level is the only one enabling the assessment of all QWL dimensions.

One of the main criticalities of QWL composite indicators is the resources required for data collection. For this reason, the majority of studies rely on secondary data. That becomes a necessity if the sample under investigation includes more than one country. Our review has underlined several sources of data available at national, European, and international level (such as the EWCS) useful to assess QWL and its variation across time, which could be accessed also by other researchers interested in this topic. In addition, 3 out of 4 indicators using the EWCS provide the full list of items used, although different among the studies, thus facilitating the replicability of the studies or implementation of the proposed indicator. On the contrary, only half of the studies collecting primary data offer the full set of questions/items, thus hindering their implementation by other organisations or researchers. It would be desirable that future proposals of QWL composite indicators provide all the data collection instrument details to enable their actual application.

To facilitate the use of a composite indicator, also the weighting and aggregating procedure, which are often quite complex, should be well documented. However, the possibility to assign differentiated importance weights to QWL dimensions raises the question whether the dimensions have the same relevance in every context in order to assess QWL, or if the weights should be context-specific. The uniformity of weights facilitates cross comparisons, but it might be reasonable to suppose that some dimensions may contribute to QWL more than others in different jobs or industries. Therefore, it would be important for QWL composite indicators to highlight the diverse importance of each dimension in characterising a country, an industry, or a working population. Interesting approaches for assigning a relative weight to each dimension are provided by Holman (2013), Muñoz de Bustillo et al. (2011b), and Decancq and Lugo (2013).

The surveyed QWL composite indicators are always expressed in a quantitative way, and only a few authors also propose a scale to label the scores according to qualitative categories. Although the quantitative value is more precise, qualitative categories might be an additional piece of information to facilitate comprehension and interpretation of results also by individual workers or a less specialised audience.

Unfortunately, the majority of the proposed composite indicators have not been fully validated, thus undermining their reliability. Extensive testing and proper validation of the indicators would be highly recommended.

Finally, each indicator could be complemented with recommendations about actions that can be implemented for improving the QWL level, based on the outcome of the assessment and analysis of the weakest dimensions in the specific context under investigation.

6 Conclusions

This paper proposes a systematic review of the composite indicators available in the scientific literature to measure QWL in European countries. Our research focuses on composite indicators and Europe, not investigating a particular industry and/or working population. Through a rigorous and reproducible methodology, we identified 19 documents and analysed them based on a set of significant factors related to QWL locutions, index name,

geographical area, industry or population, level of analysis, dimensions, type of data, inputs, outputs, and test and/or validation. The results confirm the absence of an agreed upon composite indicator of QWL at the European level, the lack of consensus on QWL dimensions, and the proposal of different kinds of approaches (e.g. objectivist, subjectivist, or multi-faceted).

A critical comparison of the different composite indicators, highlighting their main strengths and weaknesses, is given. We also propose a set of QWL macro-dimensions able to accommodate the variety of aspects considered by the different authors with the purpose to outline a unifying framework for such open dispute.

We believe that this paper has both theoretical and practical contribution. On the theoretical side, it provides scholars and academics with an overview of the state of the art of scientific literature about composite indicators for evaluating QWL in Europe. It also points out several gaps that suggest possible directions for future research. On the practical side, the critical comparison of QWL composite indicators could support practitioners in the selection of the most suitable indicator for their specific organisation.

Appendix

See Table 4.

Table 4 Composite indicators description and related dimensions

Reference	Description	Dimensions (items)
Addabbo et al. (2007)	Multidimensional fuzzy expert system in which the dimensions are the final inputs (by means of intermediate systems combining elementary variables by giving different weights to each variable) and have the same weight in determining QWL. Different levels of variables, description of several linguistic attributes for the inputs/indicators and intermediate variables, rule blocks containing the control strategy of the fuzzy system provided	Control dimension (Relation with colleagues, Relation with management/entrepreneur, Autonomy in managing working rhythms, Possibility of direct agreement with colleagues); Economic dimension (Earnings, Seniority, Job security, Social insurance, Profit sharing schemes, Wage/Firm's pay differentials schemes, Fringe benefits, Learning and training, Maternity protection, Parental leaves, Career perspectives); Ergonomic dimension (Work environment pace and intensity, Cognitive effort, Stress; Complexity dimension (Acknowledgment of one's capabilities, Job variety and richness, Effort required, Training); Social dimension (Others' esteem, Acknowledgment of professional abilities, Career perspectives, Sharing firm's decision, Work life satisfaction, Job satisfaction); Work life balance (Maternity protection, Parental leaves, Management and availability of paid holidays, Participation of employees in management of working hours distribution and shifts, Availability of family-friendly policies)
Argentero et al. (2007)	Interview to identify the 5 most important aspects, evaluate these aspects (i.e. their satisfaction rates), and assign a weight to each aspect in terms of relative contribution towards QWL. QWL overall score calculated by multiplying the satisfaction rate of each aspect and the weight ascribed and by summing the scores	Relationship (Relationship with colleagues, Communication, Work team, Relationship with management); Treatment/Taking Care of Patients (Relationship with patients, Emotive reactions to patients); Work organisation (Distance from home, Bureaucracy, Objectives, Work shift, Organisation, Technical ability, Work environment); Professional growth (Salary, Career, Professional learning); Professional grade (Independence, Professionalism, Role)
Arranz et al. (2018)	Sub-dimensions/components of 3 dimensions defined to determine the value of the dimensions based on weighted averages (components in the same hierarchical level have equal weights within each dimension). Employment Quality Index (EQI) calculated by multiplying the value of the 3 dimensions by their weights (different among dimensions, but such that the weight of each component in the EQI is the same)	Working conditions (Working part-time by reason, Usually working more hours than agreed or contained in the labour contract or the collective agreement, Wishing to work more or fewer hours than currently, Working in companies with fewer than 50 employees / 50 or more employees); Skills and training (Having undertaken on-the-job training activities funded by the company in the four weeks prior to the interview, Level of qualification required by the job, Skills mismatch); Work-life balance (Regular weekly working hours in the main job, Work in "anti-social" hours, Working in a shift system)

Table 4 (continued)

Reference	Description	Dimensions (items)
Boccuzzo and Gianecchini (2015)	Job Quality Composite Indicator (JQCI) measured as linear combination of economic, professional, and work-life balance dimensions. Hybrid stated-preference approach for weighting the several dimensions (i.e. the weights derived from both data and the opinions of a representative group of individuals). Another type of hybrid approach (i.e. hedonic one) to validate the weights	Economic (Hourly wage, Employment relationship, Contract duration); Professional (Horizontal educational match, Vertical educational match, Skill match, Career advancement opportunities, Teamwork, Responsibility level); Work-life balance (Working hours, Home-work distance)
Clark (2005)	Two measures of overall job quality: overall job satisfaction and job quality index. The job quality index is a measure based on 8 job quality variables: the number of aspects out of the 8 that make up a good job are counted	High income; Want to spend less time on job; Want to spend more time on job; Good promotion opportunities; Job secure; Hard work; Good job content; Good relations at work
Crespo et al. (2017)	Same equation reported in Simões et al. (2015), differing mainly in the assignment of equal weights for all the 11 considered dimensions (i.e. each weight equal to 1/11)	Core objective dimensions (Pay, Physical working conditions, Intensity, Autonomy, Job security); Complementary objective dimensions (Health, Promotion opportunities, Learning); Subjective dimensions (Work-life balance, Interpersonal relations, Intrinsic rewards)
De Waal et al. (2012)	Measure of quality of work in terms of workload and autonomy. Test of the relationship among user satisfaction, quality of work, and individual characteristics. Dimensions and items characterised by different loadings derived from the questionnaire	Autonomy; Workload
Gorjup et al. (2009)	Standardised index to determine the level and variability of job quality. Starting by a number of dimensions and variables identified in the literature as being extrinsic indicators of good quality jobs, obtained a bundle of 6 items by means of a correlation analysis	Salary (Gross annual salary, Benefits not related to performance); Characteristics of the contract (Percentage of temporary employees who become permanent, Percentage of permanent employees as a proportion of temporary employees); Work stability (Average stay of employees in the company, Percentage of employees with more than five years tenure in the organisation)
Heiskanen and Jokinen (2014)	Overall QWL measure by summing 5 dimensions with several items in each. Ranking of QWL level: low, medium, and high. Statistical analysis to examine stability or change of overall QWL, and relationship with separate variables	Intrinsic rewards of work; Work influence; Social openness at workplace; Open ways to solve work conflicts; Supervisory work; (Social capital)

Table 4 (continued)

Reference	Description	Dimensions (items)
Holman (2013)	Two indices of job quality based on 12 measures. A weighted index by using weights derived from statistical analysis with a criterion variable, i.e. a quite rate index. Calculation of the index as a mean score of the 12 weighted measures previously standardised. An unweighted index determined through the same procedure, but omitting weights	Work organisation (Job discretion, Performance monitoring, Self-managed teams, Offline improvement teams, Technology); Wage and pay systems (Relative pay level, Performance-related pay); Skills and development (Initial training, Ongoing training); Flexibility and security (Flexible work arrangements, Permanent contracts); Collective representation and voice (Collective bargaining)
Jones et al. (2014)	Revision of the DGB-Index (Deutscher Gewerkschaftsbund Good Work Index) used for measuring job quality (made up of resources, burdens, and income/security sub-indices) to translate it and introduce additional questions for better addressing the physical hazard assessment. Classification in good, medium, or poor jobs based on DGB-Index, quantified by combining the responses to a questionnaire through a structured scoring algorithm	Training and learning (Training opportunities, Skills development opportunities); Creativity (Opportunities to use own ideas); Promotion (Promotion prospects); Control over work (Opportunities to plan work, Influence over amount of work, Influence over how work time is organised); Information, communication (Access to necessary information, Conflicting or contradictory demands); Manager (Work planned well by supervisor/line manager, Appreciation from supervisor/line manager, Personal development valued by manager); Senior manager, culture (Cooperation encouraged, Competent management); Relationships, colleagues (Support from colleagues); Meaningful Hours (Work useful for society, Control over how much overtime worked, Working hours reliable and predictable, Personal needs considered when working hours are planned); Pressure, intensity (Unwanted interruptions, Work with high time pressure, Need to compromise work quality); Emotional demands (Need to hide feelings, Respect from others); Physical demands (Physically hard work, Working under strain/poor postures, Loud noise exposure); Job security (Worry about job/work future); Income (Fair pay, Enough pay, Enough pension)

Table 4 (continued)

Reference	Description	Dimensions (items)
McClelland and Holman (2015)	Total Job Quality Index (TJQI), a normalised weighted score whose weights of job quality measures are calculated through a criterion-based approach. The index is obtained by summing the weighted aggregate mean scores from 7 job quality dimensions and normalised on a range from 0 to 100 to aid interpretation	Work organisation (Job discretion, Variety, Social support, Work in a team, Team autonomy, Physical demands, Ambient demands, Workload, Cognitive and emotional demands, Interaction demands, Interdependency, Complexity); Wages and payment system (Wage level, Fixed salary, Performance payments, Compensation pay, Group pay); Security and flexibility (Job security, Part-time/full-time, Permanent contract, Fixed contract, Agency contract, Apprenticeship, No contract, Fixed-time schedules, Shift work, Working time set by organisation, Choice of working time schedules, Adapt working time, Night work, Evening work, Sunday work, Saturday work, Ten-hour day); Skills and development (Training, Development opportunities, Skill utilisation); Representation and voice (Engagement and consultation)
Muñoz de Bustillo et al. (2011a)	Job Quality Index, a weighted geometric mean of the 5 dimensions, in which the variables are standardised through a method that respects their original variability and each dimension receives the same weight equal to 20%. Aggregation of information within each dimension mostly done by arithmetically averaging the scores of individual variables following the hierarchical structure	Pay; Intrinsic quality of work (Skills, Autonomy, Powerfulness, Meaningfulness, Social support, Self-fulfilment); Employment quality (Contractual stability, Development opportunities); Health and safety (Physical risks, Psychosocial risks); Work-life balance (Working time, Duration, Scheduling, Flexibility, Intensity)
Paugam and Zhou (2008)	Summary index of job quality based on a scale by giving a score ranging from 1 to 4 to each item and taking the average of the summed scores. Classification into 2 categories according to respondents' scores on the index: the 50% of individuals with higher scores on the index are workers who hold high quality jobs, and the 50% with lower scores are holders of low quality jobs	Use of abilities; Discretion; Pay satisfaction; Learn; Interesting; Skill development; Respondent development; Work pressure; Participation; Work-family conflict

Table 4 (continued)

Reference	Description	Dimensions (items)
Santero-Sanchez et al. (2015)	Composite Index of Job Quality (CIJQ) based on a definition of the criteria for including individual variables, selection of indicators, performance of normalisation procedures, development of weights, and application to each indicator. By calculating the principal components, their eigenvalues, and the variance explained by each, the CIJQ is obtained from the values found for the principal components. Principal Component Analysis (PCA) when no consensus exists about the relative importance of the original variables compounded by the CIJQ	Job security (Job duration, Type of contract); Employment income and other emoluments (Salary or wages); Working hours and work-life balance (Full/part-time work); Skills and training (Jobs calling for substantial expertise/job category)
Simões et al. (2015)	Job quality index with different weights to the 11 dimensions: given more importance to pay, job security, and intrinsic rewards (i.e. equal to 2/14), whereas the other weights are set to 1/14. The assignment of same weights to each dimension is performed for testing the robustness of their results. Both the studies by Crespo et al. (2017) and Simões et al. (2015) estimate an econometric model to identify the job quality determinants	Core objective dimensions (Pay, Physical working conditions, Intensity, Autonomy, Job security); Complementary objective dimensions (Health, Promotion prospects, Learning); Subjective dimensions (Work-life balance, Interpersonal relations, Intrinsic rewards)
Sojka (2014)	Two indicators: final objective QWL level and final perceived QWL level. The former is determined according to the estimation of the importance of each job characteristic and of the required, planned, standardised, or conventional level for each characteristic. The latter measures the QWL level perceived by the workplace holder, which is de facto job satisfaction	Financial reward; Workload (Physical load, Mental load, Time load); Content of work (Autonomy, Variety of task, Feedback, Meaningful work); Social relations; Work position and potential for career development (Work position, Potential of new higher positions, Possibility for learning); Working condition (Physical conditions, Safety of work); Enterprise localisation; Benefits; Corporate culture (Tangible and intangible aspects of corporate culture, Leaders style, Communication); Enterprise image
Ventegodt et al. (2009)	Two indicators based on the "self evaluation of working life quality" questionnaire (SEQWL): "Working-Life Quality, Estimated" and "Working-Life Quality, Self-Assessed". The former is the calculated mean (equal importance) of the all considered domains, where each domain is scored as average of its sub-domains/dimensions; the latter is the self-assessed well-being used as a control	Quality of Life (Life experience, Satisfaction, Needs); Mastery (Skills, Character of work, Influence, Experience of working, Commitment to work, Salary and status, Development); Fellowship (Commitment to organisation, Information, Teamwork, Working environment, Management, Relations, Influence in the organisation); Creating real value (Mission, Quality, Efficiency, Ethics, Creating real value)

Table 4 (continued)

Reference	Description	Dimensions (items)
Warren and Lyonette (2018)	Analysis of 12 measures merged into one summative variable. Each measure dichotomised into "bad" and "not bad" categories, with values set at 1 and 0, respectively. The summative variable counts how many bad measures each person's job had, and workers with 5 or more bad measures to their job is defined as having "very bad" job quality	Pay (Wages); Skill, training, responsibility (Educational mismatch, Learning, Training, Discretion); Turnover (Job contract, Job loss); Promotion ladders (Promotion); Work-time (Autonomy, Speed, Deadlines, Overtime)

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