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Does Support for Professional Development in Early Childhood and Care Settings Matter? A Study in Four Countries

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Abstract

Professional Development (PD) can be a powerful lever for improving the quality of teacher-child interactions in early childhood education and care (ECEC) and teachers' feelings of support and competence. However, there is a dearth of studies examining different formats of PD and their links with workplace features. The present study aims to understand (a) different types of PD participation (structured and center-embedded) and their levels of interest of preschool teachers in four European countries (Cyprus, Greece, Portugal, and Romania), and (b) the extent to which they are associated with PD incentives and perceived support. Participants were preschool teachers from Cyprus ($N=93$; $M_{age} = 41$; $SD=7.47$), Greece ($N=92$; $M_{age} = 40$; $SD=9.81$), Portugal ($N=92$; $M_{age} = 45$; $SD=9.65$), and Romania ($N=97$; $M_{age} = 40$; $SD=10.40$). The vast majority of participants were women (95-99%). Participants reported on PD attendance – structured (courses/seminars, conferences) and center-embedded (e.g., observation visits, peer and/or self-observation) –, levels of interest in PD; PD incentives (e.g., release from working with children; reimbursement/payment of costs); and perceived workplace support. Results from the Multi-Group Path Models showed that, in all countries, the provision of incentives was associated with increased participation in center-embedded PD, but not in structured PD. Additionally, the perceived support from their setting was positively associated with greater interest in PD. Understanding what best supports different types of PD can be critical to inform policy efforts aiming to increase PD attendance.

Keywords Early childhood education and care · Professional development · Preschool · Workplace

There is a growing consensus that professional development (PD) can be a powerful lever for improving the quality of teacher-child interactions in early childhood education and care (ECEC). Considering the current recognition of the crucial role of the first years of life for later development, learning, and well-being, ECEC teachers are being asked to have a complex understanding of child development and to provide rich, sensitive, and meaningful experiences for all children (ET2020 Working Group, 2021). PD can be a powerful tool to increase the quality of ECEC practices. Teacher participation in PD has been shown to enact teachers' ability to create warm, responsive, and stimulating interactions with children (Egert et al., 2018, 2020; Markussen-Brown et al., 2017; Werner et al., 2015). PD has also been linked to improved professional well-being and self-efficacy (Tanaka et al., 2020) and less stress or burnout (Sandilos et al., 2018).

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Given the importance of PD for quality improvement in ECEC, it seems crucial to better understand what types of PD teachers are involved in and the factors that affect their attendance and interest in PD. According to systems and ecological frameworks, understanding what affects PD engagement and interest requires situating PD within the larger context in which it takes place (Connors, 2016; Knapp, 2003). Knapp's (2003) model of the chain of influences suggests that professional learning occurs through dynamic interactions among PD characteristics and opportunities that interact with particular professional environments and cultures, which are embedded in standards, rules, and regulations informed by larger policy and professional contexts. As such, workplace features, such as a positive organizational climate, are likely critical mechanisms that can affect the engagement and effectiveness of PD (Bayly et al., 2022; Connors, 2016). Additionally, the wider context of the ECEC policies and the overall system of a particular country can also contribute to or raise obstacles for PD attendance (Connors, 2016; Knapp, 2003), namely through time regulations and restrictions imposed on teachers in their preschools and/or the availability of financial incentives for teachers to participate in PD (OECD, 2020). Despite these established associations, there is a dearth of studies examining the links between these workplace and contextual factors and different formats of PD. The present study aims to understand better the extent to which support from ECEC settings is associated with different types of PD participation and teachers' levels of interest in PD in four European countries.

The Importance of PD

PD is widely acknowledged as a crucial strategy to improve teachers' professional competencies, skills, and knowledge in ECEC (Bove et al., 2018; Schachter, 2015). Several studies have shown positive links between participation in PD and teacher's ability to create close, warm, and stimulating interactions with children (Bayly et al., 2022; Eadie et al., 2019; Early et al., 2017; Jilink et al., 2018; Landry et al., 2014; Tveit et al., 2019; Wolf et al., 2019). Meta-analytical research into the effects of PD in ECEC confirms that ECEC practices can be improved through PD (Egert et al., 2018, 2020; Markussen-Brown et al., 2017; Werner et al., 2015).

PD can not only contribute to high-quality practices, but it can also enhance teachers' feelings of support and sense of greater competence (Peleman et al., 2018; Tanaka et al., 2020; Wolf et al., 2019). ECEC teachers face considerable challenges in their work (Mowrey & King, 2019). Their role is physically and emotionally demanding, and this can lead to high levels of stress, and burnout (Linder et al., 2016). Prior studies have found that PD can improve professional well-being, self-efficacy, sense of autonomy, and reduce levels of burnout (e.g., Jennings et al., 2013; Tanaka et al., 2020; Wolf et al., 2019). For example, in a recent study Tanaka and colleagues (2020) suggested that participation in PD led to improvements in teacher ratings of their teaching self-efficacy and well-being. Similarly, Sandilos and colleagues (2018) found that participation in PD served as a buffer against the negative association between stress and burnout and teachers' interactions with children. Thus, while contributing to teachers' overall well-being, PD can effectively ensure that ECEC teachers stay updated on evidence-based knowledge and are able to implement high-quality strategies (ET2020 Working Group, 2021).

Types of PD

PD covers a broad range of activities designed to improve teacher practices, increase their knowledge, and change their attitude and perspectives toward teaching (Schachter, 2015; Sheridan et al., 2009). PD programmes are therefore widely diverse. Most PD programmes are structured and focus on knowledge-building through short-term courses, seminars, conferences, or workshops (Linder et al., 2016; Schachter et al., 2019). However, because the format is usually based on brief contacts, with limited follow-up or feedback on observed practice, scholars have suggested that this type of PD – structured PD – has limited effects on teachers' uptake of PD (Schachter et al., 2019; Sheridan et al., 2009). In contrast, PD features such as clear links with teachers' everyday practices, opportunities for sustained reflection, group discussions, demonstrations, and documentation have been highlighted as key features for relevant and effective PD (Bove et al., 2018; Jensen & Iannone, 2018; Peleman et al., 2018). Several authors point out that, for PD to have a long-lasting effect, it seems essential to consider the background knowledge, experiences, or beliefs that teachers bring with them to the PD, as well as the environment in which they work (Linder et al., 2016; Schachter et al., 2019).

Centre-embedded models of PD, including observation visits to other settings, peer or self-observation, or on-site coaching, have received increased interest, given the direct links with everyday pedagogical work, helping teachers to transfer and apply new knowledge and skills to their daily practices (Bove et al., 2018; Peleman et al., 2018). For example, Bove and colleagues (2018) found that ECEC teachers underlined the importance of PD at the centre to support the implementation and transfer of newly acquired knowledge. In another study, Connors (2019) showed that appointing mentors to work with teachers at the centre was associated with higher participation in PD, which in turn,

was related to gains in structural and interaction quality. Resa and colleagues (2017) found that regular professional exchanges were positively related to improved quality practices. It appeared that team meetings also contributed to establishing a good team climate; facilitating regular exchanges and transfer of professional knowledge, and ultimately contributing to high-quality practices (Resa et al., 2017). More opportunities to collaborate with other teachers at the centre have also been linked to greater increases in teachers' self-efficacy (Keung et al., 2020).

PD opportunities at the centre can be particularly beneficial to increase the relevance of the PD for current practices, by increasing the likelihood of alignment between PD contents and teachers' needs and interests (Bove et al., 2018; Linder et al., 2016; Peleman et al., 2018). However, the extent to which centre-embedded PD is currently offered and for whom, is relatively unknown. Additionally, the few available studies point to great variations across countries (Jensen et al., 2015; OECD, 2020) which makes it important to further explore country-specific patterns. This study aims to delineate the types of PD a group of teachers in Cyprus, Greece, Portugal, and Romania has recently attended.

Factors Affecting Participation in PD

Grounded in ecological-systemic frameworks, several scholars argue that the contexts in which PD actions are implemented shape what participants gain in PD (Knapp, 2003). Accordingly, PD occurs within a given professional and organizational context, which gives meaning and form to the learning opportunities (Connors, 2016; Knapp, 2003). PD processes and results can be thus influenced by workplace characteristics, namely the extent to which the professional culture supports collaboration and continuous improvement (Connors, 2016). Accordingly, centres characterised by high-quality cultures of collaboration, in which the relationships among adults reflect warmth, respect, and teamwork, are likely to enhance PD engagement and effectiveness (Connors, 2016). Empirical research has recently shown that different workplace features affect the levels of engagement and the effectiveness of PD (Bayly et al., 2022). For example, Wagner & French (2010) found that teachers who reported a more positive climate at their workplace were more likely to utilize available PD opportunities. Similarly, Roberts and colleagues (2015) found a positive association between teachers' perceptions of supportive professional relationships and engagement in PD. In another study, findings showed that teachers who reported higher levels of positive workplace climate benefitted the most from PD, showing greater improvements in their quality interactions at the end of the PD (Bayly et al., 2022). It seems that teachers who feel valued and supported are more likely to be motivated and to make the most out of PD opportunities. Perceiving that their ECEC settings take an active interest in their PD may play an indirect but critical role in supporting teachers' participation in PD, thus improving classroom quality.

Prior research has also found that ECEC teachers report facing several barriers of access to PD, including distance to PD location, cost, and lack of time (Linder et al., 2016; OECD, 2020). According to OECD (2020), the three main barriers to participating in PD identified by teachers were conflicts with work schedules, lack of staff to compensate for their absence due to PD attendance, and costs associated with PD. In one study, ECEC teachers reported being more likely to attend PD when it was free and close to their workplace (Linder et al., 2016). Similarly, it has been highlighted that incentives such as paid time to engage in PD and reimbursement of PD expenses are crucial to ensure the successful implementation of new pedagogical skills (Mowrey & King, 2019). Flexible schedules are also critical to support PD participation (Bove et al., 2018; Peleman et al., 2018). Hence, providing teachers with the resources and necessary support mechanisms seems important to ensure effective participation in PD.

What remains less clear is whether the perceived climate support of the centre and the offer of incentives are differentially associated with engagement in different types of PD (structured and centre-embedded). This understanding of what best supports teacher participation in different types of PD is critical because it can inform policy efforts that aim to increase PD attendance and that can contribute to a more holistic understanding of the overall system of ECEC PD.

In Europe, the incentives teachers receive to attend PD throughout their careers are widely diverse (Jensen et al., 2015). There are vast differences across and within countries regarding incentives, but also PD regulations (Jensen et al., 2015). In the participating countries in this study, PD is mandatory for most teachers, but there are differences in PD regulations for staff working with younger and older children, and across the private and public sectors (see Table 1). In addition, although some incentives are in place (e.g., releasing work time for PD), these are not guaranteed to all teachers (European Commission/EACEA/Eurydice, 2019). It seems, therefore, important to better understand the incentives teachers actually receive and how these are associated with PD attendance and interests.

Table 1 Selected features of the ECEC systems of participating countries

Structural features	Cyprus	Greece	Portugal	Romania
Minimum qualification requirement for teachers	Bachelor	Bachelor	Master	Bachelor/ Upper secondary vocational
Continuous Professional Development (CPD)	Mandatory	Mandatory	Mandatory for core practitioners	Mandatory
Existence of national educational guidelines (age groups)	For children > 3 years-old	For children > 4 years-old	For children > 3 years-old	For entire ECEC
Compulsory/legal entitlement Age a place in ECEC is guaranteed	Compulsory at age 4.8	Compulsory at age 4	Entitlement at age 4	No guaranteed places
Maximum group size in classrooms serving for children for children aged > 3	25	25	25	20
Maximum child-adult ratio in classrooms for children aged > 3	25:1	13–25:1	13:1	20:1
Average number of weekly hours in ECEC for children aged > 3	32.8 h	25.6 h	38.5 h	23.3 h
Participation rate in ECEC aged 4 and over	92%	81.5%	94.2%	89.6%

Note: Based on European Commission/EACEA/Eurydice (2019)

The Current Study

This study builds on ecological and systems frameworks by investigating the different types of PD in which ECEC teachers participate and their interest in PD in Cyprus, Greece, Portugal, and Romania. It further examines the extent to which PD incentives and perceived support from ECEC settings are associated with attendance in both structured and centre-embedded PD. Specifically, the study aims to address the following questions: (1) What kind of PD activities were teachers mostly involved in? (2) To what extent are teachers interested in PD? (3) What kind of incentives do teachers receive to attend PD? (4) To what extent do teachers perceive their professional settings as being actively interested in their PD? (5) Are incentives and perceived support associated with levels of PD attendance (structured and centre-embedded) and interest?

Method

Participants

The participants of this study were preschool teachers from Cyprus ($N = 93$), Greece ($N = 92$), Portugal ($N = 92$), and Romania ($N = 97$). Almost all participants were women (99% in Cyprus and Romania, 95% in Greece, and 97% in Portugal). Participants had a mean age of 40 years old in Greece and Romania ($SD = 9.81$ and 10.40, respectively), 41 in Cyprus ($SD = 7.47$), and 45 in Portugal ($SD = 9.65$). On average, they had 17 years of ECEC experience in Cyprus and Romania ($SD = 11.59$ and 8.23, respectively), 13 years in Greece ($SD = 9.09$), and 20 years in Portugal ($SD = 10.67$). Groups had on average 22 children in Cyprus and Romania ($SD = 4.76$ and 11.59, respectively), 17 children in Greece ($SD = 4.88$), and 16 children in Portugal ($SD = 3.09$). In Cyprus, Greece, and Portugal, most participants hold a master's degree and a bachelor's degree in Romania (Table 2). Further sociodemographic characteristics of the participants can be found in Table 2.

Procedures

A questionnaire was developed to assess the needs of early childhood teachers' PD, careers, well-being, and existing practices to support children's socio-emotional needs. Several items were selected based on a search of available measures and new items were generated for the needs of this study. The final questionnaire integrated new and other items from widely used well-known measures, such as OECD TALIS Starting Strong (OECD, 2019). Each partner country provided input, translated, and piloted the questionnaire to ensure clarity and to check its structure. An online version of the questionnaire was created, and the link was widely disseminated through social media, newsletters, and professional associations' platforms, making use of the vast network the universities possess. The questionnaire was available online for approximately one month, during June 2020. The current study was approved by the Ethics Committees of all participating countries (Authors) and participants gave their informed consent after being informed about the project aims and methods.

Table 2 Descriptive statistics for teacher and setting characteristics

Variables per country	Cyprus ($N=93$)		Greece ($N=92$)		Portugal ($N=92$)		Romania ($N=97$)	
	M	SD	M	SD	M	SD	M	SD
Lead teacher characteristics								
Sex (1 = woman)	98.9%		94.6%		97%		99%	
Age (years)	40.75	7.47	39.92	9.81	45.22	9.65	39.86	10.40
Years of experience	16.98	8.23	13.43	9.09	20.30	10.67	16.77	11.59
Permanent contract	80.6%		59.8%		82.6%		86.6%	
Preservice qualifications								
High school or less	0%		0%		0%		6.2%	
Bachelor's	33.3%		45.7%		28.3%		50.5%	
Master's	64.5%		48.9%		69.6%		43.3%	
Doctoral	2.2%		5.4%		0%		0%	
Classroom characteristics								
Group size	21.62	4.76	17.13	4.88	16.00	3.09	21.87	11.59
School								
Public school	78.5%		83.7%		37%		99%	

Measures

Four main measures, as detailed below, were used in this study: attendance at structured and centre-embedded PD, PD interests, PD incentives, and perceived support. In the measures including scales assessing several dimensions, psychometric properties were analysed through confirmatory factor analysis (CFA). We used maximum likelihood estimation with robust standard errors in Mplus Version 7 (Muthén & Muthén, 1998–2012). Model fit was examined using the chi-square statistic, the Root Mean Square Error of Approximation (RMSEA), the Comparative Fix Index (CFI), and Tucker–Lewis Index (TLI). CFI and TLI values greater than 0.90 indicate adequate fit and values greater than 0.95 indicate good fit. Similarly, RMSEA values less than 0.08 indicate adequate fit and values less than 0.05 indicate good fit (Hu & Bentler, 1999; van de Schoot et al., 2012). Nevertheless, we have considered the possible effects of the fit indices' sensitivity to the model specifications, sample sizes, and degrees of freedom when determining the goodness-of-fit (Chen et al., 2008). Multiple Group CFA were conducted to test measurement invariance across the four countries. A series of increasingly more restrictive confirmatory factor analysis models were tested, in which constraints to various model parameters were added including, (a) a baseline model that allowed all parameters to be freely estimated separately across countries – configural invariance; (b) a model in which factor loadings constrained to be equivalent across groups – metric invariance; (c) a model in which the factor loadings and intercepts of the observed items were constrained to be equal across groups – scalar invariance (Muthén & Muthén, 1998–2010). The decrease in model fit was sequentially evaluated with Satorra-Bentler's scaled chi-square difference test for nested models' comparison.

Attendance to Structured and Centre-Embedded PD

Teachers reported if they had or had not attended PD activities in the last 12 months from a list of seven PD activities, both structured (courses/seminars, conferences), and centre-embedded (observation visits, peer and/or self-observation, network of professionals, on-site coaching, induction/mentoring activities) (OECD, 2019). Composite scores were calculated separately for structured (scores ranging from 0 to 2) and centre-embedded activities of PD (scores ranging from 0 to 5).

PD Interests

Teachers reported the extent to which they would currently like to receive PD in different content areas using a 5-point Likert scale (*1 = Not Important* to *5 = Very Important*) (OECD, 2019). Content areas in the questionnaire were the following: child development; child health or personal care; facilitating play and learning; working with children with special needs or from diverse backgrounds; working with parents/guardians and families; classroom management; monitoring/documenting child development, well-being, and learning; school discipline programs; learning about the school system; communicating with colleagues; dealing with work-related stress; teacher well-being. A confirmatory factor analysis (CFA) was conducted separately for each country. The measurement models showed an acceptable fit to the data for Cyprus, χ^2 (14) = 27.842, $p = .015$, RMSEA = 0.103 (90% CI [0.044, 0.159]), CFI = 0.945, TLI = 0.918; Greece, χ^2 (14) = 11.659, $p = .634$, RMSEA = 0.00 (90% CI [0.000,

0.085]), CFI = 1.00, TLI = 1.025; Portugal, χ^2 (14) = 29.251, p = .010, RMSEA = 0.109 (90% CI [0.052, 0.164]), CFI = 0.960, TLI = 0.941; and Romania, χ^2 (14) = 29.766, p = .008, RMSEA = 0.155 (90% CI [0.119, 0.192], CFI = 0.903, TLI = 0.866.

In the Multiple Group CFA, the configural invariance model showed acceptable fit, χ^2 (56) = 98.082, p < .001, RMSEA = 0.090, CFI = 0.957, TLI = 0.935. The decrease in model fit for the metric invariance model was non-significant, S-B$\Delta\chi^2$ (21) = 27.869, p = .144, and the model showed acceptable fit, RMSEA = 0.085, CFI = 0.947, TLI = 0.942, indicating that the factor loadings were invariant across countries. The decrease in model fit for the scalar invariance model was statistically significant, S-B$\Delta\chi^2$ (18) = 112.461, p < .001, and the model showed poor fit RMSEA = 0.118, CFI = 0.873, TLI = 0.888, indicating that scalar invariance was not achieved. Nevertheless, because the analysis focused on conducting regression models, which do not imply mean comparisons across countries, we were able to proceed with the analyses. Cronbach's alpha coefficients indicated high internal consistency of the measure, 0.92, 0.88, 0.95, and 0.93, for Cyprus, Greece, Portugal, and Romania, respectively.

PD Incentives

Teachers reported if they had or had not received five PD incentives (release from working with children for activities during regular working hours; non-monetary support for activities outside working hours; reimbursement/payment of costs; provision of materials needed for the PD activities; non-monetary professional benefits) from their school in the last 12 months (OECD, 2019). Due to low percentages of incentives reported by participants (see Table 4), a dichotomous variable was created, with 0 and 1 corresponding to "no incentive at all" and "at least one incentive", respectively.

Perceived Support

To assess teachers' perceived workplace support, the subscale "Professional Growth" from the School Organisational Health Questionnaire (Hart et al., 2000) was used. This subscale is comprised of 5 items (e.g., "I am encouraged to pursue further professional development") rated on a 5-point scale (1 = Strongly disagree to 5 = Strongly agree).

A CFA was conducted separately for each country. The measurement models showed an acceptable fit to the data for Cyprus, χ^2 (6) = 10.246, p = .115, RMSEA = 0.087 (90% CI [0.000, 0.176]), CFI = 0.992, TLI = 0.986; Greece: χ^2 (6) = 8.755, p = .188, RMSEA = 0.071 (90% CI [0.000, 0.164]), CFI = 0.993, TLI = 0.988; Portugal: χ^2 (6) = 10.288, p = .113, RMSEA = 0.088 (90% CI [0.000, 0.177]), CFI = 0.989, TLI = 0.982; and Romania, χ^2 (6) = 26.663, p < .001, RMSEA = 0.188 (90% CI [0.119, 0.264]), CFI = 0.953, TLI = 0.921. Multiple Group CFA were then conducted to test measurement invariance across the four countries. The configural invariance model showed acceptable fit, χ^2 (20) = 37.39, p = .011, RMSEA = 0.096, CFI = 0.982, TLI = 0.964, suggesting that the one-factor structure was equivalent across countries. The analyses further indicated invariance of factor loadings across countries, S-B$\Delta\chi^2$ (12) = 15.08, p = .237. The decrease in model fit for the scalar invariance model was also non-statistically significant, S-B$\Delta\chi^2$ (15) = 21.28, p = .128, indicating that scalar invariance was supported, with the model showing adequate overall fit, RMSEA = 0.081, CFI = 0.971, TLI = 0.975. Cronbach's alpha coefficients indicated high internal consistency of the School Support measure, 0.95, 0.93, 0.92, and 0.92, for Cyprus, Greece, Portugal, and Romania, respectively.

Covariates

Teachers' years of professional experience in ECEC and qualifications (*0* = Below master; *1* = Master or higher) were used as covariates in the models.

Data Analysis

To address the third and fourth questions, a series of structural equation models were estimated. First, the equivalence of each parameter across countries was tested. A full constrained model was estimated in which the associations between predictors and outcomes were constrained to be equal across countries. Through successive steps, the equality constraints were released to achieve the best-fitting model. The decrease in model fit was sequentially compared with Satorra-Bentler's scaled chi-square difference test.

Missing data for all variables in the dataset ranged from 0% to 1.6%. To account for missing data, Full Information Maximum Likelihood (FIML) estimation with robust standard errors was used. Models were estimated using the Mplus program, version 7.0 (Muthén & Muthén, 1998–2010).

Results

What Kind of PD Activities Were Teachers Mostly Involved in and to what Extent Are They Interested in PD?

The descriptive statistics for attendance and interests in PD are presented in Table 3. In Cyprus, Portugal, and Romania, most teachers (70-90%) have participated in structured

Table 3 Descriptive statistics for professional development (PD) activities – last 12 months

Variables per country	Cyprus			Greece			Portugal			Romania		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
PD Structured		0.82	0.34		0.43	0.36		0.71	0.39		0.86	0.29
Courses/seminars	88%			41%			70%			90%		
Conferences	77%			45%			72%			81%		
PD Centre-embedded		0.35	0.29		0.17	0.18		0.34	0.31		0.48	0.29
Observation visits	8%			36%			21%			30%		
Peer- and/or self-observation	63%			10%			50%			80%		
On-site coach	22%			28%			18%			50%		
Network	42%			15%			31%			50%		
Mentoring	28%			7%			36%			33%		
PD Interests		3.91	0.81		3.82	0.75		4.12	0.91		4.23	0.75

PD. The rates of participation in centre-embedded PD were lower, although there was variation. In Greece, the rates of structured PD were lower (41-45%) compared to the other countries, but followed the same pattern, with a higher prevalence of structured PD compared to centre-embedded PD (7-36%). Concerning centre-embedded PD, in Cyprus, Portugal, and Romania, it was relatively common for teachers to participate in peer- and/or self-observation, respectively, 63%, 50%, and 80%. In regard to PD interests, teachers in all countries reported moderate to high levels of interest in PD, with mean levels close to four on a five-point scale.

What Kind of Incentives do Teachers Receive to Attend PD?

Regarding incentives, the percentages of teachers reporting receiving incentives of any kind to attend PD were generally very low (see Table 4). In Cyprus, Greece, and Portugal, the rates of receiving some form of support were generally low, ranging from 2% up to 37%. In Romania, the rates were higher, with nearly half of the participants (41-54%) reported receiving some incentives. In Cyprus, release from working with children for activities during regular working hours was the most common support received, although less than half of teachers benefitted from this. The percentages in the other countries were even lower, ranging from 12 to 22%. Direct support for participation in PD, such as providing the materials needed for the activities, was the most common type in Greece and Portugal, respectively, 29% and 34%, whereas less direct types of support, such as non-monetary benefits, were relatively common in Romania, with 54% of participants reporting receiving this kind of incentive. Payment of the costs of participation was the least common of incentives in all countries, except Romania. While the results suggest some variations across countries, they overall suggest that teachers had generally little access to incentives.

To what Extent do Teachers Perceive Their Professional Settings as Actively Interested in Their PD?

Table 4 also shows the descriptive statistics for perceived institutional support for PD. Similarly, participants from Cyprus, Greece, and Portugal reported low levels of organizational climate support, with mean levels below three, perceiving the active interest for their PD from the institution as generally low. In Romania, teachers reported moderate levels of institutional support.

Table 4 Institutional support to professional development - last 12 months

Variables per country	Cyprus			Greece			Portugal			Romania		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Incentives		0.60			0.54			0.51			0.75	
Release from children	37%			16%			22%			12%		
Non-monetary support	7%			14%			9%			12%		
Reimbursement of costs	2%			4%			8%			41%		
Provision of materials	27%			29%			34%			46%		
Non-monetary benefits	22%			26%			20%			54%		
Organizational Climate Support		2.78	1.24		2.85	1.13		2.86	1.14		3.58	1.06

Are Incentives and Perceived Support Associated with Levels of Attendance and Interest in PD?

Participation in Structured and Centre-Embedded PD

A series of structural equation models were estimated to examine whether PD incentives and perceived support were associated with participation in structured and centre-embedded PD, controlling for the effects of PD and teacher qualifications.

The first model fixed the paths between predictors and outcomes to be equal across countries. This fully constrained model had an acceptable fit, $\chi 2\ (167) = 262.752$, $p < .001$; CFI = 0.939; TLI = 0.939; RMSEA = 0.078 [0.060-0.096], with fit indices suggesting that the model could be improved. This model was compared with a series of successively less constrained models, by releasing the paths for each specific country. No differences were found between the constrained and the unconstrained models for Greece (S-B$\Delta\chi 2$ (4) = 1.781, $p = .776$) and Romania (S-B$\Delta\chi 2$ (4) = 5.293, $p = .259$). Nevertheless, model fit improved significantly when the parameters for Cyprus (S-B$\Delta\chi 2$ (4) = 16.446, $p = .002$) and Portugal (S-B$\Delta\chi 2$ (4) = 25.089, $p < .001$) were freely estimated. A closer inspection of the paths showed that model fit was significantly improved if the path between PD incentives and structured PD was released in Cyprus (S-B$\Delta\chi 2$ (1) = 15.335, $p < .001$) and in Portugal (S-B$\Delta\chi 2$ (4) = 11.610, $p = .001$). Additionally, the model improved if the paths between professional experience and structured PD were released in Cyprus (S-B$\Delta\chi 2$ (1) = 23.213, $p < .001$) and between institutional support and centre-embedded PD in Portugal (S-B$\Delta\chi 2$ (1) = 13.169, $p < .001$). Thus, the best-fitting model was reached by allowing these four paths to vary and constraining all other paths to be equal across countries. This partially constrained model provided a good fit to the data, $\chi 2\ (163) = 218.011$, $p = .0026$; CFI = 0.965; TLI = 0.964; RMSEA = 0.060 [0.037-0.080]. Results are presented in Table 5.

In all countries, the provision of incentives was associated with increased participation in centre-embedded PD. Additionally, in Cyprus, incentives were also linked to higher participation in structured PD. Surprisingly, there was a negative association between incentives and engagement in structured PD in Portugal. Yet, in Portugal, perceived support was positively linked to centre-embedded PD. In all countries, teachers with higher qualifications were more likely to participate in structured PD, whereas teachers' experience was positively related to participation in centre-embedded PD. Additionally, in Cyprus, teachers with more years of experience were more likely to participate in structured PD.

Table 5 Summary of analyses predicting structured and centre-embedded PD

	Cyprus			Greece			Portugal			Romania		
	B	SE	StB	B	SE	StB	B	SE	StB	B	SE	StB
Structured PD												
Perceived support	.014[a]	0.019	0.04	.014[a]	0.019	0.04	.014[a]	0.019	0.04	.014[a]	0.019	0.05
PD incentives	**0.172**	**0.067**	0.26**	.016[b]	0.052	0.02	**−0.168**	**0.079**	**−0.23***	.016[b]	0.052	0.02
Professional experience	**0.017**	**0.004**	0.41**	.001[c]	0.002	0.02	.001[c]	0.002	0.02	.001[c]	0.002	0.03
Teacher qualifications	.120[d]	0.036	0.17**	.120[d]	0.036	0.16**	0.120 [c]	0.036	0.14**	.120[d]	0.036	0.21**
Centre-embedded PD												
Perceived support	.012[e]	0.016	0.04	.012[e]	0.016	0.07	**0.118**	**0.032**	0.38**	.012[e]	0.016	0.04
PD incentives	.059[f]	0.027	0.10*	.059[f]	0.027	0.16*	.059[f]	0.027	0.10*	.059[f]	0.027	0.08*
Professional experience	.004[g]	0.001	0.11**	.004[g]	0.001	0.18**	.004[g]	0.001	0.13**	.004[g]	0.001	0.15**
Teacher qualifications	.013[h]	0.027	0.02	.013[h]	0.027	0.04	.013[h]	0.027	0.02	.013[h]	0.027	0.02

Note: Equalized parameters are denoted by subscript letters

Parameters estimated freely are in bold

*$p < .05$ **$p < .01$

PD Interests

To address our last research question, structural equation models were estimated to examine whether perceived support, incentives, and attendance in structured and centre-embedded PD were associated with PD interests, controlling for the effects of professional development and teacher qualifications. The fully constrained model across countries, in which all paths between predictors and outcomes were fixed to be equal across countries, had a good fit, $\chi 2$ (511) = 751.812, $p < .001$; CFI = 0.919; TLI = 0.920; RMSEA = 0.071 [0.060-0.081]. A series of successively less constrained models were estimated by releasing the paths for each specific country. No differences were found between the constrained and the unconstrained models for Greece, S-B$\Delta\chi 2$ (5) = 4.90, $p = .428$, Portugal, S-B$\Delta\chi 2$ (5) = 9.387, $p = .095$, and Romania, S-B$\Delta\chi 2$ (5) = 6.579, $p = .160$, whereas model fit improved significantly for Cyprus, S-B$\Delta\chi 2$ (5) = 16.437, $p = .006$. A closer inspection of the paths showed that model fit was significantly improved if the path between professional development and interests in Cyprus was released, S-B$\Delta\chi 2$ (1) = 10.810, $p = .001$. The final partially constrained model provided an adequate fit to the data, $\chi 2$ (510) = 741.894, $p < .001$; CFI = 0.922; TLI = 0.923; RMSEA = 0.070 [0.059-0.080]. The final model is presented in Table 6.

In all countries, perceived support was positively associated with greater interest in PD. In addition, teachers with more years of experience showed less interest in PD in all countries except Cyprus. In Cyprus, more experienced teachers showed more interest in PD.

Discussion

The aim of this study was to investigate the potential relations of PD incentives and perceived support from ECEC settings with PD attendance in structured and centre-embedded PD, as well as with levels of interest in PD. Together, our findings showed that overall, ECEC teachers from this sample had high attendance rates of structured PD, the most common and traditional form of PD, but the rates of centre-embedded PD attendance were moderately low. In addition, teachers received few, if any, incentives to participate in PD and perceived low to moderate levels of institutional support. Importantly, access to PD incentives was positively related to centre-embedded PD attendance, whereas perceived support from the centre was associated with teachers' levels of interest in PD. These findings align with prior research (Bayly et al., 2022; Bove et al., 2018; Connors, 2019; Roberts et al., 2015) that suggests that contextual features can be indeed relevant for PD engagement and interest.

Table 6 Summary of analyses predicting levels of interest for PD

	Cyprus			Greece			Portugal			Romania		
	B	SE	StB	B	SE	StB	B	SE	StB	B	SE	StB
Perceived support	.202[a]	0.065	0.19*	.202[a]	0.065	0.19*	.202[a]	0.065	0.19*	.202[a]	0.065	0.20*
PD incentives	.325[b]	0.233	0.09	.325[b]	0.233	0.09	.325[b]	0.233	0.09	.325[b]	0.233	0.09
Structured PD	.060[c]	0.182	0.02	.060[c]	0.182	0.02	.060[c]	0.182	0.02	.060[c]	0.182	0.02
Center-embedded PD	− .377[d]	0.229	− 0.09	− .377[d]	0.229	− 0.06	− .377[d]	0.229	− 0.10	− .377[d]	0.229	− 0.10
Professional experience	**0.032**	**0.015**	0.24*	− .018[e]	0.006	− 0.15**	− .018[e]	0.006	− 0.18**	− .018[e]	0.006	− 0.20**
Teacher qualifications	.044[f]	0.122	0.02	.044[f]	0.122	0.02	.044[f]	0.122	0.02	.044[f]	0.122	0.02

Note: Equalized parameters are denoted by subscript letters

Parameters estimated freely are in bold

*$p < .05$ **$p < .01$

Attendance in Structured and Centre-Embedded PD

In all countries, the provision of incentives was associated with increased participation in centre-embedded PD. Our findings align with previous findings suggesting the importance of active support strategies to enable teachers to participate in centre-embedded PD (Bove et al., 2018; Mowrey & King, 2019; Peleman et al., 2018). It appears that when teachers have access to at least one incentive, such as being released from working with children during regular working hours or non-monetary support for activities outside working hours, they are more likely to attend centre-embedded PD.

Interestingly, incentives were associated with centre-embedded PD, but not with the most common type of PD, namely structured PD, such as courses and seminars. Given the high rates of participation in structured PD, it can be that there are many opportunities available for teachers, making it easier for teachers to participate, regardless of receiving incentives or not. It is possible that, for structured PD, the widespread initiatives make the availability of incentives not as important as for centre-embedded PD. It is nevertheless important to point out that, generally, there were few incentives available for teachers. Still, teachers seemed to find ways to attend structured PD, for which the high levels of interest that this sample reported may have also contributed. Incentives seem to make a difference to centre-embedded PD, which raises the possibility that attendance of this type of PD is more dependent upon the active availability of support measures than structured PD. It can be that this type is not as widely accessible for teachers as structured PD, making it harder to attend without any incentive. Findings from the TALIS Starting Strong from the OECD (2019) support this hypothesis, by showing that ECEC staff is more often involved in traditional forms of PD rather than centre-embedded PD. But it is also possible that centre-embedded PD actions are also more demanding for the teachers both in terms of time and engagement, making it more dependent on access to incentives. Eventually, as highlighted by Bayly and collaborators (2022), contextual drivers of PD need to be seen in concert to ensure effective participation in PD.

For Portuguese teachers, surprisingly, findings showed that the availability of incentives was negatively associated with structured PD. It may be that incentives are too low to make a positive difference in PD attendance rates. It is also possible that the incentives are not targeting the teachers who would make the most of them. It appears there are many teachers involved in structured PD that do not have access to incentives at all. In Portugal, incentives are not equally offered, for instance, teachers in the public sector are more likely to receive them than teachers in the private sector (ET2020 Working Group, 2021). It is possible that

teachers who do not receive incentives strive to take advantage of PD at their own expense, given the high interest they have. Although speculative, the high levels of PD interest in this sample provide some support to this hypothesis, but clearly more research is needed.

Also, in Portugal, and unique to this country, their perceived levels of active support from their centre were positively linked to centre-embedded PD. It appears that when teachers perceived interest from their institution in their career development or felt encouraged to pursue further PD, they were more likely to attend centre-based PD. These findings align with past research emphasizing the power of a supportive, positive environment at the centre to enhance PD engagement (Bayly et al., 2022; Roberts et al., 2015; Wagner & French, 2010).

Overall, our findings extend past research (Connors, 2019) by suggesting that features of the context are particularly important for centre-based PD, rather than for structured PD. As stated, and framed by ecological and systemic views (Connors, 2016), this may reflect the PD offerings in the four ECEC systems. It can be that structured PD is so widely accessible that is not as dependent upon incentives or perceived support as centre-based PD, a finding that deserves further attention from future research. Importantly, recent research suggests that this type of PD can be more effective than traditional forms in increasing teacher use of high-quality practices with children (Egert et al., 2020). Centre-based PD is more likely to provide PD opportunities for teachers in line with the specific needs of their centres (Bove et al., 2018; Linder et al., 2016; Peleman et al., 2018). It may also facilitate a lifelong learning approach, as centre-embedded PD activities occur at the centre in direct connection to everyday tasks and challenges (OECD, 2020). Thus, our findings are clearly important as they point to potential facilitators and particularly incentives that can enhance participation in such types of PD.

PD Interests

Findings from our study showed that teachers were generally interested in PD. The average means were very high, indicating that participating teachers from the four countries would like to learn more from a range of topics. Importantly, perceived support was positively associated with greater interest in PD in all countries. These findings add to the previous literature that emphasizes the important role that workplace climate can have in teachers' motivation to learn new skills and knowledge (Bayly et al., 2022; Roberts et al., 2015). It is worth mentioning that, similar to the incentive rates, the perceived support in all countries was low to moderate. It appears that most teachers did not feel supported at their centre or that their needs and interests were not considered, and many did not experience a centre climate conducive to further learning or developing new skills. Considering the positive links with PD interest, it seems. therefore, that increasing perceived support and positive workplace climate can be important venues for greater interest.

Teacher Qualifications and Experience

The links between incentives, perceived centre support, PD attendance, and interest were established even after controlling for a set of covariates, namely teacher qualifications and years of ECEC experience. It is nevertheless worth mentioning that, in all countries, teachers with higher qualifications were more likely to participate in structured PD. It can be that those teachers are more interested and look more for opportunities for PD. But it can also mean that PD opportunities are more available for qualified teachers. Even though, as previously mentioned, structured PD seems to be widely used, it is nevertheless important to pay attention to the kind of opportunities that are provided to teachers (Linder et al., 2016).

Similarly, whereas teachers with more years of experience were more likely to participate in centre-embedded PD, in most countries, those teachers showed less interest in PD. It is possible that because they are already benefiting from several PD initiatives, their interest is not as high. But it can also mean that teachers with less experience who are eager to receive PD have fewer opportunities for PD at the early stages of their careers. More empirical research is necessary to envisage this finding. It is important to mention the specific case of Cyprus. Teachers with more years of experience were not only more likely to attend both types of PD, but also showed greater interest in PD. In addition, incentives were positively associated with both types of PD attendance. Even though the incentive rates were relatively similar to the other countries, our findings may suggest that they may be more efficiently targeted and used in this particular country. Importantly, features associated with centre-embedded PD, namely incentives, were not linked to structured PD. These findings highlight the importance of examining different types of PD separately to have a nuanced knowledge about how to best promote efficient, equitable, and effective PD.

This study has several strengths, including a cross-country sample and the control for important covariates, but it has some important limitations as well. First and foremost, the sampling procedure, given the lack of random selection, prevents the generalizability of the findings. Although the recruitment process was widely disseminated through the web, participants may have answered because of their interest in this topic and therefore it is possible that PD attendance

rates and interest were inflated. Thus, we encourage replicating the findings with representative samples from each country. Second, the study is cross-sectional, and no causality can be made, limiting our ability to determine the direction of potential positive associations. Third, we only asked teachers whether they had attended different types of PD, and did not collect information about the content, quality, duration, or intensity of PD received. Future research using more precise measures would help to enhance our understanding of types of PD and their associations with contextual features. At last, all data were collected via the perspectives of only one sector of informants, the teachers. Including the perspectives of centre leaders, experts in the field and other stakeholders would offer a richer and more complex picture of PD among ECEC teachers from the four countries.

Conclusion

The current study provides evidence that the provision of incentives is positively linked to centre-embedded PD. In addition, the perceived support from the centre is positively associated with teacher interest in PD. Even though exploratory, these findings help to expand our understanding of the features that might be relevant for PD attendance and greater interest from the perspectives of ECEC teachers.

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Declarations

Competing Interests No competing interests.

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