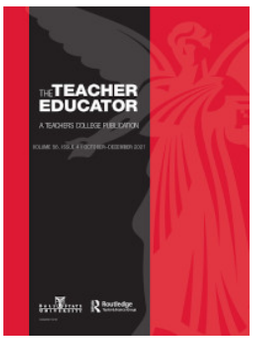

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Teacher Well-Being and Perceived School Climate during COVID-19 School Closure: The Case of Physical Education in Switzerland

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ABSTRACT

School closure and distance learning during the COVID-19 lockdown had the potential to affect teachers' perception of their well-being and of the school climate. Within the teaching community, physical education (PE) teachers particularly redesigned their activities during school closures, posing both opportunities and threats. The study aim was to contribute to the understanding of the teachers' well-being experiences (burnout and engagement) and school climate perceptions during the lockdown for PE teachers in comparison with those of teachers of other subjects. The results from 188 teacher questionnaire responses revealed better psychological experiences among PE teachers in 2020 compared to those in a traditional year and compared to those of teachers of other subjects. School closure was related to higher collaboration, vigor scores and lower levels of physical fatigue for PE teachers. These positive effects for the PE teachers suggest using some profits of the COVID-19 period in normal teaching conditions

The sudden changes related to the COVID-19 global pandemic resulted in the redesign of school environments as well as teaching activities (Masonbrink & Hurley, 2020; Viner et al., 2020). Recent studies have found mixed effects of the coronavirus disease 2019 (COVID-19) pandemic on teachers' psychological experiences (Sokal et al., 2020). Moreover, physical education (PE) teachers are confronted with specific demands related to the central role of the body (Richards et al., 2018). The school closure period and the distance with students seem particularly challenging for this discipline. Therefore, the purpose of this study to contribute to a better understanding of the effects of school closure on PE teachers' experience in comparison with those of teachers of other subjects. In comparison with teachers of other subjects, we explored the potential differences in teacher's perception of their well-being (burnout and engagement) and of school climate during the lockdown compared to those in a typical year (without lockdown).

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COVID-19 and school closure

COVID-19 began to spread worldwide at the end of 2019 and was identified as a pandemic by the World Health Organization in March 2020 (Velavan & Meyer, 2020). The major prevention effort against the spread the virus consisted of social distancing and led to lockdowns in many countries (Radwan et al., 2020). These health measures led to unprecedented social, economic, and professional challenges (Velavan & Meyer, 2020). In the teaching context, many countries chose to implement national school closures to reduce social interaction. However, it was necessary to maintain teaching quality and student support without physical presence (Viner et al., 2020). In this way, distance learning was organized in a majority of schools (notably in the state of Vaud in Switzerland, the place of data collection for this study). Teachers had to rapidly adapt their teaching activities to respond to national programs and pass on knowledge, despite a lack of experience and background in distance learning. Previous studies have shown mixed effects of school closure on teachers' experiences (la Velle et al., 2020; Rapanta et al., 2020; Sokal et al., 2020). Teachers have reported perceptions of losing opportunities to practise teaching (la Velle et al., 2020; Sokal et al., 2020), restricted interaction, lack of equipment, exhaustion, cynicism, and negative cognitive and emotional attitudes (Sokal et al., 2020). However, during this period, research have also documented positive opinions about distance organization and increased time for pedagogical reading and thinking (Rapanta et al., 2020), increased efficacy for classroom management and self-accomplishment (Sokal et al., 2020) and opportunities to develop digital competences according to one's personal resources and educational background (König et al., 2020).

Physical education in the school context

Across the teaching community, PE has a particular and marginal status for various reasons (Gaudreault et al., 2018; Koustelios & Tsigilis, 2005; Richards et al., 2018). First, PE teachers are physically distanced from the other school staff. PE classes are regularly conducted outside the school in specific places, such as a gym, an athletic track, an outdoor sports field, or a swimming pool. In connection with these specific workplaces, PE teachers must adapt, be mobile, and deal with difficult weather conditions (Koustelios & Tsigilis, 2005; Zhang & Chen, 2017). In addition, administrators and school policies often allocate a specific PE teacher room in the school gym that is separated from the other teachers. This physical distance between PE teachers and teachers of other subjects promotes privileged, frequent, and informal exchanges within the PE teacher team (Armour & Yelling, 2007; Koustelios & Tsigilis, 2005). Second, the main characteristic of PE is the central role of the body. Contrary to other subjects, PE involves body movement, making student success and failure directly visible to students and teachers. PE teachers interact with students who are in continuous movement, whereas teachers of other subjects assign students to personal seats (Reuker, 2017). Therefore, PE teachers carry out unique activities and are exposed to specific constraints. For instance, they must cope with students' excessive movements and be particularly careful about students' misbehavior and security (Reuker, 2017).

PE teachers regularly reported their feeling of marginal status of their discipline in the school community (Gaudreault et al., 2018). However, despite their distance from school intellectual values, PE teachers are frequently identified as having strong educational values and noninstructional activities that lead to close connections with students and different roles in the school (Gaudreault et al., 2018; Richards et al., 2018). In addition, because of their specific teaching characteristics, PE teachers are more subject to physical pain, such as voice trauma (Smith et al., 1998) or body pain (Goossens et al., 2016). In this way, distance learning could be considered an opportunity to limit the physical constraints of PE teaching (Varea & González-Calvo, 2021). However, without the usual physical proximity, the school closure could produce a lack of job meaning for PE teachers (Gaudreault et al., 2018). St Pierre (1998) reported that for students and teachers, distance learning in PE may not be appropriate. Thus, considering the specific constraints for PE, exploring the specific effects of the lockdown period on PE teachers' experiences in comparison with teachers of other subjects seems beneficial.

Teacher well-being: Burnout and engagement

Apart from the specific teaching characteristics of PE (i.e., central role of the body, distance with colleagues of other disciplines, marginal status), the well-being of teachers has been widely studied in the educational literature. Conservation of resources (COR) theory (Hobfoll, 2010) concerns psychological health at work, postulating that all humans aim to maintain their resources and develop new resources (Westman et al., 2004). According to this theory, the gain or loss of resources (e.g., physical, emotional, cognitive) leads to important well-being outcomes, such as burnout or engagement (Shirom, 2003b, 2011).

Being a teacher is difficult, and much research has confirmed the laboriousness of the teaching profession (Boyle et al., 1995). Depending on the school context, teachers could deal with a wide variety of psychological (i.e., pressure from institutions and parents), social (i.e., low status, violent behaviour), and physical (i.e., musculoskeletal pain, fatigue) demands (Boyle et al., 1995). Consequently, teachers represent a population that is especially exposed to burnout (Ghanizadeh & Jahedizadeh, 2015). Burnout refers to a negative psychological syndrome involving emotional, physical, and cognitive exhaustion related to working conditions (Shirom, 2003b). Burnout is a complex concept, and there is no consensus on its measurement. Theoretically driven by COR theory, the Shirom-Melamed model of burnout is based on the threat of the loss of different forms of individual resources. Thus, burnout is defined as a syndrome with three dimensions that represent common symptoms of burnout (Shirom, 2003b): physical fatigue (i.e., overall physical exhaustion), emotional exhaustion (i.e., the feeling of "being drained" from work), and cognitive fatigue (i.e., difficulties concentrating and quickly mobilizing one's intellectual capacities). However, in environments including both positive (e.g., autonomy, meaningful job) and negative (e.g., institutional pressures, student misbehavior) aspects, empirical studies have reported that teachers are not only exposed to maladaptive outcomes (Kinnunen et al., 1994; Salmela-Aro et al., 2019). Notably, the lockdown period has mainly been explored with a focus on negative effects (Donohue & Miller, 2020; Husky et al., 2020).

In line with recent developments in positive psychology, positive outcomes such as work engagement have been investigated. Teaching activity has also been defined as stimulating, significant work involving both challenges and opportunities (Salmela-Aro et al., 2019). Engagement was first considered to be the exact opposite of burnout on the same continuum according to the bipolar approach (Shirom, 2011). However, currently, burnout and engagement are frequently considered independent concepts following a bivariate approach (Pérez-Fuentes et al., 2019). For instance, a teacher with low levels of burnout will not automatically experience high levels of engagement. Shirom (2003a, 2011) conceptualized a multidimensional approach to work engagement focused on vigor, referring to a positive, pleasant affect. In the same way as burnout, vigor is a concept for engagement driven by COR theory and related to the perception of one's own resources, with physical, emotional, and cognitive components: the feeling of possessing physical strength (i.e., the individual's physical abilities), emotional energy (i.e., the individual's ability to express sympathy and empathy for others), and cognitive alertness (i.e., the individual's thinking skills and mental agility) (Shirom, 2003a). Vigor has been associated with a range of positive outcomes, such as workers' job satisfaction and mental and physical well-being (Rusu & Colomeischi, 2020). Up to now, there is little published data on the differences in the burnout and vigor levels according to the subject taught. However, in a similar study in an usual period, Guillet-Descas and Lentillon-Kaestner (2019) have revealed low differences in burnout and no difference in vigor for PE teachers in comparison with other teachers controlling sex.

Finally, previous studies have revealed that contextual factors may impact the risk of burnout (Vandenberghe & Huberman, 1999). For instance, constraints such as difficult working conditions (e.g., lack of recognition) and poor quality in relationships (e.g., with colleagues, principal, or students) have been related to teachers' burnout (Ponnelle, 2008). During the COVID-19 pandemic, school closures suddenly redefined academic functioning and the teaching context. In particular, teachers had to revise communication with staff and students (e.g., web platforms) and develop, share, and adapt to new teaching forms (Viner et al., 2020).

Teachers' perceptions of school climate

Whereas the school climate is recognized as one of the main determinants of academic achievement (Maxwell et al., 2017), there are a variety of definitions of this concept. Among these distinct views, the staff perspective appears relevant insofar as teachers' perceptions are sensitive and are of prime importance for teaching and learning activities (Johnson et al., 2007). Teachers' perceptions have been related to significant outcomes for both teachers and students (Maxwell et al., 2017). In particular, teachers' perceptions of school climate have been associated with teacher job satisfaction, burnout, and self-efficacy as well as student achievement (Aldridge & Fraser, 2016). From this perspective, the Revised School Level Environment Questionnaire (RSLEQ, Johnson et al., 2007) was constructed based on Moos's general dimensions of the human environment (Moos, 1973). This multidimensional scale assesses instructional innovation (i.e., perception of the innovative potential of the school), collaboration (i.e., quality of interactions with other teachers), decision making (i.e., opportunities for teachers to

make decisions), school resources (i.e., quality of school equipment), and student relationships (i.e., quality of interactions with students). Among the various school environment measures, these components are theoretically driven and constructed to be applicable and relevant to the criteria highlighted by teachers in a school setting (Johnson et al., 2007). The literature has revealed that the school climate depends on the environment and school policies (Thapa et al., 2013). The suitability of the scale for the assessment of teachers' experiences and the psychometric invariance of the scale (Grazia & Molinari, 2021; Johnson et al., 2007) appear to make it suitable for use in the investigation of the modification of school setting during school closure and the differences in teachers' perceptions according to the subject taught.

Study purpose and relevance

The aim of this study was to explore PE teachers' well-being experiences (burnout and engagement) and perceptions of school climate during the lockdown compared to those in a typical year and compared to those of teachers of other subjects (see Figure 1 for a summary of the study-variables).

The present study is relevant for three main reasons. First, recent studies have focused mostly on teacher burnout (and not on teacher engagement) and suggested that the lockdown was related to an increase in teachers' levels of burnout due to additional stress factors (Sokal et al., 2020). However, in previous studies, burnout scores during the lockdown were not compared with those of a traditional year. In addition, in addition to teacher burnout, it would be interesting to explore the effects of school closures on positive feelings, such as engagement. Second, no previous study has investigated the specific experiences of PE teachers during the COVID-19 pandemic and the impact of school closures on contextual factors, such as teachers' perceptions of school climate. During the school closure, the contextual constraints changed compared to those during a traditional year (Viner et al., 2020), with both a decrease in some demands (e.g., physical constraints) and an increase in others (e.g., replacement of usual activities). In line with the specificities of PE in school, the redesign of teaching constraints could

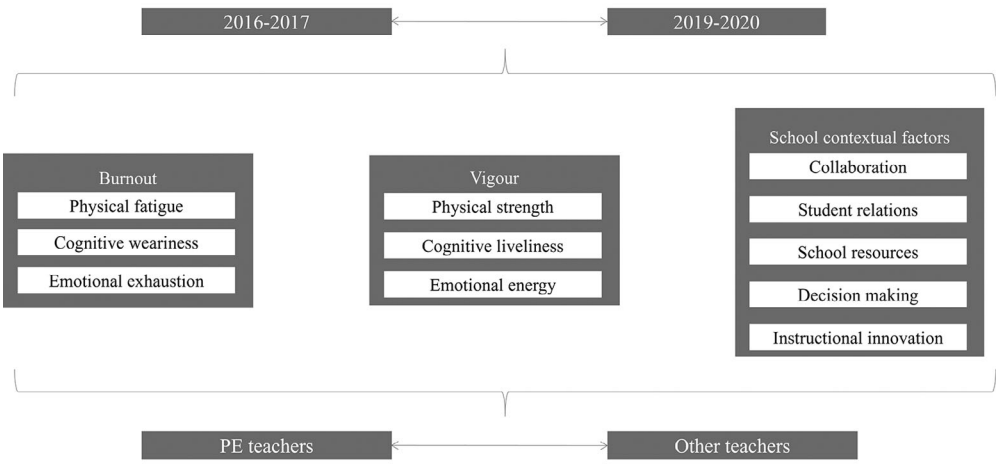

Figure 1. Summary of study variables.

particularly impact PE teachers' burnout and vigor. Do the teachers experience different perception of well-being and school climate levels during COVID-19 period? Are these differences the same for the different subjects taught? How the PE teachers cope with this period compared to other subject teachers considering the important role of physical proximity in this discipline?

Based on theoretical and empirical research (e.g., Gaudreault et al., 2018; Goossens et al., 2016; Hobfoll, 2010; Sokal et al., 2020), different assumptions were developed. First, because of the reduction in specific constraints for PE teachers (e.g., safety concerns, physical demands), we expected a more functional impact of school closures on PE teachers' burnout than on that of teachers of other disciplines during the lockdown period and consequently an increase in the difference between the burnout levels of PE teachers and teachers of other subjects during the school closure compared to that during a traditional year.

Second, because of the possible lack of meaning with distance learning in PE (Gaudreault et al., 2018; St Pierre, 1998), we assume a more deleterious effect of the lockdown for PE teachers' vigor than for the vigor of teachers of other subjects during the school closure and, consequently, an increase in the difference between the vigor levels of PE teachers and other teachers during the lockdown compared to that in a traditional year.

Finally, because of the specific consequences for teaching activities according to the subject taught, we assumed that the interaction effects on the scores for teachers' school climate perceptions would reveal an increase in differences between PE teachers and other teachers during the lockdown compared to that during a traditional year. However, we expected that these differences would differ according to the variables. First, in line with the particular characteristics of PE and the existing close relationships among PE teachers (Goossens et al., 2016; Silva et al., 2019; Smith et al., 1998; Varea & González-Calvo, 2021), we expected more functional collaborative experiences during the lockdown for PE teachers than for other teachers. On the other hand, we assumed a less functional effect of the lockdown on student relations for PE teachers than for other teachers, with the lockdown limiting the usual relational proximity of PE teachers with students. Finally, given that all teachers were involved in distance learning, no differences were expected for decision making, school innovation or school resources.

Materials and methods

Participants

The sample consisted of 188 secondary school teachers from the state of Vaud in Switzerland ($M = 38.41$ years, $SD = 13.92$). One hundred nine teachers were females, and 79 were males. One hundred eighteen teachers participated in the 2016–2017 school year, which was considered a typical year, and 70 participated in the 2019–2020 school year during the lockdown period. The two samples were fully independent. A total of 112 teachers were PE teachers, whereas 76 were teachers of other subjects (e.g., mathematics, English, French, history). On average, the mean teaching experience was 16.33 years ($SD = 9.48$).

Procedure

The research was conducted in accordance with the principles of international ethical guidelines. Permission to conduct the study was granted by the ethics board of the host university. The teachers were reminded that their participation was voluntary, that their responses would be confidential and that they were free to withdraw from the study at any time. The participants provided written informed consent before the start of the procedure. They needed 20 minutes to complete the questionnaire during their free time. The questionnaires were sent and completed online. The data were collected between March and May during 2017 and 2020.

Measures

Teachers completed a French version (Sassi & Neveu, 2010) of the Shirom-Melamed Burnout Measure (SMBM, Lerman et al., 1999) to assess burnout levels. Fourteen items and three subscales were used to measure physical fatigue (6 items, e.g., "I feel tired"), cognitive weariness (5 items, e.g., "I have trouble concentrating"), and emotional exhaustion (3 items, e.g., "I feel unable to be close to my colleagues"). Engagement was measured using the French version (Isoard-Gautheur et al., 2020) of the Shirom-Melamed Vigor Measure (SMVM, Shirom, 2003a). Three subscales and 12 items were used to measure physical strength (5 items, e.g., "I feel energised"), cognitive liveliness (3 items, e.g., "I feel creative"), and emotional energy (4 items, e.g., "I feel attuned to the needs of my colleagues"). For these two scales, the participants responded on a 7-point Likert scale with values ranging from 1 (never) to 7 (always).

Finally, contextual factors were measured by a translated version of the RSLEQ (Johnson et al., 2007). Twenty-one items and five subscales were used to measure collaboration (6 items, e.g., "There is good communication among teachers"), student relations (4 items, e.g., "Most students are motivated to learn"), school resources (4 items, e.g., "Instructional equipment is not consistently accessible"), decision making (3 items, e.g., "Teachers are frequently asked to participate in decisions"), and instructional innovation (4 items, e.g., "New and different ideas are always being tried out"). The participants responded on a 5-point Likert scale with values ranging from 1 (not agree at all) to 5 (totally agree).

Data analyses

Two categorical independent variables were considered in this study: subject taught (PE vs. other subjects) and school year (2016–2017 vs. 2019–2020). First, preliminary analyses were conducted; we examined the normality of the distributions and screened the data set for multivariate outliers.

Chi-square tests and t-tests were used to check the homogeneity of the two samples (between school years) regarding teacher sex and teaching experience. A series of analyses were performed to confirm the reliability of the subscales used in this study (i.e., the RSLEQ, SMBM, and SMVM). The Cronbach's alphas and confirmatory factor analyses (CFA) were computed. The CFA models were specified according to theoretical expectations; each item loaded on the target factor. A value of .70 was considered acceptable

for the Cronbach's alphas. The assessment of model fit was performed using the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the chi-square test of model fit (Hu & Bentler, 1999). A CFI greater than .90 and an RMSEA and SRMR smaller than .08 indicate an acceptable fit. Then, we verified the absence of sample biases for the disciplines. Thus, multiple indicators multiple causes (MIMIC) models were performed to explore the possible differential item functioning (DIF) for the discipline taught. Two models were specified (Morin et al., 2016): a factor-only model (the paths from the covariates to the item responses were forced to be zero, but the path to the latent factors was freely estimated) and a saturated model (the paths from the covariates to the item responses, but not the factors, were freely assessed). A change of less than .010 in the CFI and .015 in the RMSEA suggested an equivalent level for the MIMIC models (Chen, 2007) and revealed an absence of DIF.

Finally, a 2*2 multivariate analysis of covariance (MANOVA) was used to examine the main and interaction effects of school year (i.e., 2016–2017 vs. 2019–2020) and subject taught (i.e., PE vs. other subjects) on the dimensions of burnout, engagement, and teachers' perceptions of school climate. If significant effects were reported ($p < .05$), Tukey's HSD was used for post hoc tests to compare the different groups. Statistica software, version 8.0, was used to perform descriptive statistical analyses and MANOVA, and MPlus was used for the CFA and MIMIC models.

Results

Preliminary analyses

To confirm that the 2016–2017 school year was representative of a typical year, the data from this school year (burnout, vigor, perceived school climate) were compared to the data from another sample drawn from two other typical school years (2017–2018 and 2018–2019 school years) ($N = 82$). Data were also collected between March and May during the 2017–2018 and 2018–2019 school years. According to the MANOVA, no significant differences were found between the selected typical year (2016–2017) and the two other years (2017–2018 and 2018–2019) for burnout, engagement, and teachers' perceived school climate (see supplemental material; Table 1). Thus, 2016–2017 was considered a typical school year.

The chi-square test and t-test revealed no significant differences between the 2016–2017 school year sample and the 2019–2020 school year sample by sex or teaching experience ($p > .05$).

For the SMBM, the Cronbach's alpha coefficients (see the supplemental material; Table 2) were acceptable across the two samples for physical fatigue, cognitive weariness, emotional exhaustion, physical strength, cognitive liveliness, emotional energy, collaboration, student relations, school resources, and instructional innovation (the α coefficients ranged from .71 to .95). The Cronbach's alphas were questionable for decision making (.64 and .55). The coefficients could be explained by the low numbers of items and the limited size of the samples. The CFA provided evidence of the internal reliability of the three scales (see Table 1). The CFAs showed an acceptable fit to the data for the SMVM, the SLEQ, and the RSLEQ (CFI $\geq$ .90; RMSEA and SRMR $\leq$ .08).

Table 1. Goodness of fit statistics and information criteria of confirmatory factor analysis (CFA) and multiple indicators multiple causes (MIMIC) models.

Scale	Model	χ^2	df.	CFI	TLI	AIC	BIC	ABIC	RMSEA	90%CI RMSEA	SRMR
SMBM	CFA	242.90	74	.916	.897	7064.48	7214.01	7071.44	.08	[.06-.09]	.055
SMVM		162.48	87	.946	.934	6831.25	6990.75	6838.67	.07	[.05-.08]	.051
RSLEQ		362.32	179	.909	.894	9289.44	9512.40	9300.12	.07	[.05-.08]	.066
SMBM	MIMIC – factor only	252.95	85	.915	.895	.6493.40	6649.00	6496.96	.09	[.08-.10]	.053
	MIMIC – saturated	255.92	85	.913	.893	6497.27	6652.88	6500.84	.09	[.08-.10]	.064
SMVM	MIMIC – factor only	188.81	99	.934	.921	6302.72	6468.05	6306.50	.07	[.05-.08]	.053
	MIMIC – saturated	185.26	97	.936	.920	6303.57	6475.38	6307.50	.07	[.05-.08]	.058
RSLEQ	MIMIC – factor only	401.67	195	.890	.866	8596.03	8829.44	8601.37	.07	[.06-.08]	.071
	MIMIC – saturated	407.27	196	.887	.867	8600.33	8830.50	8605.60	.07	[.06-.09]	.079

Note. SMBM Shirom-Melamed Burnout Measure. SMVM Shirom-Melamed Vigor Measure. RSLEQ Revised School Level Environment Questionnaire. CFA Confirmatory factor analysis; MIMIC Multiple Indicators Multiple Causes; df Degrees of freedom; CFI Comparative fit index; TLI Tucker Lewis index; AIC Akaike information criterion; BIC Bayesian information criterion; ABIC Sample size adjusted BIC; RMSE Root mean square error of approximation; SRMR Standardized Root Mean Square Residual. All chi-square values are significant at $p < .001$.

Table 2. 2x2 MANOVA results: interaction effects of subject taught (PE and other) and school year (2016–2017 and 2019–2020) on burnout, vigor, and perceived school climate.

		PE 2017 (1)	Other 2017 (2)	PE 2020 (3)	Other 2020 (4)	$F(3, 184)$	p	η^2	Tuckey's HSD*
Well-being – Burnout	Physical fatigue	2.87 (1.22)	2.97 (1.13)	2.67 (1.17)	3.43 (1.13)	*2.97*	*.03*	*.05*	3 < 4
	Cognitive weariness	2.55 (1.04)	2.76 (1.00)	2.30 (.72)	2.89 (1.11)	*2.24*	*.08*	*.04*	
	Emotional exhaustion	2.54 (.91)	2.51 (.96)	2.36 (.76)	2.79 (1.01)	*1.38*	*.25*	*.02*	
Well-being – Vigor	Physical strength	4.88 (.77)	4.83 (.71)	5.51 (.83)	4.96 (.91)	*2.89*	*>.01*	*.07*	3 > 4
	Cognitive liveliness	4.79 (.69)	4.76 (.71)	5.33 (.69)	4.89 (.85)	*4.82*	*>.01*	*.06*	3 > 1, 2, 4
	Emotional energy	5.08 (.69)	4.93 (.64)	5.55 (.61)	5.34 (.76)	*3.91*	*>.01*	*.10*	3 > 1, 2
School climate	Collaboration	3.68 (.61)	3.50 (.72)	3.75 (.65)	3.20 (.71)	*6.60*	*>.01*	*.08*	3 > 1, 2
	Student relations	3.67 (.73)	3.69 (.76)	3.86 (.66)	3.66 (.79)	*.47*	*.70*	*.01*	
	School resources	3.34 (.84)	3.53 (.83)	3.63 (.67)	3.20 (.74)	*1.62*	*.19*	*.03*	
	Decision making	2.80 (.60)	2.63 (.80)	2.85 (.60)	2.51 (.59)	*2.08*	*.10*	*.03*	
	Instructional innovation	3.17 (.41)	3.15 (.52)	3.38 (.33)	3.18 (.53)	*1.54*	*.21*	*.02*	

Note. PE = physical education teachers; Other = teachers of other subjects.

The MIMIC results did not indicate an improvement in the level of fit associated with the saturated model compared with that associated with the factor-only model (Δ CFI, TLI < .010; Δ RMSEA < .015). The absence of improvement in fit associated with the saturated model compared with that associated with the factor-only model revealed an absence of DIF for burnout, engagement, and teachers' perceptions of school climate concerning subject taught (see Table 1).

Main analyses

The descriptive data are presented in Table 2. For burnout, the 2*2 MANOVA results revealed a significant main effect of subject taught on physical fatigue, $F(1,184) = 4.10$, $p < .05$, and cognitive weariness, $F(1,184) = 5.32$, $p < .05$, with lower scores for the PE teachers than for the other teachers. Moreover, the results revealed a significant

interaction effect of subject taught and school year only on physical fatigue, $F(3, 184) = 2.97$, $p < .05$, and a marginal interaction effect on cognitive weariness, $F(3,184) = 2.24$, $p = .08$, but not on emotional exhaustion. The post hoc analyses revealed that the PE teachers in 2020 experienced lower levels of physical fatigue than the other teachers in 2020, whereas no difference between groups was observed in the 2016–2017 school year. No further effect was found (see Table 1).

The analyses also revealed a significant main effect of school year on physical strength, $F(1,184) = 5.78$, $p < .05$, cognitive liveliness, $F(1,184) = 5.22$, $p < .05$, and emotional energy, $F(1,184) = 15.51$, $p < .01$, with higher levels during the 2019–2020 school year. Moreover, the results showed an interaction effect of subject taught and school year on the three engagement factors, including physical strength, $F(3, 184) = 4.82$, $p < .01$, cognitive liveliness, $F(3, 184) = 3.91$, $p < .01$, and emotional energy, $F(3, 184) = 6.60$, $p < .01$. More precisely, the post hoc analyses revealed no difference between the PE teachers and other teachers in the 2016–2017 school year. However, the PE teachers in the 2019–2020 school year experienced (a) higher levels of physical strength than the PE teachers and other teachers in the 2016–2017 school year and other teachers in the 2019–2020 school year; (b) higher levels of cognitive liveliness than the PE teachers and other teachers in the 2016–2017 school year; and (c) higher levels of emotional energy than the PE teachers and other teachers in the 2016–2017 school year. No further effect was found for engagement scores.

Finally, the 2*2 MANOVA results revealed a significant main effect of subject taught on collaboration, $F(1,184) = 10.22$, $p < .01$, and decision making, $F(1,184) = 5.39$, $p < .05$, with higher scores for the PE teachers than the other teachers. The results also revealed significant interaction effects of subject taught and school year on perceived collaboration, $F(3, 184) = 5.23$, $p < .01$. More precisely, the post hoc analyses revealed that the PE teachers experienced higher levels of collaboration than the other teachers in the 2019–2020 school year, whereas no difference was observed in the 2016–2017 school year. No significant effects were found for the other school climate factors.

Discussion

The aim of this study was to explore the specificities of well-being experiences (burnout and engagement) and school climate perceptions during the 2019–2020 school closure for PE teachers in comparison with those of teachers of other subjects.

First, concerning teacher burnout, the analyses revealed that the PE teachers in 2020 experienced lower levels of physical fatigue than the other teachers in 2020, whereas no difference was observed in the 2016–2017 school year. This result is partially in line with our assumption and suggests that distance learning was related to a reduction in some constraints for PE teachers. In particular, the absence of traditional demands such as students' safety and vocal demands (Goossens et al., 2016; Silva et al., 2019; Smith et al., 1998; Varea & González-Calvo, 2021) reduced teaching constraints for PE teachers during the lockdown. A distinction among the three burnout components (i.e., physical, cognitive, and emotional) was also found in the analyses, supporting the use of the multidimensional approach of Shirom-Melamed (Shirom, 2003b; Shirom & Melamed, 2006). Thus, the difference between PE and other teachers lies mainly in the

physical dimension of burnout. This finding is consistent with the main specificities of PE related to physical movement. Overall, this study highlighted an additional perspective of job stressors for teachers in line with a few previous studies (Al-Mohannadi & Capel, 2007; Gaudreault et al., 2018). A distinction according to the discipline taught seems useful. The marginal effect on cognitive weariness also suggests that distance learning may reduce the cognitive demands of teaching for PE teachers.

Second, concerning teacher vigor, the PE teachers reported significantly higher levels of physical strength, cognitive liveliness, and emotional energy during school closure than during a traditional period, whereas no difference was found for the other teachers. These results disprove our assumption. Thus, in a COR perspective (Hobfoll, 2010), despite the absence of physical presence, which is the core of PE, the present results suggest that the lockdown period was associated with a gain of resources for PE teachers but not for other teachers. In line with the analyses of König et al. (2020), the lockdown period could be considered a more challenging but stimulating time for PE teachers than for other teachers. The impossibility of providing the usual forms of teaching may led to a total redesign of the teaching activity (Viner et al., 2020) and the establishment of new forms of teaching including both synchronous and asynchronous sessions, which was related to more positive teaching well-being experience for PE teachers than for other teachers. Another assumption would refer to the absence of the usual constraints for teachers and a significant reduction of their workload during COVID-19 period. Thus, as for burnout and in line with COR theory, the school closure would be related to a save of PE teachers' resources for meaningful activities. Moreover, these results revealed more effects of school closure on engagement than burnout factors. Contrary to the burnout results, the school closures led to differences between the PE teachers and other teachers for each vigor factor. In line with positive psychology (Bakker & Schaufeli, 2015), this result supports the interest in investigating both positive and negative effects of a changing context. Finally, in line with a bivariate approach (Shirom, 2011), the present results highlight that burnout and vigor refer to independent concepts because the PE teachers did not experience lower emotional exhaustion during the 2020 school closure than during the traditional year but reported higher levels of emotional energy.

Finally, concerning teachers' perceptions of school climate, in line with our assumption, the collaboration scores were significantly higher for the PE teachers than for the teachers of other subjects during the school closure, whereas no difference was found during the traditional year. Thus, the absence of physical presence was not a limit for the perception of collaboration for the PE teachers. We assume that the PE teachers were accustomed to working as a team with close relationships (due to specific working/meeting places and shared equipment) (Armour & Yelling, 2007; Koustelios & Tsigilis, 2005) and that the PE teachers may have been a better resource for each other during lockdown than the other teachers. Moreover, in line with our initial assumption, no additional differences between the PE teachers and other teachers were found during lockdown in terms of school resources, decision making, and instructional innovation. These results are consistent with the distance learning that was imposed for all the teachers regardless of the subject taught. However, the absence of an additional difference in student relations levels disproves our assumption regarding the usual relational

proximity of PE teachers with students (Gaudreault et al., 2018). Notably, the student relations scores were also similar between the PE teachers and other teachers during the traditional year. This result could question the effective specific relational proximity of PE teachers in comparison to others.

Limitations and perspectives

Despite the relevance of this study, some limitations should be mentioned. From a methodological perspective, we acknowledge the limited sample size. The busy COVID-19 pandemic period did not facilitate the availability of teachers (Huang et al., 2020). A larger and more heterogeneous sample would allow to explore inter-individual differences with person-centred approaches. All teachers may not similarly experience a school closure period due to differences in personal resources or sensibilities, as has been reported for healthcare workers (Soto-Rubio et al., 2020). Moreover, another limitation concerns the independent samples between the traditional year and the lockdown year that made it impossible to directly control the previous individual scores. To reduce this limitation, we underlined the similarities in the teacher sample characteristics between the two compared school years. In addition, in the preliminary analysis, we compared data from the selected typical year to another typical year. However, it would have been better to implement a longitudinal study over two years to compare data from the same teachers in a typical year and the lockdown year. It could also be relevant to explore teachers' experiences upon the subsequent reopening of school (Sheikh et al., 2020). The necessary distancing factor (e.g., wearing masks, equipment cleaning) in addition to the traditional constraints may be considered a new stress factor, especially for PE teachers. Finally, teachers' perceptions of this period could be explored with a qualitative approach. Semi-directive interviews could permit deeper investigation of teachers' feelings and stressors during school closure in comparison with those during a typical time. This qualitative approach would also allow to a better understanding of the stress factors for PE teachers in comparison to other teachers and the main differences in the school conditions between closure and opening.

To conclude, the present study aimed to explore the specificities of well-being experiences (burnout and engagement) and school climate perceptions during the lockdown for PE teachers in comparison with those of teachers of other subjects. Overall, the results revealed better psychological experiences for PE teachers in 2020 compared to those in a traditional year and compared to those of teachers of other subjects. More precisely, school closure was related to higher scores for physical strength, cognitive liveliness, and emotional energy and lower levels of physical fatigue for PE teachers. From a COR perspective (Hobfoll, 2010), these findings suggest that the absence of the usual constraints was more beneficial for PE teachers than for teachers of other disciplines given the resources that each group of teachers possessed. Moreover, the higher perceived collaboration scores for PE teachers than other teachers during lockdown were consistent with PE teachers' levels of burnout and engagement that suggested greater adaptation. Based on the present results, it seems relevant to further explore the role of teacher collaboration on teacher burnout and engagement in future research. Finally, on a practical perspective, the positive results of this study for PE teachers

suggests using profits of the COVID-19 period in normal teaching conditions. For instance, based on this period, it may be interesting to try to implement new teaching methods such as complementary use distance learning in PE (Silva et al., 2019) or little taught physical activities (e.g., yoga, fitness). Moreover, the improvement of well-being levels for PE teachers in the present study promotes a decrease of physical constraints for PE teachers. Thus, in a practical perspective, further studies may explore the potential effects of different working arrangements (e.g., reduction of physical constraints with lower distance between courses or/and working time, prefer students' demonstrations for movements) on PE teacher well-being.

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