Are educator-created (dis)empowering climates equally associated with motivational experiences in physical education pre-service teachers as in foreign language pre-service teachers?

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ABSTRACT: Guided by self-determination theory, the objective of the present research was to examine the differences between physical education (PE) and foreign language (FL) pre-service teachers in terms of the associations between perceived educator-created (dis)empowering climates and need-based experiences and motivation. A convenience sample of 246 PE and 208 FL pre-service teachers (57.08% women, M_{age}=24.92, SD=4.07) participated in this cross-sectional research. All the participants came from eight Andalusian public universities: Almería (19.8%), Cádiz (5.7%), Córdoba (3.7%), Granada (32.2%), Huelva (3.5%), Jaén (4.8%), Málaga (16.1%) and Sevilla (14.1%). The participants completed the following scales: the Educator-Created Empowering and Disempowering Climate Questionnaire, the Basic Psychological Needs Satisfaction Scale, the Psychological Needs Thwarting Scale, and the Academic Motivation Scale. The results showed that PE pre-service teachers scored significantly higher than FL pre-service teachers in disempowering climate, need satisfaction and amotivation. The results from the multi-group path analysis revealed that, overall, empowering and disempowering climates were differentially associated with the motivational outcomes between the PE and FL pre-service teachers. More specifically, FL pre-service teachers had slightly higher associations between empowering climates and need satisfaction, and between disempowering climates and need frustration. PE pre-service teachers, on the other hand, had slightly stronger relationships between need satisfaction and controlled motivation and autonomous motivation, as well as between need frustration and amotivation. Conclusions: the findings underscore the importance not only of teacher educators creating empowering climates, but also of avoiding disempowering climates so as to promote adaptive motivational processes in both groups of student teachers.
Keywords: behavioural regulation, basic psychological needs, bright side, dark side, initial teacher education.

¿Los climas (des)empoderadores creados por el formador del profesorado se asocian por igual con las experiencias motivacionales del profesorado en formación inicial de educación física y lengua extranjera?

RESUMEN: Basado en la teoría de la auto-determinación, el objetivo de la presente investigación fue analizar las diferencias en las asociaciones del clima (des)empoderador creado por el formador con la satisfacción y frustración de las necesidades psicológicas básicas y la calidad de la motivación entre el profesorado en formación inicial de educación física (EF) y de lengua extranjera (LE). En este estudio trasversal, participó una muestra de conveniencia de 246 docentes de formación inicial de EF y 208 de LE (57,08%mujeres, M_{edad}=24,92, SD=4,07). Los participantes pertenecían a ocho universidades públicas andaluzas: Almería (19.8%), Cádiz (5.7%), Córdoba (3.7%), Granada (32.2%), Huelva (3.5%), Jaén (4.8%), Málaga (16.1%) y Sevilla (14.1%). Cada participante completó las siguientes escalas: el Educator-Created Empowering and Disempowering Climate Questionnaire, la Basic Psychological Needs Satisfaction Scale, la Psychological Needs Thwarting Scale, y la Escala de Motivación Académica. Los resultados mostraron que el profesorado en formación inicial de EF obtuvo valores medio significativamente superiores que el profesorado en formación inicial de LE en el clima desempoderador, satisfacción de las necesidades y desmotivación. Los resultados del análisis de senderos multi-grupo relevaron en líneas generales que el clima empoderadores y desempowerador se asociaron de manera diferente con las variables motivacionales en profesorado en formación inicial de EF y de LE. Concretamente, el profesorado en formación inicial de LE mostró asociaciones ligeramente mayores del clima empoderamiento con la satisfacción de las necesidades y, del clima desempoderamiento con la frustración de las necesidades y la desmotivación. En cambio, el profesorado en formación inicial de EF obtuvo a mayor relación entre la satisfacción de las necesidades y la motivación controlada, entre la satisfacción de las necesidades y la motivación autónoma y, entre la frustración de las necesidades y la desmotivación. Como conclusiones, nuestros hallazgos destacan la importancia no sólo de crear climas empoderadores por parte del formador del profesorado, sino también de evitar los climas desempoderadores para promocionar los procesos motivacionales adaptativos en ambos grupos de estudiantes a profesorado.
Palabras clave: regulación conductual, necesidades psicológicas básicas, lado brillante, lado oscuro, formación inicial del profesorado.

1. INTRODUCTION

The latest reports estimate that at least 69 million new secondary teachers are needed by 2030 to "guarantee inclusive and equitable quality education and promote lifelong learning opportunities for all" (UNESCO Institute for Statitics, 2016, page 4). In an attempt to enhance the teacher candidate recruitment process, motivation has been identified as one of the most determining factors for student teachers, not only in accessing initial teacher education programmes, but also in maintaining their intention to enter and stay in the teaching profession (Richardson et al., 2014). Building upon Self-Determination Theory (SDT; Ryan & Deci, 2017), the teacher educator is seen as playing an essential role in fostering the pre-service teachers' motivational processes, impacting on initial teacher education through what he/she does, says, and his/her way of organising and managing the classroom learning environment (i.e., the motivational climate; Duda & Appleton, 2016). Nevertheless, as the notion of educator-created empowering and disempowering climates (Duda & Appleton, 2016) has only recently been included on the agenda of teacher education researchers, little attention has so far been paid to how the pre-service teachers' perceptions of educator-created empowering and disempowering climates may foster their motivational processes in initial teacher education programmes.

In Spain, initial secondary teacher education follows a consecutive five-year model in which teacher candidates must first complete specific knowledge-based studies (i.e., four full-time academic years) and after that take a professional master's programme in education (i.e., one full-time academic year) (Santos-Rego & Lorenzo-Moledo, 2015). In consecutive teacher education models, previous research has found that pre-service teachers differed in their motivational outcomes depending on their specific knowledge domain (e.g., Glutsch & König, 2019; Lee et al., 2019; Roloff-Henoch et al., 2015). While much of the previous research into initial teacher education has focused on motivational differences between STEM and non-STEM domains, none has explored the motivational processes affecting pre-service teachers in their initial teacher education programmes with regard to the differences between the physical education (PE) and foreign language (FL) domains. Given the distinct nature of teaching PE and FL, the present SDT-grounded research sought to expand existing knowledge by examining the differences between PE and FL pre-service teachers in terms of the associations of perceived educator-created empowering and disempowering climates with their need-based experiences and quality of motivation.

1.1. Motivational process in initial teacher education

SDT is focused on explaining the dynamic interplay between the social environment and the quality of motivation (Ryan & Deci, 2017). SDT distinguishes between three qualities of motivation along a self-determination *continuum* based on the relative autonomy level present in each of them (Ryan & Deci, 2017, 2020). At one end of the self-determination *continuum* lies autonomous motivation, which represents the prototype of active human nature. It refers to behaviours adopted for their own sake, with inherent pleasure and curiosity (intrinsic motivation), congruent with one's own personal system of values, needs and goals (integrated regulation), and the recognition of their benefits (identified regulation) (Ryan et al., 2021). At the centre of the *continuum* lies controlled motivation, which refers to behaviours adopted to comply with the demands of others (external regulation) and/or of oneself (introjected regulation) (Ryan et al., 2021). At the other end of the *continuum* lies amotivation, referring to the complete absence of self-determination towards the desired behaviour (Ryan et al., 2021).

SDT posits that the quality of motivation is promoted or undermined by the specific perception of basic psychological needs (Ryan & Deci, 2017; Vansteenkiste et al., 2020). Autonomous motivation, in particular, is believed to be energised by the satisfaction of the need for autonomy (i.e., experiences of choice, willingness, and ownership of the target behaviour), for competence (i.e., experiences of mastery, efficacy and accomplishment towards the desired goals) and for relatedness (i.e., experiences of mutual care, belonging, and genuine bonds with others) (Ryan et al., 2021; Vansteenkiste et al., 2020). Conversely, controlled motivation and amotivation are thought to be facilitated by the frustration of the need for autonomy (i.e., feelings of being controlled by externally enforced or self-imposed pressures), for competence (i.e., feelings of inferiority, inefficacy, and failure to achieve the desired goals) and for relatedness (i.e., feelings of social rejection, loneliness, and alienation) (Vansteenkiste et al., 2020). Apart from the energising and facilitating roles attributed to need satisfaction and need frustration, respectively, SDT also suggests that need satisfaction acts as a buffer against lower-quality motivation (i.e., controlled motivation and amotivation) in

the same way as need frustration plays a hampering role in higher-quality motivation (i.e., autonomous motivation) (Ryan et al., 2021; Vansteenkiste et al., 2020). In the specific context of initial teacher education, a growing number of studies have shown that need satisfaction was positively and significantly associated with autonomous motivation, but not related to lower-quality motivation (Burgueño et al., 2022; Kaplan & Madjar, 2017). In contrast, the potential role of the pre-service teachers' need frustration on their motivational processes has so far received little attention. While the López-García et al. (2023) study reported positive associations between need frustration and controlled motivation and amotivation, the Burgueño et al. (2022) research revealed non-significant relationships between need frustration and autonomous (relative to controlled) motivation. Therefore, it is imperative to gain a deeper insight into the distinctive roles that need satisfaction and need frustration might play in the motivational quality of initial teacher education in general, and between PE and FL pre-service teachers in particular.

1.2. Teacher educator-created empowering and disempowering climates

Central to SDT is the assumption that a person's perception of their social environment differentially shapes how they experience basic psychological needs (Ryan et al., 2021; Ryan & Deci, 2017, 2020). In the specific context of initial teacher education, teacher educators are in a pivotal position to guide pre-service teachers within the classroom social environment ring their initial teacher education programme (Chan et al., 2023). Teacher educators can optimally direct the pre-service teachers' motivational processes (Duda & Appleton, 2016) through what they do, say, and how they organise the learning environment and manage the classroom (i.e., the motivational climate). Specifically, Duda and Appleton (2016) propose that teacher educators can create more empowering (or more disempowering) climates to foster (or undermine) the pre-service teachers' motivational processes during their initial teacher education programme.

In order to study more accurately the classroom social environment, Duda and Appleton (2016) conceptualise the motivational climate from a broader, hierarchical and multidimensional perspective, integrating the main facets of the social environment proposed in the SDT (i.e., autonomy support, control, and social support) and in Achievement Goal Theory (i.e., task-involving and ego-involving climates). Consistent with Appleton et al. (2016), a teacher educator creates an empowering climate when he/she provides pre-service teachers with opportunities to choose, gives meaningful rationales for activities, acknowledges their preferences and opinions (i.e., autonomy support), establishes intrapersonal criteria for success based on effort, cooperative learning, skills development and hard work (i.e., a task-involving climate), and makes them feel valued and cared for as people (i.e., social support). In contrast, a teacher educator creates a disempowering climate when he/she uses pressuring tactics to make pre-service teachers think, behave, and feel in a prescribed way (control), and establishes interpersonal success criteria based on the display of superiority, rivalry, students' differentiated treatment depending on their performance levels, and where mistakes are punished and achievements rewarded (i.e., an ego-involving climate).

By including the climate dimensions from SDT and Achievement Goal Theory, Duda and Appleton (2016) argue that empowering and disempowering climates yield specific need-based experiences and motivational qualities. As empowering climates integrate need-supportive

facets, they would primarily tend to support need satisfaction and higher-quality motivation (Duda & Appleton, 2016). Therefore, they suggest that, theoretically, empowering climates fit as social antecedents in the bright motivational pathway (empowering climates → need satisfaction → autonomous motivation) proposed by SDT (Ryan et al., 2021; Ryan & Deci, 2017; Vansteenkiste et al., 2020). In contrast, disempowering climates, which incorporate need-thwarting elements, would tend to foster need frustration and lower-quality motivation (Duda & Appleton, 2016). Hence, disempowering climates are theoretically believed to fit as social antecedents in the dark motivational pathway (disempowering climates → need frustration → controlled motivation/ amotivation) proposed by SDT (Ryan et al., 2021; Ryan & Deci, 2017; Vansteenkiste et al., 2020).

Given that the notion of empowering and disempowering climates has only recently been included on the agenda of teacher education researchers, very little is known about the role that either type of educator-created climate might play in the pre-service teachers' motivational processes during their initial teacher education programme (López-García et al., 2023). To date, the small body of previous works into initial teacher education has focused on examining the separate effects of particular facets of the motivational climate (e.g., autonomy support and control) on the pre-service teachers' motivational processes (Burgueño et al., 2022; Granero-Gallegos et al., 2022; Kaplan & Madjar, 2017). While more attention has been paid to the beneficial effects of perceived autonomy support from the educator on the pre-service teachers' need satisfaction (Burgueño et al., 2022; Granero-Gallegos et al., 2022; Kaplan & Madjar, 2017), less attention has been given to the detrimental effects of perceived control from the educator on pre-service teachers' need frustration (Burgueño et al., 2022). Although these studies shed some light on how determined elements from the classroom social environment might separately lead to a specific motivational process, they failed to operationalise the educator-created motivational climate from the empowering and disempowering perspective. Thus, additional research is needed to explore the differentiated effects of educator-created empowering and disempowering climates on the bright and dark sides of motivation in initial teacher education in general, and between PE and FL pre-service teachers in particular.

1.3. Motivational differences between knowledge domains: physical education and foreign languages

As in many Western countries, initial secondary teacher education programmes in Spain (i.e., PME) are designed around particular knowledge domains (namely, STEM, Social Studies and Humanities, Languages and FL, and PE) (Santos-Rego & Lorenzo-Moledo, 2015). Regarding consecutive teacher education models, previous research has documented that pre-service teachers' motivational processes can vary depending on the knowledge domain to which they belong. Specifically, STEM pre-service teachers had higher fallback career levels than non-STEM pre-service teachers (Kilinç et al., 2012), along with greater academic requirements with more qualifications (Lee et al., 2019) – motives that could theoretically fit with controlled motivation (Ryan & Deci, 2017). STEM pre-service teachers also perceived a greater influence from others compared to those not in STEM (Lee et al., 2019). In contrast, language/FL pre-service teachers present higher levels of interest, personal satisfaction and intrinsic value than STEM pre-service teachers (Glutsch et al., 2018;

Glutsch & König, 2019; Roloff-Henoch et al., 2015) – reasons that could theoretically fit with autonomous motivation (Ryan & Deci, 2017). Furthermore, language/FL pre-service teachers showed a greater desire to work with adolescents and contribute to society than those in social sciences (Glutsch & König, 2019) – motives strongly linked to autonomous motivation (Ryan & Deci, 2017). Nonetheless, Watt et al. (2017) reported no differences in motivations between STEM and language/FL pre-service teachers. Even though a growing body of works has suggested that language/FL pre-service teachers were mainly guided by autonomous motivation during their initial teacher education programme, the motivational processes of PE pre-service teachers remain to be explored.

Drawing on the idea that our society is increasingly globalised, making it essential to communicate with people from different countries using a common language (e.g., English) and where physical activity has become a global health priority, initial teacher education in the FL and PE domains takes on a special significance (Correia, 2021; Johnson & Golombek, 2020). However, to the best of our knowledge, there are no SDT-grounded studies that have looked at the potential differences between PE and FL pre-service teachers in terms of the associations of educator-created empowering and disempowering climates with the motivational processes involved in initial teacher education. Indeed, this lack of prior research into initial teacher education gives us the opportunity to provide evidence of the differentiated effects of educator-created empowering and disempowering climates on need-based experiences and motivational quality, as well as to shed light on the specific roles that need satisfaction and, especially, need frustration might play in facilitating or undermining the three qualities of motivation in pre-service teachers, focusing particularly on the differences between PE and FL pre-service teachers. Studying these differences in the associations of empowering and disempowering climates with the bright and dark sides of motivation, as outlined in SDT, can help teacher education researchers gain a better insight into how the teacher educator can structure and manage the classroom learning environment to foster the pre-service teachers' motivational processes based on the knowledge domain to which the student teachers belong. Furthermore, this information may be useful to raise the awareness of teacher educators and pre-service teachers not only to the potential educational benefits associated with exposure to an empowering climate, but also to the potential educational risks derived from a disempowering climate.

1.4. The present study

The objective of this research was to examine the possible differences between PE and FL pre-service teachers in the associations of perceived educator-created empowering and disempowering climates with their need-based experiences and quality of motivation. For this, we first analysed the possible mean differences between PE and FL pre-service teachers in terms of their perceptions of educator-created motivational climates, need-based experiences, and quality of motivation. Second, we performed a multi-group path analysis to examine the possible differences in the predictive relationships between educator-created empowering and disempowering climates with need-based experiences and the between PE and FL pre-service teachers. Given the absence of a consistent body of prior research, we did not venture to formulate any hypotheses.

2. METHOD

2.1. Participants and setting

The convenience sample consisted of 246 PE and 208 FL pre-service teachers (N=454; 259 woman, 196 men and 1 giving no gender information) aged between 22 and 57 years (M=24.92, SD=4.07) who took part in this cross-sectional research. The participants were enrolled in the PME (post-primary) from eight Andalusian public universities: Almería (19.8%), Cádiz (5.7%), Córdoba (3.7%), Granada (32.2%), Huelva (3.5%), Jaén (4.8%), Málaga (16.1%) and Sevilla (14.1%).

To participate in the research, the potential pre-service teachers had to meet the following inclusion criteria: a) to be studying the PME in either the PE or FL specialisations; b) to have given consent for their data to be used for academic and research purposes; and c) to have completed the questionnaire. Before starting with the research, *Free Statistics Calculator* v.4,0 (Soper, 2023) software was used to estimate the minimum sample size required to ensure the trustworthiness of the results. For structural equation modelling with seven manifest variables, an effect size of f^2 = .215, a statistical power of .90, and a significance of α = .05, a minimum sample size of 449 participants was required.

2.2. Instruments

2.2.1. Empowering and disempowering climates created by the teacher educator

To assess the pre-service teachers' perception of a teacher-created motivational climate, we used the Educator-Created Empowering and Disempowering Climate Questionnaire (Granero-Gallegos et al., submitted). This instrument is headed by the phrase: "In my classes…" and followed by 21 items that measure autonomy support (five items, e.g., "My educator gives the students choices and options"), task-involving climate (four items, e.g., "My educator expects us to learn new skills and acquire new knowledge"), social support (three items, e.g., "My educator listens openly and does not judge the student's personal feelings"), control (six items, e.g., "My educator is less supportive of students when they are not performing well"), and ego-involving climate (three items, e.g., "My educator gives more attention to the successful students"). The items are rated on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Consistent with previous research (Granero-Gallegos et al., submitted), a mean score for an empowering climate was estimated by averaging the scores for autonomy support, task-involving climate, and social support. Likewise, a mean score for a disempowering climate was estimated by taking the average scores for control and an ego-involving climate. In this study, the second-order two-factor model obtained a good fit to the observed data: χ^2/df=2.10, p<.001; CFI=.95; TLI=.94; SRMR=.052; RMSEA=.049 (90%CI=.042–.046).

2.2.2. Need satisfaction in initial teacher education

To assess the pre-service teachers' perception of need satisfaction in initial teacher education, we used the Spanish version adapted to education (León et al., 2011) of the Basic Psychological Needs Satisfaction Scale (Gillet et al., 2008). The instrument is headed by

the phrase: "In my classes…" and followed by 15 items grouped into five items per factor, measuring autonomy satisfaction (e.g., "I feel free to make my own choices"), competence satisfaction (e.g., "I feel I am good at what I do") and relatedness satisfaction (e.g., "I feel I get along with the people around me"). Items are rated on a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree). A composite score for need satisfaction was estimated by averaging the values for autonomy, competence, and relatedness satisfaction. In this study, the second-order one-factor model obtained an acceptable fit to the observed data: χ^2/df=4.71, p<.001; CFI=.92; TLI=.90; SRMR=.072; RMSEA=.077 (90%CI=.062–.086).

2.2.3. Need frustration in initial teacher education

To assess the pre-service teachers' perception of need frustration in initial teacher education, we used the Spanish version adapted to education (Cuevas et al., 2015) of the Psychological Need Thwarting Scale (Bartholomew et al., 2011). The instrument is headed by the phrase "In my classes…" and followed by 12 items grouped into four items per factor, measuring autonomy frustration (e.g., "I feel pushed to behave in certain ways"), competence frustration (e.g., "Situations occur in which I am made to feel incapable") and relatedness satisfaction (e.g., "I feel I am rejected by those around me"). Items are rated on a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree). A global score for need frustration was estimated by averaging the values for autonomy, competence, and relatedness frustration. In this study, the second-order one-factor model obtained an acceptable fit to the observed data: χ^2/df=3.66, p<.001; CFI=.95; TLI=.94; SRMR=.037; RMSEA=.067 (90%CI=.055–079).

2.2.4. Quality of motivation in initial teacher education

To assess the pre-service teachers' perception of the quality of motivation in initial teacher education, we used the Spanish version (Burgueño et al., 2017) of the Academic Motivation Scale (Vallerand et al., 1992). The instrument is headed by the phrase "I am studying the professional master's programme in education…" and followed by 32 items grouped into four items per factor, measuring intrinsic motivation to experience stimulation (e.g., "... for the pleasure of reading interesting topics"), intrinsic motivation to accomplish (e.g., "... for the satisfaction I feel in achieving each of my personal goals"), intrinsic motivation to know (e.g., "… for the pleasure of knowing more about the issues that interest me"), integrated regulation (e.g., "… because I consider it to be in accordance with my values"), identified regulation (e.g., "… because it will possibly allow me to enter the labour market in the field that I like"), introjected regulation (e.g., "… because attending university makes me feel important"), external regulation (e.g. "… because in the future I want to have a good life") and amotivation (e.g., "I honestly don't know, I have the impression that I'm wasting my time in the master's programme"). Items are rated on a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree). Consistent with SDT, a global score for autonomous motivation was estimated by averaging the scores of the three subtypes of intrinsic motivation, integrated regulation, and identified regulation, while a global score for controlled motivation was estimated by averaging the introjected and external regulation scores. In this study, the second-order one-factor model obtained an acceptable fit to the observed data: χ^2/df=3.98, p<.001; CFI=.93; TLI=.91; SRMR=.063; RMSEA=.071 (90%CI=.058–.081).

2.3. Procedure

The researchers contacted the different PME academic coordinators at each participating university to request their collaboration. After informing them of the research project objectives and characteristics, the researchers obtained all the necessary permissions and authorisations from each of the eight public universities involved. In accordance with the study's inclusion criteria, all the pre-service teachers enrolled at each participating university were contacted via e-mail to request their participation and to ask them to complete an online questionnaire. This e-mail included information concerning the relevance of the research, and explained how the students' participation would be voluntary and anonymous in nature, that there were no right or wrong responses, and that one was free to leave the study at any time. After reading this information, the pre-service teachers had to give their informed consent before accessing the online questionnaire, which they then completed. There were no missing values because the data collection form did not allow responses to be left blank. The participants took approximately 15 minutes to fill in the questionnaire. They received no form of compensation for taking part in the study and their participation in no way influenced their student record in any subject. All the 454 participants responded in full, and all the inclusion criteria were met. This research was approved by the Ethics Committee of the University of Almería (Ref: UALBIO2021/009).

2.4. Data analysis

2.4.1. Preliminary analysis

Descriptive statistics were calculated for every variable under study. The correlations between variables were estimated, with values up to .85 being indicative of the absence of multicollinearity between the target variables (Kline, 2016). The McDonald's omega (ω) coefficient was also calculated, with scores greater than .70 representing a good level of reliability (Viladrich et al., 2017). Once the univariate normality assumption was supported by standardised skewness values between -.77 and 1.05 and kurtosis values between -.62 and .35 (Field, 2017), independent samples Student t-tests were performed to analyse the possible mean differences in the target variables between the PE and FL pre-service teachers. Complementary to the p-value from the independent samples Student t-tests, the Cohen's d coefficient was calculated to measure the effect size. Small, medium and large effect sizes were considered to be values up to .20, .50 and .80, respectively (Cohen, 2013). The above-mentioned analyses were run using IBM®SPSS® version 28.00 software.

2.4.2. Main analysis

To examine the differences between PE and FL pre-service teachers in the associations of perceived educator-created empowering and disempowering climates with need-based experiences and the quality of motivation, a multi-group structural equation modelling (SEM) was performed using IBM®SPSS®AMOS version 28.00 software. To estimate a suitable proportion between the statistical parameters and the number of participants, the SEM was specified using manifest variables (i.e., path analysis) (Kline, 2016). In addition, as the pre-service teachers' motivational processes could vary depending on gender (Glutsch & König, 2019),

this was introduced as a covariate. The multi-group path analysis was run using the maximum likelihood method together with the 5000-resampling bootstrapping technique due to the violation of the multivariate normality assumption (Mardia's coefficient=7.41, p<.010 for PE pre-service teachers, and Mardia's coefficient=12.44, p<.010 for FL pre-service teachers) (Kline, 2016). The model's fit was assessed with values as high as 3 for the ratio between χ^2 and degrees of freedom (χ^2/df), higher than .95 for the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), and up to .060 for the Standardised Root Mean Squared Residual (SRMR) and Root Mean Squared Error of Approximation (RMSEA) (Kline, 2016). Indirect effects were examined following the Hayes' (2017) approach, indicating that every indirect effect is significant when its confidence interval at 95% (95%CI) does not include zero. According to Dominguez-Lara (2017), the total variance explained (R^2) represents a good effect-size measure for SEM analyses as it shows the degree of influence that quantifies the percentage of dependent-variable variance explained by the independent variables. Thus, values close to .02, .13 and .26 would be taken as small, medium and large effect sizes (Dominguez-Lara, 2017). The 95%CI was also calculated to confirm that no value was below the minimum for interpretation (R^2 =.02).

3. RESULTS

3.1. Preliminary results

Table 1 shows that both PE and FL pre-service teachers scored higher than the mid-point of the 5-point Likert-type scale in empowering climates, need satisfaction, autonomous motivation, and controlled motivation, while mean scores lower than the mid-point were obtained for disempowering climates, need frustration and amotivation. Moreover, PE pre-service teachers scored significantly higher than FL pre-service teachers in disempowering climates, need satisfaction and amotivation.

Table 1. *Descriptive statistics and mean differences between pre-service teachers*

	PE Pre-service Teachers (N= 246)		FL Pre-service Teachers (N =208)		Mean Differences			
Variables	M	SD	M	SD	Dif	t_{453}	p-value	d
1. Empowering climates	3.46	.67	3.69	.75	.23	.29	.387	.02
2. Disempowering climates	2.23	.80	1.93	.72	.30	4.13	<.001	.39
3. Need satisfaction	3.85	.67	3.75	.69	.10	1.72	.043	.16
4. Need frustration	2.20	.81	2.30	.74	.10	1.41	.080	.13
5. Autonomous motivation	3.38	.91	3.49	.89	.02	1.37	.085	.12
6. Controlled motivation	3.92	.88	3.92	.92	.01	.08	.469	.01
7. Amotivation	2.02	1.02	1.82	1.03	.20	2.06	.020	.19

Note: Dif = Mean difference; *d* = Cohen's *d* effect-size coefficient; the subscript number represents the degrees of freedom from the independent-samples *t*–tests.

Table 2 presents McDonald's omega values between .81 and .88. Moreover, correlations from -.58 to .59 were found in PE pre-service teachers, and between -.54 and .70 in FL pre-service teachers, indicating the absence of multicollinearity between variables. In both groups of pre-service teachers, empowering climates were positively correlated with need satisfaction and autonomous motivation whereas they were negatively correlated with dis-empowering climates, need frustration and amotivation. Likewise, there were only positive correlations between disempowering climates and need frustration and amotivation.

Table 2. *Reliability and correlations*

						Variables			
	Variables	*ω*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
8.	1. Empowering climates	.81	-	-.16*	.54***	-.33***	.45***	.09	-.16*
9.	2. Disempowering climates	.85	-.31***	-	-.05	.36***	.07	.10	.38***
10.	3. Need satisfaction	.84	.70***	-.26**	-	-.58***	.59***	.03	-.13*
11.	4. Need frustration	.83	-.35***	.45***	-.54***	-	-.28***	.16*	.36***
12.	5. Autonomous motivation	.88	.56***	-.10	.61***	-.37***	-	.19**	-.19**
13.	6. Controlled motivation	.82	-.05	.26**	-.08	.25**	.13*	-	.05
14.	7. Amotivation	.84	-.26**	.41***	-.24**	.37***	-.22**	.21**	-

Note: Numbers above the diagonal show correlations for PE pre-service teachers. Numbers below the diagonal show correlations for FL pre-service teachers. ***p<.001; **p<.01; *p<.05

3.2. Main Results

The multi-group path analysis showed a good fit to the observed data: χ^2/df=2.35; p<.016; CFI=.99, TLI=.95; SRMR=.025; RMSEA=.055 (90%CI=.022–.087; p-close=.025). Figure 2 shows that, for PE pre-service teachers, the total variance explained accounted for 37% in autonomous motivation, 6% in controlled motivation, and 21% in amotivation. For FL pre-service teachers, the total variance explained was 40% in autonomous motivation, 7% in controlled motivation and 21% in amotivation.
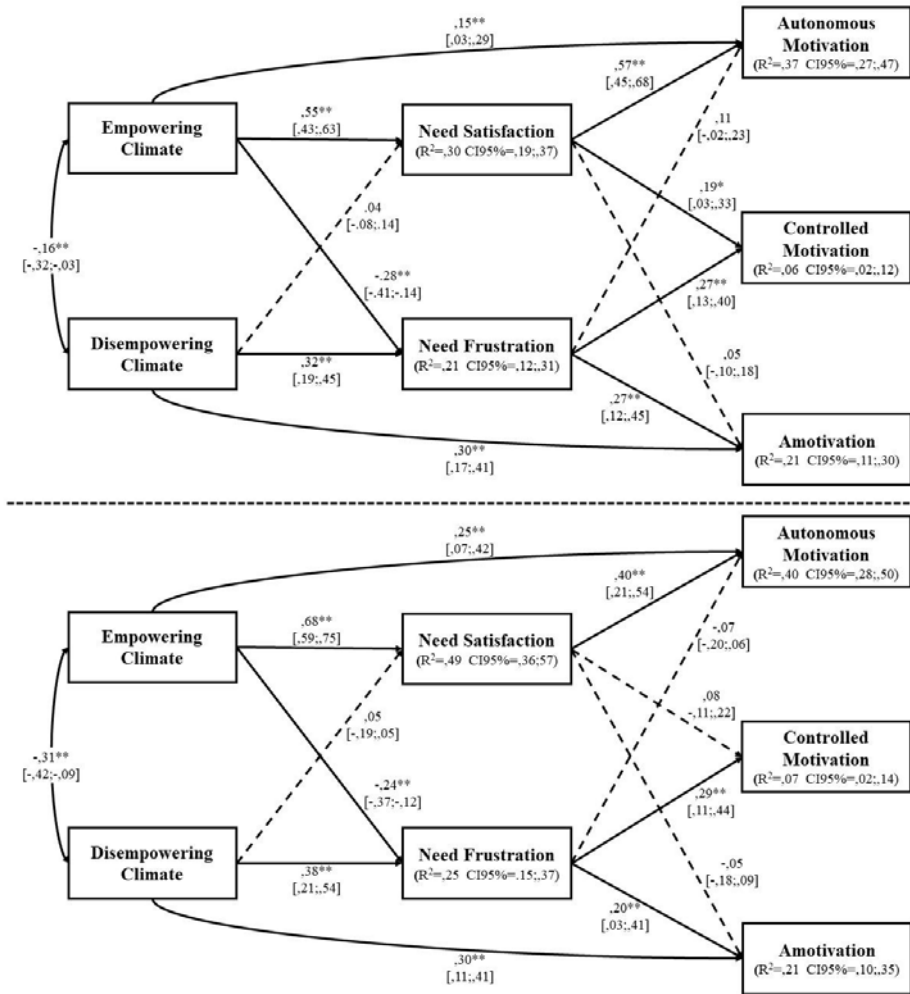
Figure 1. *Predictive associations of perceived empowering and disempowering climates with need-based experiences and motivation in physical education (above) and foreign language (below) pre-service teachers*

Note: The 95% CI_{BC} is reported in parentheses **p<.01; *p<.05. R^2=Explained variance; CI=Confidence interval. The dotted arrows represent non-significant relationships.

Figure 2 also shows that perceived educator-created empowering climates positively predicted need satisfaction, just as perceived educator-created disempowering climates positively predicted need frustration. In addition, a negative prediction was found between perceived educator-created empowering climates and need frustration. More specifically, the magnitude of the three direct predictions was higher in FL pre-service teachers than in the PE pre-service teachers. Furthermore, educator-created empowering climates positively and directly predicted autonomous motivation, although the magnitude of the prediction was higher in FL pre-service teachers, while perceived disempowering climates positively and directly predicted amotivation with the same magnitude in both pre-service teacher groups. Regarding the direct paths from need satisfaction to the quality of motivation, need satisfaction positively predicted autonomous motivation in both pre-service teacher groups, although the prediction was greater in the PE group than in the FL group. Need satisfaction only predicted controlled motivation in PE pre-service teachers. Concerning the direct paths from need frustration to the quality of motivation, need frustration positively predicted controlled motivation and amotivation across both pre-service teacher groups. It is worth stressing that while PE pre-service teachers had a higher prediction in the path from need frustration to amotivation, FL pre-service teachers had a slightly higher prediction in the path from need frustration to controlled motivation.

On the other hand, need satisfaction significantly mediated the relationship between educator-created empowering climates and autonomous motivation in PE (β=.31; 95%CI=.21–.44; p<.001) and FL (β=.27; 95%CI=.19–.41; p<.001) pre-service teachers. Moreover, the relationship between educator-created disempowering climates and amotivation was significantly mediated by need frustration in the PE (β=.39; 95%CI=.31–.50; p<.001) and FL (β=.38; 95%CI=.32–.52; p<.001) pre-service teachers. Additionally, need frustration significantly mediated the association of disempowering climates with controlled motivation both in the PE (β=.09; 95%CI=.02–.16; p=.008) and FL (β=.11; 95%CI=.01–.18; p=.025) pre-service teachers. In Figure 1, the 95%CIs of the R^2 are shown and none of these are less than the minimum value for interpretation, thus the R^2 values were taken as measures of ES (Domínguez-Lara, 2017).

4. Discussion

The objective of this research was to analyse the differences between PE and FL pre-service teachers in the associations of perceived educator-created empowering and disempowering climates with their need-based experiences and quality of motivation. The main results show that: a) PE pre-service teachers scored significantly higher than FL pre-service teachers in disempowering climates, need satisfaction and amotivation; b) educator-created empowering climates were positively associated with need satisfaction while disempowering climates were positively related to need frustration, although the strength of these associations was higher in FL than in PE pre-service teachers; c) need satisfaction was positively related to autonomous motivation while need frustration was positively related to amotivation, albeit the magnitude was greater in PE than FL pre-service teachers, and d) need satisfaction was only associated with controlled motivation in PE pre-service teachers.

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With respect to the motivational mean differences between PE and FL pre-service teachers, our results reveal that PE and FL pre-service teachers had similar levels of need frustration, controlled motivation, autonomous motivation, and educator-created empowering climates. These findings suggest that pre-service teachers from both domains tend to share similar motivational processes in their initial teacher education programme, consistent with previous research comparing STEM and FL pre-service teachers (Watt et al., 2017). However, the results also underscore motivational differences such that pre-service teachers scored significantly higher than the FL pre-service teachers in educator-created disempowering climates, need satisfaction and amotivation. The fact that PE pre-service teachers had a higher perception of educator-created disempowering climates would manifest in the PE teacher educators tending to use a greater number of controlling and ego-involving strategies to direct PE pre-service teachers in their initial teacher education programme. A plausible justification would be that PE teacher educators, unlike FL teacher educators, believe in using disempowering climates as an appropriate and effective instructional strategy to foster optimal learning in their pre-service teachers and, in turn, avoid passivity and chaos during classroom activities by providing their PE teacher students with strict and rigorous commands (control) and encouraging competitiveness through rewards and punishments to make them work harder and succeed in the activities they undertake (an ego-involving climate); however, this might come with a motivational cost (Reeve, 2009). Our findings also indicated that the FL pre-service teachers had a lower perception of need satisfaction than the PE pre-service teachers, which partially accords with the study by Glutsch and König (2019), who reported FL teacher students feeling less competent than STEM pre-service teachers. This suggests that FL pre-service teachers perceive their autonomy, competence, and relatedness as being less satisfied than do PE pre-service teachers during their initial teacher education, probably because they feel they have fewer opportunities than they would like to choose, do not perform as well as expected in the activities they undertake, and enjoy fewer close relationships with their classmates, compared to PE pre-service teachers. Another finding was that the PE pre-service teachers experienced more amotivation than the FL pre-service teachers during their initial teacher education. This would imply that the PE pre-service teachers had a worse opinion of the MPE than the FL pre-service teachers, such that they showed less interest in the programme and perceived it as having little use or value in becoming teachers. A plausible explanation could be that, while FL pre-service teachers see the teaching career as their main career choice, PE pre-service teachers view the teaching profession as a possible fallback career, preferring instead more attractive and better-paid career opportunities (Glutsch & König, 2019).

Concerning the differences between PE and FL pre-service teachers in the associations of perceived educator-created empowering and disempowering climates with need-based experiences and motivational quality, the results from our research found that the pre-service teachers' perceptions of educator-created empowering and disempowering climates was associated with need-based experiences. Consistent with the SDT postulates (Ryan & Deci, 2017; Vansteenkiste et al., 2020), and in line with previous research into initial teacher education (Burgueño et al., 2022; Kaplan & Madjar, 2017; López-García et al., 2023), our research found positive associations between educator-created empowering climates and need satisfaction, and between educator-created disempowering climates and need frustration. A plausible rationale for this would be that, when pre-service teachers perceive their teacher

educators as providing them with flexibility and opportunities to choose, implementing intrapersonal success criteria and creating close bonds between them, they will be more likely to feel that their autonomy, competence and relatedness are satisfied during the initial teacher education programme. Conversely, when pre-service teachers perceive their teacher educator as using strict commands, corrective feedback and interpersonal success criteria to complete the activity in a prescribed way, they will tend to feel that their autonomy, competence, and relatedness are frustrated. Furthermore, our findings showed a significant negative relationship between educator-created empowering climates and need frustration, but not between disempowering climates and need satisfaction. Following Duda and Appleton (2016), while at odds with the Burgueño et al. (2022) and Granero-Gallegos et al. (2022) studies, our results suggest that exposure to empowering climates buffers pre-service teachers from experiencing need frustration while exposure to disempowering climates does not undermine need satisfaction. A plausible argument would be that, when pre-service teachers perceive their teacher educator as implementing autonomy-supportive, task-involving, and social-supportive strategies, they probably feel less pressured when carrying out the activities in question (i.e., autonomy frustration), less inefficacy towards the activities (i.e., competence frustration) and less socially excluded from their classmates (i.e., relatedness frustration).

Examining the differences between the two knowledge domains, our research results showed that the relationship between the motivational climate and need-based experiences was greater in FL pre-service teachers than in the PE pre-service teachers. Thus, our findings suggest that FL pre-service teachers give more importance to the educator-created learning climate in facilitating their need-based experiences than do PE teacher students. More specifically, FL pre-service teachers are more dependent on exposure to empowering climates to support their needs satisfaction than the PE pre-service teachers, in the same way as they are more sensitive to exposure to disempowering climates in leading to needs frustration. Our results agree to some extent with those from the Roloff-Henoch et al. (2015) study, in that the FL pre-service teachers attached greater importance to the classroom learning environment and needed more involvement from their educator to foster their autonomy and competence throughout the initial teacher education programme.

On the other hand, our results also found positive associations between need satisfaction and autonomous motivation, and between need frustration and controlled motivation and amotivation. This accords with both the SDT postulates (Ryan & Deci, 2017; Vansteenkiste et al., 2020) and the small body of studies into initial teacher education (Burgueño et al., 2022; López-García et al., 2023). A plausible explanation would be that, when pre-service teachers feel their needs to be satisfied, they participate in lessons guided by a sense of inherent interest and enjoyment, personal importance, and acknowledge the benefits of the initial teacher education programme in becoming teachers. Conversely, when pre-service teachers perceive their needs as being frustrated, they tend to participate in lessons guided by a sense of external obligation and personal responsibility (i.e., controlled motivation) as well as a passive commitment to initial teacher education. Furthermore, our results revealed negative yet non-significant associations between need satisfaction and amotivation, and between need frustration and autonomous motivation. They shed light on the roles played by need-based experiences in buffering or undermining the three qualities of motivation in the context of initial teacher education. In contrast to the SDT postulates (Vansteenkiste et al., 2020), our findings indicate that pre-service teachers' need satisfaction does not protect

them from experiencing futility, and a lack of interest and value, just as need frustration does not hamper experiencing enjoyment, curiosity and reflective self-endorsement when participating in the initial teacher education programme.

In analysing the differences between the two knowledge domains, our findings revealed that the relationships between need-based experiences and the quality of motivation were higher in the PE pre-service teachers than in the FL pre-service teachers. Indeed, while a significant positive relationship was found between need satisfaction and controlled motivation amongst PE pre-service teachers, there was no significant relationship in FL pre-service teachers. Unlike the SDT postulates (Vansteenkiste et al., 2020), our findings suggest that when PE pre-service teachers feel their autonomy, competence and relatedness to be satisfied in class, they are also able to comply with the external demands made by the educator to complete their teacher education programme (controlled motivation). Overall, these results suggest that PE pre-service teachers are more prone to use their own internal sources to guide their motivational experiences and are less dependent on the classroom learning environment created by their educator.

4.1. Implications for teaching practice

The findings demonstrate that teacher educators play an essential role in fostering motivational processes in pre-service teachers during their initial teacher education programme, especially in FL pre-service teachers. Therefore, it is recommended that teacher educators not only create predominantly empowering climates that maximise adaptive motivational outcomes among pre-service teachers, but also minimise any maladaptive motivational consequences. Teacher educators are also advised to avoid disempowering climates as much as possible because of the high motivational cost they incur amongst pre-service teachers. To do this, it is imperative to develop continuous education programmes that help teacher educators implement autonomy-supportive, task-involving, and social-supportive elements in order to effectively create an empowering climate and, in turn, diminish controlling and ego-involving strategies in the classroom. Such programmes should focus on raising the teacher educators' awareness of the motivational risks associated with disempowering climates, and especially the educational benefits derived from creating optimally empowering climates that energise adaptive motivational experiences and act as a buffer against maladaptive ones.

When considering the differences between PE and FL pre-service teachers in terms of the associations of motivational climates with motivational outcomes, teacher educators should seek to create empowering climates and avoid disempowering ones as much as possible for pre-service teachers in both domains, although particularly in FL pre-service teachers. Gaining a deeper insight into how educator-created motivational climates influence pre-service teachers' motivational processes, in accordance with their knowledge domain (PE or FL), could provide teacher educators with useful information on how best to implement and design concrete learning situations that improve the quality of initial teacher education programmes.

4.2. Limitations and future research lines

As with any scientific research, the present study had various shortcomings. Firstly, the use of a non-probabilistic sampling method means that the obtained results should be interpreted with caution. For this reason, additional research is required to expand the evi-

dence obtained from our results with more heterogeneous and diverse samples of pre-service teachers from other knowledge domains (i.e., STEM, Social Studies, and the Arts), from other educational stages (e.g., Early-childhood and Primary pre-service teachers), and from other types of education programmes (i.e., presential, blended, or online) as well as from different higher-education providers (i.e., public or private universities). Secondly, although the present study relied on the SDT framework, causal relationships could not be demonstrated because of the cross-sectional nature of our research. Therefore, further studies are needed to tackle the question of whether the associations (and their directions) would still hold if a longitudinal or experimental design were employed. Thirdly, the data from the present research on pre-service teachers relied upon self-reported measures. Even though the pre-service teachers' perception of the motivational climate created by their educator is considered the most proximal indicator of motivational variables, future research should adopt a multi-informant (e.g., teacher educator, external observer, and pre-service teacher) approach to gain a deeper understanding of the ways that teacher educators create empowering and disempowering climates, and how they are perceived by pre-service teachers.

5. Conclusions

This is the first research study that analyses the differences between PE and FL pre-service teachers in terms of the predictive associations of educator-created empowering and disempowering climates on the bright and dark motivational pathways as outlined by SDT. Our results indicate that educator-created empowering climates were positively related to need satisfaction whilst disempowering climates were positively associated with need frustration, and that these associations were greater in FL pre-service teachers than in PE pre-service teachers. Furthermore, need satisfaction was positively associated with autonomous and controlled motivation while need frustration was positively related to amotivation, although the magnitude of these relationships was greater in the PE pre-service teachers than in the FL pre-service teachers. Overall, our findings suggest that the teacher educator plays a more important role in supporting need satisfaction and autonomous motivation among FL pre-service teachers, whereas PE pre-service teachers tend to energise their autonomous motivation through their own internal sources (i.e., need satisfaction). Our research results lead us to recommend that teacher educators are trained not only to effectively create empowering climates, but also to avoid disempowering strategies in the classroom environment so as to maximise the adaptive motivational experiences of pre-service teachers in their initial teacher education programme, especially in the case of FL pre-service teachers.

6. References

Appleton, P. R., Ntoumanis, N., Quested, E., Viladrich, C., & Duda, J. L. (2016). Initial validation of the coach-created empowering and disempowering motivational climate questionnaire (EDMCQ-C). *Psychology of Sport and Exercise*, *22*, 53–65. https://doi.org/10.1016/j.psychsport.2015.05.008

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thøgersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport & Exercise Psychology*, *33*(1), 75–102. https://doi.org/10.1123/jsep.33.1.75

Burgueño, R., González-Cutre, D., Sicilia, Á., Alcaraz-Ibáñez, M., & Medina-Casaubón, J. (2022). Is the instructional style of teacher educators related to the teaching intention of pre-service teachers? A self-determination theory perspective-based analysis. *Educational Review*, *72*(7), 1282–1304. https://doi.org/10.1080/00131911.2021.1890695

Burgueño, R., Sicilia, Á., Medina-Casaubón, J., Alcaraz-Ibáñez, M., & Lirola, M. J. (2017). Academic motivation scale revised. Inclusion of integrated regulation to measure motivation in initial teacher education. *Anales de Psicologia*, *33*(3), 670–679. https://doi.org/10.6018/analesps.33.3.249601

Chan, S., Maneewan, S., Koul, R., & Chan, S. (2023). An examination of the relationship between the perceived instructional behaviours of teacher educators and pre-service teachers' learning motivation and teaching self-efficacy. *Educational Review*, *75*(2), 264–286. https://doi.org/10.1080/00131911.2021.1916440

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences (Revised Edition)*. Academic Press. https://doi.org/10.4324/9780203771587

Correia, W. R. (2021). Physical education at school: Work and Teaching Subjectivity within one Brazilian post-Graduate programme. *Sport, Education and Society*, *26*(7), 800–811. https://doi.org/10.1080/13573322.2021.1907567

Cuevas, R., Sánchez-Oliva, D., Bartholomew, K. J., Ntoumanis, N., & García-Calvo, T. (2015). Adaptation and validation of the psychological need thwarting scale in Spanish physical education teachers. *Spanish Journal of Psychology*, *18*(e53), 1–9. https://doi.org/10.1017/sjp.2015.56

Dominguez-Lara, S. (2017). Effect size in regression analysis. *Interacciones: Revista de Avances En Psicología*, *3*(1), 3–5. https://doi.org/10.24016/2017.v3n1.46

Duda, J. L., & Appleton, P. R. (2016). Empowering and disempowering coaching climates: Conceptualization, measurement considerations, and intervention implications. In M. Raab, P. Wylleman, R. Seiler, A.-M. Elbe, & A. Hatzigeorgiadis (Eds.), *Sport and Exercise Psychology Research* (pp. 373–388). Academic Press. https://doi.org/10.1016/B978-0-12-803634-1.00017-0

Field, A. (2017). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Gillet, N., Rosnet, E., & Vallerand, R. J. (2008). Development of a scale of satisfaction of the fundamental requirements in sporting context. *Canadian Journal of Behavioural Science*, *40*(4), 230–237. https://doi.org/10.1037/a0013201

Glutsch, N., & König, J. (2019). Pre-service teachers' motivations for choosing teaching as a career: Does subject interest matter? *Journal of Education for Teaching*, *45*(5), 494–510. https://doi.org/10.1080/02607476.2019.1674560

Glutsch, N., König, J., & Rothland, M. (2018). Pre-service teachers' motivations for choosing teaching as a career – Does bubject choice make a difference? *Zeitschrift Für Pädagogik*, *64*(4), 461–485. https://doi.org/10.25656/01

Granero-Gallegos, A., Baena-Extremera, A., Ortiz-Camacho, M. M., & Burgueño, R. (submitted). Influence of empowering and disempowering climates on academic self-conceptamongst STEM, social studies, language, and physical education pre-service teachers: A test of basic psychologicalneeds. *Educational Review*.

Granero-Gallegos, A., Escaravajal, J. C., López-García, G. D., & Baños, R. (2022). Influence of teaching styles on the learning academic confidence of teachers in training. *Journal of Intelligence*, *10*(3). https://doi.org/10.3390/jintelligence10030071

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford publications.

Johnson, K. E., & Golombek, P. R. (2020). Informing and transforming language teacher education pedagogy. *Language Teaching Research*, *24*(1), 116–127. https://doi.org/10.1177/1362168818777539

Kaplan, H., & Madjar, N. (2017). The motivational outcomes of psychological need support among pre-service teachers: multicultural and self-determination theory perspectives. *Frontiers in Education*, *2*, 1–14. https://doi.org/10.3389/feduc.2017.00042

Kilinç, A., Watt, H. M. G., & Richardson, P. W. (2012). Factors Influencing Teaching Choice in Turkey. *Asia-Pacific Journal of Teacher Education*, *40*(3), 199–226. https://doi.org/10.1080/1359866X.2012.700048

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Lee, J. A., Kang, M. O., & Park, B. J. (2019). Factors influencing choosing teaching as a career: South Korean preservice teachers. *Asia Pacific Education Review*, *20*(3), 467–488. https://doi.org/10.1007/s12564-019-09579-z

León, J., Domínguez, E., Núñez, J. L., Pérez, A., & Martín-Albo, J. (2011). Translation and validation of the Spanish version of the échelle de satisfaction des besoins psychologiques in academic context. *Anales de Psicologia*, *27*(2), 405–411. https://revistas.um.es/analesps/article/view/123031

López-García, G. D., Granero-Gallegos, A., Carrasco-Poyatos, M., & Burgueño, R. (2023). Detrimental effects of disempowering climates on teaching intention in (physical education) initial teacher education. *International Journal of Environmental Research and Public Healthi*, *20*(1), 878. https://doi.org/10.3390/ijerph20010878

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, *44*(3), 159–175. https://doi.org/10.1080/00461520903028990

Richardson, P. W., Karabenick, S. A., & Watt, H. M. G. (2014). *Teacher motivation. Theory and practice* (1st ed.). Routledge.

Roloff-Henoch, J., Klusmann, U., Lüdtke, O., & Trautwein, U. (2015). Who becomes a teacher? Challenging the "negative selection" hypothesis. *Learning and Instruction*, *36*, 46–56. https://doi.org/10.1016/j.learninstruc.2014.11.005

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory. Basic psychological needs in motivation, development and wellness*. Guilford Press. https://doi.org/10.1521/978.14625/28806

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*(April), 1–11. https://doi.org/10.1016/j.cedpsych.2020.101860

Ryan, R. M., Deci, E. L., Vansteenkiste, M., & Soenens, B. (2021). Building a science of motivated persons: Self-determination theory's empirical approach to human experience and the regulation of behavior. *Motivation Science*, *7*(2), 97–110. https://doi.org/10.1037/mot0000194

Santos-Rego, M. A., & Lorenzo-Moledo, M. (2015). La formación del profesorado de educación secundaria: Pensando en la reconstrucción del proyecto universitario. *Revista Española de Pedagogia*, *73*(261), 263–281.

Statitics, U. I. for. (2016). *The world needs almost 69 million new teachers to reach the 2030 education goals*. http://unesdoc.unesco.org/images/0024/002461/246124e.pdf

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, *52*(4), 1003–1017. https://doi.org/10.1177/0013164492052004025

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, *44*(1), 1–31. https://doi.org/10.1007/s11031-019-09818-1

Viladrich, C., Angulo-Brunet, A., & Doval, E. (2017). A journey around alpha and omega to estimate internal consistency reliability. *Anales de Psicologia/ Annals of Psychology*, *33*(3), 755–782. https://doi.org/10.6018/analesps.33.3.268401

Watt, H. M. G., Richardson, P. W., & Morris, Z. A. (2017). Divided by discipline? Contrasting motivations, perceptions, and background characteristics of beginning Australian English and mathematics teachers. In *Global perspectives on teacher motivation* (pp. 349–376). Cambridge University Press.