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Research article

Leadership in times of crisis. School principals facing COVID-19

A. Ramos-Pla [a,*], M. Tintoré [b], I. del Arco [a]

[a] University of Lleida, Spain
[b] International University of Catalunya, Spain

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ABSTRACT

This article analyzes the personal leadership resources utilized by a sample of school principals in Catalonia (Spain) during the confinement and post-confinement periods due to the COVID-19 crisis. A questionnaire was designed, validated, and provided to the principals from Primary Education schools to carry out the study. The questionnaire analyzed personal leadership resources used by the principals during the confinement and post-confinement periods, compared to a former "normal situation". The data analysis results confirmed that the role of the principals was crucial in redirecting the situation and completing the academic course satisfactorily. The principals scored their leadership resources remarkably high in the former normality and maintained proactivity at a similar level during the crisis. However, other resources scored lower during the same period. As a direct result, there was a high degree of adaptation to this situation from the principals. The results indicate that principals do not lead in the same manner in times of crisis as in normal times. Age, experience, and type of school influence the results only in former normal situations but not in times of crisis.

1. Introduction

The health crisis of COVID-19 had a worldwide effect at almost every level in society. In Catalonia (Spain), the Spanish government decreed a State of Alarm, resulting in a home confinement which lasted four months. During this period, the educational institutions remained closed, and the pedagogical practices were conducted online. The management of the school by the administration underwent a radical change overnight, thereby transforming the functions and responsibilities of their duties (del Arco et al., 2021). Consequently, the academic planning process that was initiated and implemented in educational institutions for the academic year 2019–2020 was completely altered (Díez et al., 2020), thus having to modify the pedagogical actions over a short-term situation. During this unprecedented situation, school principals were forced to use their personal leadership resources (PLRs) in new manners and by varying degrees, while at the same time, they had to be adjusted to the crisis, in which a high volume of adaptations and modifications were needed. For the present research study, we focused on the analysis of PLRs utilized during the former normality and the stages of confinement and post-confinement, as we are interested in understanding how the pandemic affected the management of a school. The PLRs analyzed were those proposed by Leithwood (2012), and utilized by Leithwood et al. (2019): the problem solving efficiency, knowledge of effective practices, systems thinking, perceiving emotions, managing emotions, acting in emotionally appropriate ways, and the levels of optimism, self-efficacy, resilience, and proactivity. Thus, the objective of the study is *to analyze the PLR utilized by the primary school principals in Catalonia during the pandemic (in confinement and post-confinement), and to determine if there are significant differences of the PLR utilized before the pandemic, in the former normality.*

2. Personal Leadership Resources (PLRs) in times of crisis

Effective leaders use and develop their personal qualities and specific traits or dispositions in order to bring about leadership practices (Leithwood et al., 2019) and to improve the leadership of the organization. Hence, part of this research focuses on studying the PLRs used by a sample of primary school principals.

First, we must define PLRs, a concept that has become a classic in academic literature on educational leadership. Leithwood (2012) introduced this concept, noting that it included *specific traits and dispositions* that can influence the effectiveness with which leadership practices are carried out. PLRs include three categories identified by the author, which have been recognized, accepted, and completed in the latest educational leadership review to date (Leithwood, Harris & Hopkins, 2020, p. 11):

* Corresponding author.
E-mail address: anabel.ramos@udl.cat (A. Ramos-Pla).

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1. Cognitive resources: specific knowledge on problem-solving, systems thinking, and domain-specific knowledge.
2. Social resources: perception and management of emotions and acting in an emotionally appropriate way.
3. Psychological resources: qualities that are usually considered traits: optimism, self-efficacy, resilience and proactivity.

Using this concept is pertinent, considering the current state of research on educational leadership. Leithwood (2012) initial proposal overcomes trait theories that preoccupied leadership research in its early days. Thus, PLRs are a stable and coherent set of personal characteristics that foster a consistent pattern of leadership performance in a variety of group and organizational situations (Leithwood, 2012). Leithwood's study in 2012 only included the PLRs for which there was conclusive empirical evidence that defined them as instrumental for leadership success. Even though the PLRs report was conducted in Ontario, it was applicable to other environments and circumstances.

Apart from these PLRs, successful leadership exercised by school principals greatly depends on the context (Hallinger, 2018; Eacott, 2019; Hoogsteen, 2020). Therefore, the degree of development of the PLRs is determined by the educational institution, environment, and place in which the institution is located, as shown in Figure 1. In this respect, it can be said that the PLRs which are activated in times of crisis can have different degrees and intensities as compared to those used in times of former normality.

Academic research has shown that effective educational leadership is characterized by the following: leadership focused on learning which is distributed throughout the organization and promotes the development of everyone in the educational community, and having a particular emphasis on social justice and equity (Bush, 2019; Bush and Glover, 2014; Leithwood et al., 2019). In promoting this type of leadership, school principals play an essential role (Bell, 2018; Díez et al., 2020; Glatthorn et al., 2016; Stein, 2016), which becomes more important in times of crisis (Bolívar, 2013; Grint, 2020; Halverson et al., 2004; Van Wart et al., 2011).

Diverse research projects support the idea that the principals, as pedagogical leaders, prime movers and innovators of educational institutions, must be flexible enough to enable the improvement of the relationships of the educational community, guide academic planning, delegate tasks to other members of the school community and motivate the rest of the team to carry out the objectives (Hoque et al., 2011; Bolívar, 2013; Stein, 2016; Bell, 2018; Díez et al., 2020). Therefore, the principal, acting as a manager, must boost the skills of the team by effectively using PLRs. This enables teachers to take on their responsibilities and to experience an increase in self-esteem which makes them perform better at work and feel that they have a greater involvement in the organization [educational center] (OCDE, 2010; Egeberg et al., 2016; Tintoré et al., 2021). Furthermore, various studies indicate that it is crucial that the leader of the organization supervise and provide guidance to teachers to plan their professional development (Miller and Rowan, 2006; Leithwood, 2010).

According to Grint (2020), leadership is more necessary than management in times of crisis, as it focuses on solving complex problems with an unknown or difficult solution, mobilizing collective efforts, and promoting collaboration. Leaders do not lead in the same manner in times of adversity as they do in normal conditions. There is a greater emphasis on the present state of on people's emotions during a crisis, which therefore requires more and better communication and greater flexibility. These characteristics, among others, have been pointed out in leadership analysis in times of crisis (Halverson et al., 2004; Mumford et al., 2007; Smith and Riley, 2012; Van Wart et al., 2011).

Although the COVID-19 crisis generated anxiety and uncertainty in school principals (Ahlström et al., 2020), recent studies affirmed that this challenging situation allowed them to reflect on the importance of focusing on what was essential (O'Connell and Clarke, 2020). Furthermore, research by Ahlström et al. (2020) highlighted the importance of confidence and trust in the principals during confinement, as well as in the different administrations in charge of managing the situation. This indicates that schools with a positive climate have the necessary elements to be resistant in times of crisis, and that proactivity and actively preventing damage are essential elements (Starrat, 2004).

While it has indeed been necessary to modify some leadership practices in times of crisis, such as that of COVID-19, the content and the PLRs continue to be the same (Ahlström et al., 2020).

In addition to the characteristics of effective leadership mentioned above, authors such as Hung et al. (2020) indicate that it is also necessary to stabilize an ecological leadership particularly at the time of a crisis. This ecological leadership allows teachers and leading principals to forge alliances, including alliances with families and other agencies or administrations.

3. Objectives and methods

3.1. Objectives

The pandemic brought with it the need to adapt to an unknown reality marked by the confinement of the population and the closing of educational centers. This led the management teams having to provide

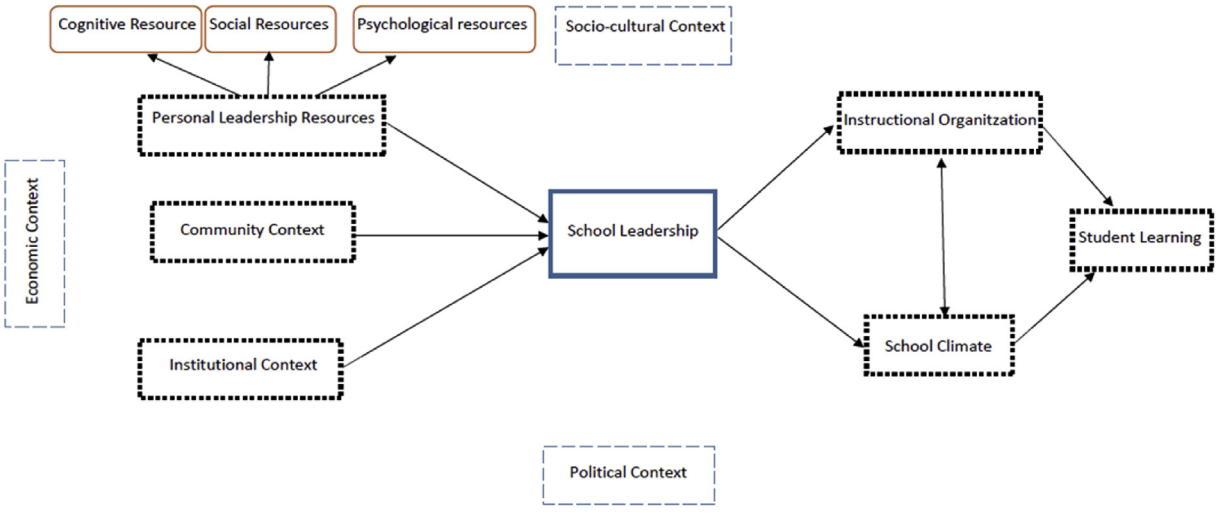

Figure 1. Model of the influence of context on the leadership typology exercised by principals. Source: Adapted from Hallinger (2018: 17), Harris, Leithwood & Hopkins (2019) and Hoogsteen (2020: 25).

responses to situations of complete closure, partial opening, intermittent openings, confinement of isolated groups, etc., different situations that were separated in time, or which occurred at the same time.

This study seeks to elucidate how the school principals acted during these periods of emergency, and for this, as mentioned above, the objective was to analyze the personal leadership resources (PLR) utilized by the primary school principals in education centers in Catalonia during the pandemic (in confinement and post-confinement), and to determine if there are significant differences of the PLR utilized before the pandemic, in the former normality.

Three specific objectives are derived from the general objective (mentioned above):

1. To analyze the mobilization of the principals' PLRs during the former normality.
2. To analyze the mobilization of the principals' PLRs during the confinement and post-confinement periods.
3. To compare the mobilization of the principals' PLRs between the former normality and the confinement and post-confinement periods.

3.2. Methodological approach. Information collection strategy

To provide an answer to the objectives, a descriptive study was conducted based on a non-experimental and quantitative design. An *ad-hoc* online questionnaire was provided to principals from different types of schools (public, concerted, and private).

The data collection instrument chosen to carry out the research was a questionnaire (Del Rincón et al., 1995; Casas et al., 2003; McMillan and Schumacher, 2005). The questionnaire was designed with a total of 24 questions, most of which were closed-ended Likert-type questions, except for the last item, which was open-ended. These items were divided into five thematic blocks (Table 1):

The demographic sections of the questionnaire (Block 1 and 2) described information about the principals and the schools where they worked. These data were the independent variables of the study.

The remaining part of the questionnaire constituted the dependent variable of this study and was designed to split each block and item in two: part A asked about the state previous to the COVID pandemic, the former normality, and part B asked about the period of confinement/post-confinement. Thus, it had two parts with independent answers.

The ten questions corresponding to PLR (Block 3) are analyzed in this study. This block 3 analyzes the main factors related to PRL: problem-solving efficiency (item 01), emotional intelligence (item 02), systems thinking (item 03), social awareness: recognition of other people's emotions (item 04), self-awareness: managing one's own emotions (item 05), relationship management (item 06), optimism level (item 07), self-efficacy level (item 08), resilience level (item 09) and proactivity level (item 10).

Items 01 to 03 correspond to cognitive resources; 04 to 06 correspond to social resources; finally, 07 to 10 correspond to psychological resources. These questions were structured as Likert-type scales of 4-points with a range of responses from 1 as null/nothing to 4 as much/always (McMillan and Schumacher, 2005; Chiva Sanchís and Ramos Santana, 2015).

3.3. Characterisation of the sample

A non-probability, convenience sampling method was used (McMillan and Schumacher, 2005), since both the ease of access and the availability of people to be part of the sample were taken into account within the group of Primary Education school principals in Catalonia. An invitation letter to participate in the study was sent via e-mail to all Primary Education schools in Catalonia. In the letter and the questionnaire, the confidentiality of the data processing and analysis was ensured, as well as the voluntary nature of participation in the research study. A total of 204 participants was obtained. In terms of gender, a clear majority of females (67%) was found in the population studied, as compared to males (32.8%). Their ages ranged between 30 and 64 years old, with a median of 50 (Table 2).

In relation to the level of education of the principals, Table 2 shows that 53.4% had a bachelor's degree. However, 42.6% had a vocational degree, and lastly, only 3.9% had obtained a Doctorate degree. Also, the median length of time as a principal was 7.73 years, with 25% having this position for 3 years, and another 25% with more than 10 years. Also, it should be remarked that mean length of time of the men as directors was 10.4 years, with the women showing a lower value (6.5 years). This result was statistically significant at $p < 0.05$ (Mann-Whitney: value 2.48; p-value = .013). Therefore, the experience of the participants in the position was longer for men than for women.

Most of the participants ran public primary schools (67.2%); the rest were concerted primary schools except for two, which were private primary schools. These data were in agreement with the distribution standards in the Catalonian centers, in which 67.13% were public schools, and 32.87% were either concerted or private (IDESCAT, 2019).

Lastly, the data showed that most of the participating centers had 1 (40.2%) or 2 groups (39.7%) per grade. On the contrary, it was less frequent to find 3 groups (15.7%) or be a rural school, a finding that

Table 1. Description of the data collection instrument.

Block	N. of items	Description
1. Identification data of the informant (independent variables)	4 items	Identification data of the informant: age, gender, level of education, and time in the position
2. Information about the educational establishment (independent variables)	3 items	Information about the center where principals work: type of center, number of groups per grade, number of students
3. Personal Leadership Resources (PLR) (dependent variables)	10 items	Problem solving efficiency Knowledge of effective practices Systems thinking Perceiving other's emotions Managing one's own emotions Acting in emotionally appropriate ways Optimism level Self-efficacy level Resilience level Proactivity level
4. Leadership (dependent variables)	4 items	Tasks performed and time dedicated Specific actions: collaboration and coordination with the teachers, improvement of the teacher's skills, organization of the schedules and spaces, coordination with principals from other centers, etc.
5. Satisfaction	2 items	Level of satisfaction due to the principal's performance and justification

Table 2. Descriptive analysis. Summary of the sample's characteristics (N = 204).

			Results	95% C.I.	
				Lower Lim.	Upper Lim.
Participants	Sex	Women	67.2 % (137)	60.30%	73.60%
		Men	32.8 % (67)	26.40%	39.70%
	Age	*Mean (Std. Dev) years*	48.95 (±8.17)	47.82	50.08
		Median/Age range	50.00/30-64	–	–
	Education	Vocational	42.6 % (87)	35.80%	49.70%
		Bachelors	53.4 % (109)	46.30%	60.40%
		Doctorate	3.9 % (8)	1.70%	7.60%
	Time in the position	*Mean (Std. Dev) years*	7.73 (±7.03)	6.76	8.7
		Median/Age range	5.00/<1-35	–	–
Center	Type	Public	67.2 % (137)	60.30%	73.60%
		Concerted	31.9 % (65)	25.50%	38.70%
		Private	1.0 % (2)	0.10%	3.50%
	Number of groups	One	40.2 % (82)	33.40%	47.30%
		Two	39.7 % (81)	32.90%	46.80%
		Three or more	15.7 % (21)	6.50%	15.30%
		ZER (Rural school)	4.4 % (9)	2.00%	8.20%

Source: Authors, using IBM SPSS Statistics 25

complies with the standards of the number of groups in Primary School in Catalonia, where it is not frequent to find a very large or very small school (IDESCAT, 2019). Also, it should be mentioned that the rural schools (ZER) had incomplete groups. As the number of students is low, all the different ages are concentrated in the same class.

3.4. Process and data analysis

After obtaining the data, a statistical analysis was conducted with the SPSS v25 program. The techniques and statistics tests applied were:

- For qualitative variables (nominal): frequency distribution and percentages, with a 95% CI.
- For the quantitative variables: analysis of the data with a Q-Q plot adjusted to normality, histogram, asymmetry and kurtosis/height coefficients, along with the Kolmogorov-Smirnov goodness-of-fit test, and a description with the habitual measure of centrality (mean, median), and variability (standard deviation, range, and interquartile range)
- Tests for differences in means for repeated measurements: Student MR and Wilcoxon.
- Tests for the difference in means between independent groups: Student's T-test and ANOVA when the variables were normal, and Mann-Whitney and Kruskal-Wallis when they were not.
- Construct validity through an Exploratory Factor Analysis.
- Estimation of reliability with Cronbach's Alpha coefficient.

3.5. Ethical considerations of the research

To carry out the study, the ethical guidelines of the American Psychological Association (2016) were considered. The principles of the code of ethics addresses the privacy and confidentiality of the participants: maintenance of confidentiality (standard 4.01), in which the information is protected, and informed consent of the research (standard 8.02), in which the objective is reported of the study, duration and procedure, as well as the right to decline and/or abandon the study even if the research has started.

4. Results

In this section, each of the above-mentioned sub-objectives of the study will be analyzed.

4.1. Validity and reliability of the instrument

The questionnaire was submitted for content validation to three judges with extensive experience in school management, as well as in university teaching. The validation criteria used were univocity, relevance, and the degree of importance of each item. The suggestions from these judges were considered when writing the final version of the questionnaire.

The Exploratory Factor Analysis (EFA) method was used to address the construct validation of this Questionnaire (Table 3). Both parts were been validated separately: the set of items that asked about the situation of the former normality (part A) and the set that asked about the present state (part B). In both, we made the initial assumption of one-dimensionality, that is to say, that all the items were part of a single (and same) dimension. The Principal Components (PC) extraction method was used, and its result was verified with other procedures (Maximum likelihood, Axis Factorization and Least-squares) obtaining similar results.

At the same time, the degree of reliability of this scale was studied using the classical method of Cronbach's "Alpha" Coefficient. Additionally, the corrected homogeneity indices were calculated for each of the

Table 3. Reliability and Validity. Personal Leadership Resources Scale, in a situation of former normality. N = 204//KMO: 0.87//Bartlett: p < .0001//Total explained variance: 53.8%//Cronbach's Alpha = .85

Items Part A: Former normality	Description	Exploratory Factor Analysis (EFA) by Principal Components (PC)	
	Mean	Communality	Factorial load
01-Problem solving efficiency	3.22 (0.55)	.493	.702
02 Emotional intelligence	3.35 (0.56)	.410	.640
03-Systems thinking	3.41 (0.58)	.337	.581
04-Social awareness	3.45 (0.56)	.343	.585
05-Self-awareness	3.29 (0.56)	.454	.674
06-Relationship management	3.26 (0.51)	.464	.681
07-Optimism level	3.47 (0.61)	.488	.699
08Self-efficacy level	3.39 (0.54)	.370	.609
09-Resilience level	3.50 (0.55)	.418	.647
10-Proactivity level	3.47 (0.62)	.500	.707

Source: Authors, using IBM SPSS Statistics 25

Table 4. Reliability and Validity. Scale of Personal Leadership Resources, in confinement or post-confinement situations. N = 204//KMO: 0.90//Bartlett: p < .0001//Total explained variance: 55.7%//Cronbach's Alpha = .86

Items Part B	Description	Exploratory Factor Analysis (EFA) by Principal Components (PC)	
	Mean (S.D.)	Communality	Factorial load
01-Problem solving efficiency	3.09 (0.57)	.538	.734
02 Emotional intelligence	3.18 (0.56)	.382	.527
03-Systems thinking	3.28 (0.67)	.499	.707
04-Social awareness	3.28 (0.68)	.453	.673
05-Self-awareness	3.03 (0.71)	.483	.695
06-Relationship management	3.11 (0.59)	.491	.701
07-Optimism level	3.13 (0.76)	.485	.696
08Self-efficacy level	3.17 (0.64)	.482	.694
09-Resilience level	3.39 (0.64)	.511	.715
10-Proactivity level	3.43 (0.68)	.445	.667

Source: Authors, using IBM SPSS Statistics 25

Table 5. Descriptive analysis. Items of the PLRs Questionnaire, under former situation of normality. (N = 204).

Items Part A: former normality	% response				Descriptive statistics		
	1	2	3	4	Mean	Median	Standard Deviation
01-Problem solving efficiency	1.0	1.0	62.7	35.3	3.32	3.00	0.55
02 Emotional intelligence	–	3.9	56.9	39.2	3.35	3.00	0.56
03- Systems thinking	–	4.9	49.5	45.6	3.41	3.00	0.58
04-Social awareness	1.0	–	52.0	47.1	3.45	3.00	0.56
05-Self-awareness	1.0	2.5	63.2	33.3	3.29	3.00	0.56
06-Relationship management	–	3.4	67.2	29.4	3.26	3.00	0.51
07-Optimism level	1.0	2.9	44.1	52.0	3.47	4.00	0.61
08Self-efficacy level	–	2.5	56.4	41.2	3.39	3.00	0.54
09-Resilience level	–	2.5	45.6	52.0	3.50	4.00	0.55
10-Proactivity level	1.0	3.4	43.1	52.5	3.47	4.00	0.62

Source: Authors, using IBM SPSS Statistics 25

items which assessed their contribution to the reliability of the total scale.

The suitability of using the EFA over PC was verified, obtaining that: (a) the value of the coefficient of adequacy KMO (0.87) was optimal; and (b) that Bartlett's sphericity test was highly significant, at $p < .001$ (value: 637.17; p-value = .000000), thus guaranteeing the existence of high correlations between items that allowed obtaining underlying factors. Therefore, the suitability of using the EFA with this data matrix was shown.

The communalities were high (>.300) so that all the items were well represented in the final solution. Factor extraction managed to demonstrate the unidimensionality of this set of items, as all of them obtained high and even very high factor loadings (in the range between .581 and .707; with a mean value of .652). Hence, the results guaranteed the construct validity of this total scale, as well as each of the items.

Regarding reliability, all the items had high homogeneity indices (>.400), which therefore provide a more than sufficient contribution to the reliability of the total scale, which was very high according to the Cronbach's Alpha coefficient obtained: .85 (IC: .82 - .88).

These findings suggest that the validity and reliability of Part A of the Questionnaire on Personal Leadership Resources were both amply proven in the former normality.

Once again, the suitability of the use of the EFA over PC was verified, as (Table 4): (a) the value of the coefficient of adequacy KMO (0.90) was high; and (b) the Bartlett's Sphericity Test was highly significant, at $p < .001$ (value: 702.91; p-value = .000000), which guarantees the existence of high correlations between items that allow for obtaining underlying factors. Thus, the suitability of using the EFA with this second data matrix was also proven.

The communalities were high (>.300) indicating that all the items were well represented in the final solution; perhaps only item 02 was somewhat less represented than the others. The factor extraction demonstrates the one-dimensionality of this second set of items, as they all had high or remarkably high factor loadings (in the range between .527 and .734; with a mean value of .681). As a result, the construct validity of the second part of the questionnaire, as well as each of the items, is guaranteed.

All the items had a very high homogeneity index (>.400). They were measured according to Cronbach's Alpha coefficient of reliability, and as a result they showed the high reliability of the total scale: .86 (CI: .83 - .89). In conclusion, the validity and reliability of Part B of the Personal Leadership Resources Questionnaire, in the confinement or post-confinement situation, was more than sufficiently proven.

4.2. Results: descriptive analysis

The results will be presented by first conducting a descriptive analysis, having in mind each moment in time, before the pandemic (former normality, or part A), and during the pandemic (confinement/post-confinement, or part B), to then present the data gat for each part. Afterwards, an inferential analysis will be performed, having in mind the independent variables considered.

4.2.1. Mobilization of PLR in the former normality

In this section we aim to analyze the mobilization of the principals' PLRs during the former normality. The statistical analysis used is descriptive.

The responses collected on the assessment of the former normality (Table 5) were concentrated in the upper end of the response scale (values 3 and 4). These findings suggest that the participants had self-assessed each indicator with high scores, as all the means were in the range between 3.26 and 3.50 points.

Figure 2 shows these mean values, which despite their proximity to each other, were significantly different, $p < .001$ (MR ANOVA: F-value = 6.83; p-value = .000000; R2 = .033), due to internal homogeneity responses (standard deviation: 0.5–0.6 points).

In summary, the five PLRs that stand out (means between 3.50 and 3.41) in principals before the pandemic were, in this order, resilience, proactivity, optimism, social awareness, and systems thinking.

On the contrary, five PLRs have the lowest means (between 3.26 and 3.39): relationship management, self-awareness, problem-solving efficiency, emotional intelligence and self-efficacy level.

4.2.2. Mobilization of PLR during confinement and post-confinement

The specific objective of this section is to analyze the mobilization of the principals' PLRs during the confinement and post-confinement periods. The statistical analysis used is descriptive as in the previous section.

In part B, the same questions were used but in relation to the COVID 19 pandemic. Our findings (Table 6) indicated a higher concentration on value 3. In fact, a considerable amount of answers showed results in a

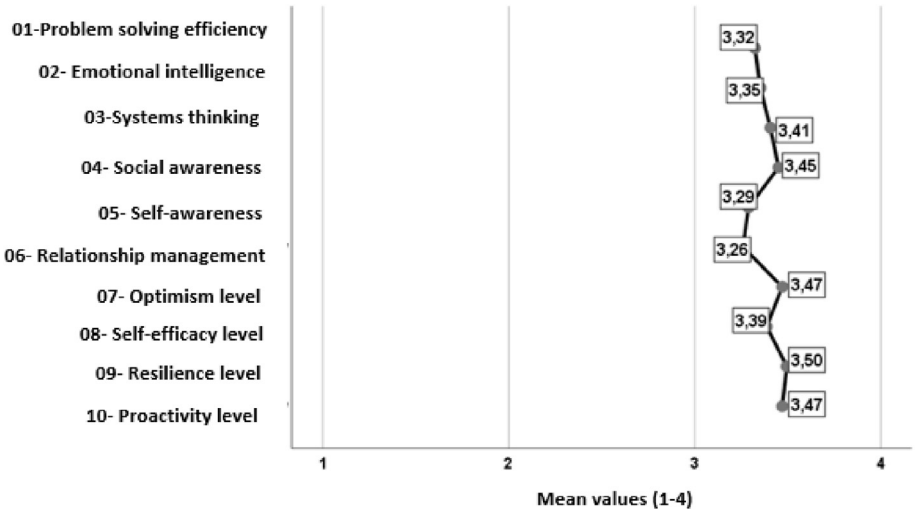

Figure 2. Plot of the means. Items of the PLRs. Old normality situation (N = 204). Source: Authors, using IBM SPSS Statistics 25.

Table 6. Descriptive analysis. Items of the PLRs Questionnaire in confinement/post-confinement situations.

Items Part B: Confinement/Post-Conf.	% response				Descriptive study		
	1	2	3	4	Mean	Median	Standard Deviation
01-Problem solving efficiency	1.5	7.8	71.1	19.6	3.09	3.00	0.57
02 Emotional intelligence	0.5	6.9	67.2	25.5	3.18	3.00	0.56
03- Systems thinking	1.0	9.3	50.5	39.2	3.28	3.00	0.67
04-Social awareness	1.5	8.3	51.0	39.2	3.28	3.00	0.68
05-Self-awareness	2.5	16.7	56.4	24.5	3.03	3.00	0.72
06-Relationship management	0.5	11.3	65.2	23.0	3.11	3.00	0.59
07-Optimism level	2.9	14.2	50.0	32.8	3.13	3.00	0.76
08Self-efficacy level	0.5	11.8	58.3	29.4	3.17	3.00	0.64
09-Resilience level	0.5	6.9	46.6	46.1	3.38	3.00	0.64
10-Proactivity level	2.5	3.4	42.6	51.5	3.43	4.00	0.68

Source: Authors, using IBM SPSS Statistics 25

range of 3.03–3.43 points in all the means. However, a greater internal variability was observed in each item, which implies that more responses obtained values at the lower end of the scale.

Figure 3 shows the mean values with signficant differences, $p < .001$ (ANOVA MR: F-value = 13.60; p-value = .000000; R2 = .063). It should be underlined that the lowest values were found in the items 01-Problem solving efficiency, 05-Self-awareness, 06-Relationship management, related with the emotional dimension when experiencing an unusual event.

In summary, the five PLRs that stand out (means between 3.43 and 3.18) in principals before the pandemic were, in this order, proactivity, resilience, social awareness, systematic thinking and emotional intelligence. Thus, proactivity outweighs resilience. Optimism becomes a less employed PLR and emotional intelligence advances to the first positions.

On the contrary, five PLRs have the lowest means (between 3.03 y 3.17): self-awareness, problem-solving efficiency, relationship management, optimism, and self-efficacy level. In this case, self-awareness becomes the PLR least used by managers, and optimism lowers several positions.

4.2.3. Comparison between the two situations

The specific objective of this section is to compare the mobilization of the principals' PLRs between the former normality and the confinement and post-confinement periods. The statistical analysis used is inferential.

The mean values of both measurements were contrasted with the others (Table 7). Highly significant differences were observed ($p < .001$) in most items: 01, 02, 04, 05, 06, 07 and 08; with the average value always remaining higher in the former normality. The effect sizes were moderate in items 07-optimism (4.8%) and 01-problem solving efficiency, lower in the 05-self-awareness: managing one's own emotions (3.2%); and somewhat lower in the remaining ones. There was also a slight significance, but only with $p < .05$ and small effect size (1%) in items 03 and 09, with the means also found to be higher in the former normality. Only in item 10, proactivity, was there no significant difference ($p > .05$).

We have sufficient statistical evidence to be able to conclude that these indicators of PLRs were reduced during the confinement period, with the exception of proactivity, which remained at the similar level as before the COVID-19 pandemic situation and it was the most used PLR during pandemic (Table 7).

After comparing the information between the data obtained in the two parts, A and B, and given the previous results, we can generate two total scores of PLRs for each participant: one in a situation of former normality and another in a confinement or post-confinement situation. The scores for both parts were calculated by adding all the points obtained (total sum of the answers from all items).

Having defined these variables, we will now explore and describe them (Table 8):

- Total Score of PLRs in former normality. Two anomalous values were detected due to a low total score with respect to the rest of the participants, which, at the same time, were the same points that were vastly different from the normal statistical data. However, they were kept in the sample due to their low effect on the average values. The variable was not distributed normally, and in the case of the aforementioned asymmetry, and thus, a greater tailing (or Kurtosis) was observed as a result of the accumulation of cases with similar values. This result was shown as a significant deviation in the Kolmogorov-Smirnov Goodness-of-Fit Test (K–S test) ($p < .001$). The range of values observed was 15–40 (the possible range being 10–40) with a median of 34 points and a mean of 33.9 (CI: 33.4–34.4).
- Total Score of PLRs in confinement or post-confinement. It was observed that the 2 participants who previously obtained abnormal values, had now come closer to the group and were only atypical and, therefore, tolerable. A new anomalous case appeared instead, and remained in the study due to its low effect on the averages. Once again, the variable had a leptokurtic targeting due to the accumulation of cases with similar scores, which produced a statistically

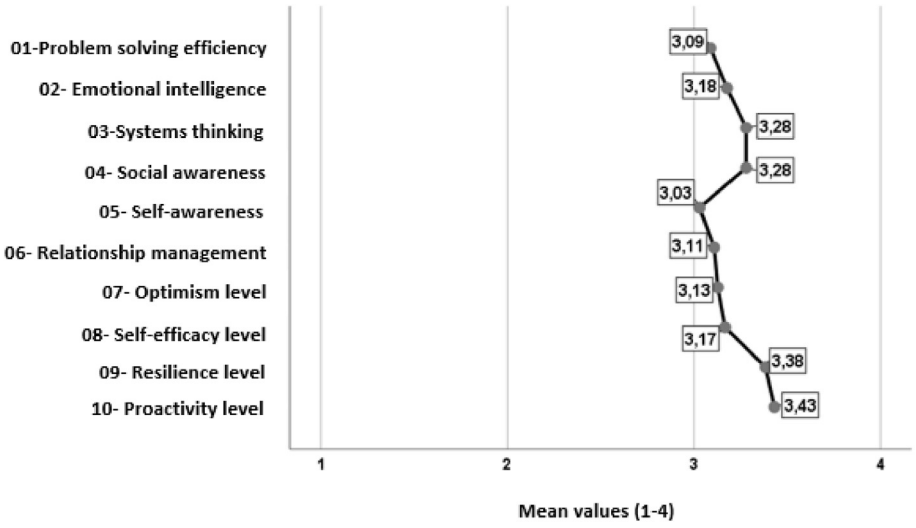

Figure 3. Plot of the means. Items of the PLRs. Confinement/post-confinement situation (N = 204). Source: Authors, using IBM SPSS Statistics 25.

Table 7. Comparative inferential analysis: *Student for MR*. Changes in Personal Leadership Resources, depending on the relative measurement situation related to COVID-19. (N = 204).

Items	Median (Standard Deviation)		Wilcoxon (MR)		95 % confidence interval	Size effect: R^2
	Former normality	CONFINAM./POST-CONF.	Value	p-value		
01-Problem solving efficiency	3.22 (0.55)	3.09 (0.57)	5.50**	.000	0.16/0.31	.041
02-Emotional intelligence	3.35 (0.56)	3.18 (0.56)	4.04**	.000	0.09/0.26	.024
03- Systems thinking	3.41 (0.58)	3.28 (0.67)	2.39*	.017	0.03/0.23	.010
04-Social awareness	3.45 (0.56)	3.28 (0.68)	3.80**	.000	0.08/0.26	.016
05-Self-awareness	3.29 (0.56)	3.03 (0.71)	4.99**	.000	0.16/0.36	.032
06-Relationship management	3.26 (0.51)	3.11 (0.59)	3.68**	.000	0.07/0.23	.016
07-Optimism level	3.47 (0.61)	3.13 (0.76)	6.03**	.000	0.24/0.44	.048
08Self-efficacy level	3.39 (0.54)	3.17 (0.64)	5.33**	.000	0.14/0.30	.029
09-Resilience level	3.50 (0.55)	3.39 (0.64)	2.44*	.014	0.02/0.20	.010
10-Proactivity level	3.47 (0.62)	3.43 (0.68)	1.02 ^{NS}	.306	—/—	.001

NS = Not Significant; * = Significant; ** = Highly Significant.
Source: Authors, using IBM SPSS Statistics 25

Table 8. Exploratory and descriptive analysis. Variables of the total Scores of the PLRs. (N = 204).

Variable	Exploration: Form			Centrality		Range (Min./Max.)	Variability	
	Asymmetry	Kurtosis	Test KS: p value	Mean	Median		Standard Deviation	Interquartile Range
Former normality	-1.40	5.72	.000	33.91	34.00	15/40	3.67	4.00
Confinement	-1.17	4.02	.000	32.07	32.00	10/40	4.38	5.00

Source: Authors, using IBM SPSS Statistics 25

significant deviation in the K–S test which was used to determine goodness-of-fit ($p < .001$). The range of observed values was 10–40 (covering the entire possible range), with somewhat more variability than in the previous measurement. The median value was 32 points, with the mean being 32.1 (CI: 31.5–32.7).

The difference between the means of both scales was contrasted (33.9 in the former normality and 32.1 in the confinement situation), resulting in a highly significant difference at $p < .001$ (Wilcoxon: ZW = 6.10; p-value = .000000), equivalent to a moderate effect size (4.2%), which provided sufficient statistical evidence to confirm that with the COVID-19 pandemic situation, PLRs were reduced globally. It was found that the score had decreased in 105 of 204 participants, 51.5% (CI: 44.4%–58.5%). The score was maintained in 28.8% of the participants (59 cases) and improved/increased in the remaining 19.6% (40 cases). When trying to understand why a lower score was found in the PLR during the pandemic, some explanations were found in the answers provided in the last open-ended question from the questionnaire. Thus, most of the informants indicated that the high degrees of improvisatison and disinformation had an effect on the PLRs, such as the problem-solving efficiency, or emotional intelligence.

"There has been a lot of adversity in facing this unexpected situation that we have experienced and continue to experience [...]." (DCEP_I19 18:21 (39:39)

"There has been a lot of improvisation and ignorance." (DCEP_I46 77:78 (85:85)

Table 9. Inferential analysis. Differences in the Total Score of the PLRs questionnaire, in the former normality. (N = 204).

Factor	Categories	Mean (SD)/Median	Contrast Test		Effect Size: R^2
			Value	P-value	
Sex			$Z_U = 0.30$ NS	.762	.000
	Female	33.86 (3.90)/34.00			
	Male	34.00 (3.18)/34.00			
Age			$Z_U = 2.30$*	.021	.026
	≤ 50 years of age	33.35 (4.02)/34.00			
	=> 51 years of age	34.53 (3.15)/35.00			
Degree held			H = 5.33 NS	.070	.024
	Diploma	33.94 (3.28)/33.00			
	Bachelor's degree	33.68 (3.93)/34.00			
	Doctorate	36.63 (3.25)/37.00			
Time held in position			$Z_U = 2.71$**	.007	.023
	≤ 5 years	33.51 (3.31)/33.00			
	=> 6 years	34.36 (4.02)/35.00			
Typology			$Z_U = 2.18$*	.029	.019
	Public	34.15 (3.92)/35.00			
	Semi-private	33.40 (3.08)/33.00			
No of students			$Z_U = 0.63$ NS	.529	.005
	≤ 323 students	33.61 (4.12)/34.00			
	=> 324 students	34.21 (3.15)/35.00			

N.S. = NOT significant; * = Significant; ** = Highly significant.
Source: Authors, using IBM SPSS Statistics 25

Despite the involvement of the entire education community, especially the principals, to face the different challenges posed by the situations of confinement and post-confinement, the score of PLRs of proactivity was the only one which was very similar, as compared to the results from the former normality. Some informants explain it in the following terms:

> *"Despite the adjustment in the changeover of our school from one day to the next, I believe that all those involved in our center have been positively engaged in the best possible way making my task much easier."* (DCEP_I20 21:25 (26:26)

4.2.4. Differential factors

Finally, the variables generated by the questionnaire were contrasted, depending on possible differential factors, such as Sex, Age, or Degree held, etc. Contrast tests were used to determine the significance of the difference between averages (mean/median) of the non-parametric type given the lack of adjustment to statistical normality of the total scores of the PLRs. The estimate of the effect size (R^2) was added to assess the degree of relationship between the variables and the factor.

The results obtained for the total score in the former normality (Table 9) suggested the following conclusions:

Table 10. Inferential analysis. Differences in the Total Score of the PLRs questionnaire, in a confinement or post-confinement situation. (N = 204).

Factor	Category	Mean (SD)/Median	Contrast Test		Effect size: R^2
			Value	P-value	
Sex			$Z_U = 0.31$ NS	.759	.001
	Female	32.17 (4.25)/32.00			
	Male	31.87 (4.67)/32.00			
Age			$Z_U = 0.67$ NS	.503	.004
	≤ 50 years	31.80 (4.82)/32.00			
	=> 51 years	32.36 (3.85)/32.00			
Studies/degree			H = 1.78 NS	.410	.011
	undergraduate degree	32.59 (3.68)/32.00			
	Bachelor/Degree	31.82 (4.39)/32.00			
	Doctorate	29.87 (9.16)/30.00			
Period of time in position			$Z_U = 0.89$ NS	.375	.000
	≤ 5 years	32.09 (3.33)/32.00			
	=> 6 years	32.04 (5.36)/33.00			
Typology			$Z_U = 0.52$ NS	.604	.002
	Public	32.20 (4.32)/32.00			
	Semi private/private	31.79 (4.54)/32.00			
No of students			$Z_U = 1.29$ NS	.196	.004
	≤ 323 students	32.34 (4.57)/33.00			
	=> 324 students	31.79 (4.19)/32.00			

N.S. = NOT significant.
Source: Authors, using IBM SPSS Statistics 25

- A highly significant difference ($p < .01$) was found, although with only a small effect size (2.3%) keeping in mind the time factor of the position (using the median of 5 years in the said position). The data indicated that those participants who have been in their positions for a longer period of time tended to have higher scores (34.4 vs 33.5) in the contrasted variable.
- A significant difference ($p < .05$) with a slight effect size (2.6%) was also found depending on the age (below the median age of 50). According to our results, older participants tended to have higher scores (34.5 vs 33.4) in the contrasted variable.
- Likewise, statistical significance ($p < .05$) with a small effect size (1.9%) was observed depending on the typology factor of the center; the mean score for the variable being higher in public schools (34.2 vs 33.4).
- No significance ($p > .05$) or effects to be considered (<1%) were found in the factors: sex, degree held, and the number of students at the school.

While considering the total score of PLRs during confinement or post-confinement (Table 10), neither statistically significant differences ($p > .05$) nor effects (<1%) were found which could justify that some of these crossover variables were differential factors.

In conclusion, in (Part A), from the questionnaire score obtained in a normal situation, the statistical evidence indicated that while the differences were small: time in position, age and type of center, they were differential factors. In contrast, in the Part B score, these differences disappeared with the evaluation of the confinement situation.

5. Discussion and conclusions

In the former normality, this research shows that the most used PLR was resilience, followed by proactivity and optimism (both at the same level), social awareness, and systems thinking. With the pandemic, the perception regarding the effectiveness of PLRs decreased in all cases compared to the preceding moment, meaning that the principals were aware of their difficulties using the PLRs during the pandemic. However, proactivity comes first, then resilience, and later - at the same level - systemic thinking and social awareness. Emotional intelligence entered at this second moment in the ranking of the most used PLRs, and optimism fell from a second to a sixth position (the most significant decrease experienced by a PLR in this block of the questionnaire).

The least used PLRs before and after the COVID-19 crisis were efficiency in problem solving and self-awareness. These resources, which were already less developed in the pre-crisis period, worsened with confinement and post-confinement, perhaps because the principals had to face new and unknown moments for which they lacked the experience to solve the problems.

There are significant differences in evaluating items before and after the crisis, namely a substantial decrease in optimism and self-awareness. The differences are explainable if we consider the circumstances that these directors had to live.

A situation such as the one experienced, full of uncertainty and with scarce instructions from the Department of Education, forced the principals to be more proactive and provide immediate responses to the different challenges at the cost of great personal and emotional effort. This response of the principals was similar to the reaction shown in other researches related to the management of the COVID-19 crisis (Ahlström et al., 2020; CEPAL-UNESCO, 2020; Díez et al., 2020; Gurr and Drysdale, 2020; Khan, 2021). For example, Gurr and Drysdale (2020), in their analysis of the pandemic management in 29 countries, stated that worldwide leaders had adapted quickly to the new situation, acting proactively. The CEPAL-UNESCO (2020) report on crisis management in Latin American countries points out: "The responses that the various countries have implemented have shown that there are innovative initiatives and promising practices, as well as important advances in record time to ensure continuity of learning " (p. 16), despite the pandemic exacerbating social inequalities, inequity, and exclusion.

The principals stated that they acted by utilizing all the resources available but always under the uncertainty of not knowing if they worked correctly (Ramos-Pla et al., 2021). The results of these acts were unknown, and the effects were uncertain during the crisis. When analyzing the profiles of the principals during the former normality, we observed that those who had held the position for the longest time (more than five years), those who were older (more than 50 years), and especially those from public centers, obtained the highest scores when evaluating the PRLs used. These results imply that the experience as principals and the training received as directors of public schools helped develop personal resources during normal times. However, these differences during the former normality disappeared when assessing the PLRs in the confinement or post-confinement.

These results indicate that leadership is different when facing a crisis, as other authors had previously shown (Halverson et al., 2004; Mumford et al., 2007; Smith & Riley, 2012; Tintoré et al., 2021; Van Wart et al., 2011). The mentioned authors stated that one could not lead the same way in times of crisis as in a period of normality, and this was confirmed in the current study, given that in the former normality, the principals indicated a 3–4 (sufficient/a lot) score on the PLRs performance numbers. However, the result was a 3 or less (little/nothing) during the confinement period, even though some principals maintained high performance.

Different use of PLRs can mean different results and leadership, as leaders in the post-crisis period show greater vulnerability and experienced a decline of some essential resources for effective leadership, particularly optimism or the feeling of self-efficacy (Leithwood, 2012; Leithwood et al., 2020).

In summary, after analyzing the PLRs used before and after the pandemic, this study shows that the principals made less effective use of their PLRs during the pandemic in all cases, remaining similar in the case of proactivity, the most used resource during the confinement and post-confinement periods. Additionally, we have observed a significant decrease in the use of some PLRs, notably self-awareness and optimism. This decline is worrisome because the specialized literature shows the importance of optimism and personal development skills for proper and effective leadership (Leithwood, 2012; Leithwood et al., 2020).

We have also observed that factors such as age, experience and training affect less in times of pandemic when the need for immediate responses puts all principals on the same level. Hence, the crisis can be a significant training period for the principals and the whole organization (Ackerman and Maslin-Ostrowski, 2003; Ramos-Pla, 2016; Silva et al., 2018; Ramos-Pla et al., 2021). In addition, principals can take advantage of the challenge posed by the crisis not to focus on returning to the old normality but to make the changes that education needs at this time (United Nations, 2020).

It is crucial to analyze the facts, actions, and leadership during the pandemic to determine strategies that could help face other possible situations in future crises. We must extract the lessons learned during an exceptional situation such as this one and shape training proposals in school management in times of crisis, avoid the decrease in the use of PLRs, and re-enforce its more successful use. In the end, this is about acquiring leadership competencies for managing other crises from a more positive point of view, thereby avoiding improvisation.

Despite the results of this research, there are also some limitations. The first one is that there are no similar studies since the research on this topic is emerging given the proximity of the events. Thus, there is a difficulty in comparing the results with other realities. Furthermore, only the point of view of the directors is available in this investigation. Therefore, as future research, it is proposed to expand the study with the point of view of the rest of the educational community and compare the present analysis with studies that examine the personal resources put into practice by principals during the crisis in other parts of the world and at different educational levels.

To conclude, this research can help these principals and other colleagues realize that good management of the COVID-19 pandemic can offer opportunities to change schools despite dire circumstances. The changes should be profound, sustainable, and durable at the same time (Azorín, 2020; Harris, 2020; Hung et al., 2020; United Nations, 2020; Zhao, 2020) instead of just giving immediate and fleeting responses to emergencies. Good use of the personal resources described by the academic literature and support to develop the PLRs properly can significantly help principals.

Declarations

Author contribution statement

Ramos-Pla, A.: Conceived and designed the experiments; Wrote the paper.

Tintoré, M.: Performed the experiments; Wrote the paper.

del Arco, I.: Contributed reagents, materials, analysis tools or data; Wrote the paper.

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The data that has been used is confidential.

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The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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