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Cross-cultural examination of teacher-child dependency and relationship quality across Greece and China

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ABSTRACT

This cross-cultural study investigated the factorial structure and the measurement invariance of the Teacher-Child Dependency Scale (TCDS) and Student-Teacher Relationship Scale (STRS-SF) in Greece and China. The sample consisted of 346 children (Greece: 170, China: 176) and 44 teachers across 18 Early Childhood Education and Care (ECEC) settings. A two-factor structure of the TCDS - emotional dependency and physical dependency was supported and found to be invariant across cultures. Chinese teachers reported higher levels of closeness and physical dependency than their Greek counterparts, whereas emotional dependency was similar across countries. Teacher-child closeness negatively predicted internalizing and externalizing problems in both contexts. However, cultural differences emerged: emotional dependency significantly predicted behavioral issues in Greek children, whereas physical dependency played a more prominent role in internalizing issues for Chinese children. These results highlight the role of cultural contexts in shaping teacher-child relationships and suggest the need for culturally tailored practices and interventions in ECEC.

1. Introduction

The affective quality of teacher-child relationships has consistently been recognized as a crucial factor in children's socio-emotional and academic development (Lei et al., 2016; Liu et al., 2020; Spilt & Koomen, 2022; Zhang & Nurmi, 2012). Research has shown that relational dimensions such as closeness, conflict, and dependency play a critical role in shaping children's school adjustment, peer relationships, and engagement (Liu et al., 2020; Soininen et al., 2023; Split & Koomen, 2022; Zhang & Sun, 2011). However, the interpretation and manifestation of these relationship dimensions -particularly dependency- in different cultural and educational contexts has received relatively less attention (Xu et al., 2023). Most existing research on teacher-child relationships focuses on closeness and conflict dimensions, with few studies including the construct of dependency (Ferreira et al., 2020; Vatou et al., 2023). To our knowledge, only three studies have so far examined cross-cultural variations in dependent teacher-child relationships (Beyazkurk & Kesner, 2005; Chen et al., 2019; Xu et al., 2023), with only one of these focusing on early childhood education and care (ECEC) (e.g., Beyazkurk & Kesner, 2005).

Furthermore, most research has been conducted in Western contexts such as the United States, Germany, and the Netherlands (e.g., Alexandersen et al., 2024), whereas comparatively few studies have examined Eastern contexts (e.g., Zhang & Sun, 2011; Chen et al., 2019; Lei et al., 2016;). Research from Eastern collectivistic countries, where interconnectedness among individuals is prioritized (Markus & Kitayama, 1991), reveals differences in the quality of teacher-child relationships when compared to findings from Western individualistic countries, where individual independence is emphasized (Wei et al., 2013; Yang et al., 2013). This suggests that culture significantly influences how relationships are expressed and perceived. Therefore, it is essential to understand how the quality of teacher-child relationships may differ across various cultural contexts.

To enhance our understanding of potential cross-cultural variations in the quality of teacher-child relationships, particularly dependent ones, this study examined teacher-child relationships in ECEC settings in

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Greece (a country where individualistic and collectivistic orientations coexist) and China (a collectivistic country) (Triandis, 1995). Specifically, the study examined the cross-cultural measurement invariance of scales measuring the quality of teacher-child relationships and teacher-child dependency. It also compared mean differences across countries and explored potential associations between teacher-child relationship quality, teacher-child dependency and children's problem behavior in these two countries.

1.1. Teacher-child relationship quality and children's social development

The teacher-child relationship represents a unique bond within the ECEC settings, playing a crucial role in enhancing young children's social development. Research indicates that children benefit significantly from high-quality teacher-child relationships in ECEC environments (OECD, 2021). This relationship serves as a foundation for children to develop their understanding of social interactions, emotional regulation, and interpersonal skills (Lei et al., 2016; Zhang and Nurmi, 2012). A positive teacher-child relationship fosters an environment of trust, support, and mutual respect, providing children with a secure base to explore and navigate their social world (Pianta, 1999).

From a conceptual perspective, attachment theory is pivotal in understanding dyadic teacher-child relationships (Bowlby, 1982). According to this theory, nurturing teacher-child relationships offer children a secure base from which they can explore their school environment, gain new experiences, and engage more fully in classroom activities. Teachers can serve as a safe haven for children, providing comfort and security during times of fear or stress (Verschueren & Koomen, 2012). The teacher-child relationship constitutes a unique attachment dynamic, countering recent arguments that attribute solely attachment-based characteristics to this bond. Throughout the weekdays, children spend a significant portion of their waking hours with their teachers, often more than with their parents. Furthermore, developing a differentiated relationship with teachers, distinct from that with parents, may create unique opportunities for educators to support children with challenging attachment histories, particularly those from adverse backgrounds (Gregoriadis et al., 2020; Zhang et al., 2008).

In recent decades, attachment-based research has defined the quality of teacher-child relationships through three essential relational dimensions: closeness, conflict, and dependency (Pianta, 2001). Relationships characterized by high levels of closeness are marked by warmth, open communication, and teachers' sensitivity to children's needs (Pianta et al., 2003; Verschueren & Koomen, 2012). Conversely, conflictual teacher-child relationships can foster negative emotions such as insecurity, stress, aggression, or social withdrawal. Children in these conflictual relationships often become disengaged from classroom activities and may develop negative attitudes toward school (Cadima et al., 2015). Dependent relationships describe children who exhibit overly clingy and submissive behaviors, constantly seeking attention from their teachers. Such inappropriate dependency often results in children's low levels of autonomy and hampers their ability to form healthy relationships with peers (Spilt & Koomen, 2022).

Previous research and meta-analyses have demonstrated the significant impact of teacher-child relationships on children's socio-emotional development and behavioral outcomes (Lei et al., 2016; Soininen et al., 2023; Xu et al., 2023; Zhang & Nurmi, 2012). For instance, a close teacher-child relationship is associated with lower levels of externalizing behaviors in children (Roorda et al., 2017, 2021). When children experience warm, supportive, and responsive relationships with their teachers, they are more likely to engage in positive social interactions, exhibit prosocial behaviors, and develop effective emotion regulation skills (Soininen et al., 2023). In contrast, conflictual or strained teacher-child relationships have been linked to a higher likelihood of problem behaviors in children (Zhang & Sun, 2011). These disruptive behaviors not only hinder the learning environment but also impede children's socio-emotional development (Lei et al., 2016; Roorda et al., 2021). To date, only a limited number of studies have explored how teacher-child dependency relates to children's behavioral outcomes. Hughes et al. (2014) found that children exhibiting high levels of dependency on their teachers are more likely to show symptoms of anxiety, compared to those with less dependent or conflictual relationships. Additionally, other studies indicate that children with dependent relationships with their teachers may experience higher levels of internalizing problems (Mejia & Hoglund, 2016).

Finally, despite the abundance of studies on teacher-child relationships that strive to capture this complex construct, most have overlooked the dimension of dependency. This oversight may stem from a delayed recognition of its developmental significance and mixed findings regarding its psychometric properties (Gregoriadis et al., 2020; Koomen et al., 2012). Furthermore, recent years have revealed subtle cultural differences in how teacher-child relationships, particularly the aspect of dependency, are interpreted and understood across various cultural contexts (Chen et al., 2024; Fabris et al., 2023). Therefore, it is essential to incorporate the dimension of dependency when evaluating the quality of teacher-student relationships, especially from a cross-cultural perspective.

1.2. Dependent teacher-child relationships

Recent literature has reignited interest in dependency, particularly its conceptualization within attachment theory (Bosman et al., 2018). Dependency is a complex relational characteristic that encompasses behaviors such as seeking assistance, guidance, and acceptance from others (Ainsworth, 1972). It reflects a child's insecurity regarding the availability of their parent or teacher (Sroufe, 2021). Researchers are highlighting the multifaceted nature of dependency (Verschueren & Koomen, 2020) and revisiting foundational studies that initially explored the construct of children's dependency. According to Sroufe (2021), all children remain dependent on adults, particularly teachers, for support within ECEC settings. However, the ways in which they express this dependency can vary significantly. Research indicates that dependency comprises two dimensions that influence children's relationships: emotional or interpersonal dependency and physical or instrumental dependency (Bornstein, 2012; Sroufe, 2021). Emotional dependency involves seeking ongoing nurturance, protection, praise, and support, even in situations where autonomous functioning is feasible (Bornstein, 2012). Instrumental dependency, proposed by Heathers (1955), refers to a dependency pattern in which the responses of others serve as tools to help the individual achieve specific goals. For instance, physically dependent children aged 2–6 years may ask their teacher for assistance in getting dressed.

A recent meta-analysis underscored the developmental importance of dependency and its correlation with engagement, academic outcomes, and prosocial behavior, as well as its links to both externalizing and internalizing behaviors (e.g., Roorda et al., 2021). Additional studies have similarly indicated that dependency adversely affects school adjustment, academic performance, and engagement in classroom activities (Rudasill, 2021; Vatou et al., 2023). Beyond these cognitive and academic repercussions, dependent children often show less enthusiasm for peer interactions, which may hinder their opportunities to develop essential social skills (Coplan & Prakash, 2003). Moreover, a growing body of literature on teacher-child relationships is beginning to recognize the cultural factors that influence how these relationships are perceived and evaluated (Gregoriadis et al., 2021; Chen et al., 2024). Clearly, there is a pressing need for further conceptual and empirical exploration of the dependency construct, as well as the cultural influences that shape the assessment of teacher-child relationship quality.

1.3. Cultural foundations of teacher-child relationships in China and Greece

An examination of the philosophical and historical underpinnings of education in China and Greece reveals a shared foundation, providing a rational basis for a meaningful comparison between the two countries. For centuries, Chinese education and learning traditions have been influenced by Confucianism, where the goal of learning is "cultivation of self in community" for the benefit of society (Choy, 2017). Confucius's conception of education to "transform individuals for the better" remains central to the purpose of education emphasizing the cultivation of moral integrity and social harmony for the greater good of the community (Yuan et al., 2023). Within this cultural context, the teacher assumes an authoritative role and serves as a moral model. Teacher–child relationships may reflect a hierarchical orientation, where children's effort and compliance are interpreted as indicators of respect and development (Chen et al., 2019). In ancient Greece, philosophers such as Plato and Socrates also regarded education as a fundamental aspect of an individual's identity. The explicit purpose of education was to support children in becoming "virtuous citizens" or "wise and good" man (Karatsiori, 2023). The concept of the "wise and good" man, emphasized the holistic development of both the mind and body to produce ethical and engaged members of the city-state, providing a compelling basis for comparison (Karatsiori, 2023). In this context, the teacher serves more as a supportive mentor. Teacher–child relationships were shaped by dialog and mutual understanding, reflecting the interactive foundations of learning (Pianta, 2001). It seems that both traditions, despite developing independently, viewed education as inseparable from moral cultivation and community orientation. This shared foundation – that the aim of education is to foster moral, ethical and civic minded individuals for the benefit of society – provides a robust rationale for this cross-cultural study.

These philosophical traditions continue to resonate in contemporary educational research in both China and Greece, where the quality of teacher–child relationships is shown to be strongly influenced by cultural values and educational structures (e.g., Chen et al., 2019; Spilt & Koomen, 2022). Moreover, research highlights that the quality of teacher-child relationships is significantly influenced by the structures, values, and norms inherent in a country's national educational context (Chen et al., 2019). Alongside this, the cultural context in which these relationships operate also influences young children's internal working models, affecting how they perceive and experience relationships (Ladd, 1996). Given the variations across educational systems and cultural contexts worldwide, it is crucial to consider cultural variability when examining the way teacher-child relationships are perceived in ECEC.

However, defining the term "cultural context" is inherently complex. It is challenging to identify the parameters necessary to categorize populations within a specific cultural framework (Carlson & Harwood, 2003) and to understand how the norms and values of a cultural context influence relationship. Among the various dimensions that characterize a cultural context, one of the most fundamental is the individualism-collectivism typology (Hofstede et al., 2010). Individualism and collectivism are best described by Triandis (1995) as cultural syndromes that reflect values, beliefs, and shared attitudes organized around a central theme.

The term "individualism" refers to a social pattern characterized by "loosely linked individuals who view themselves as independent of collectives" (Triandis, 1995, p. 2). Typical attributes of individualistic cultures include autonomy, competition, achievement orientation, and self-reliance. In contrast, "collectivism" describes a social pattern consisting of "closely linked individuals who see themselves as parts of one or more collectives (family, co-workers, tribe, nation) and are primarily motivated by the norms and duties imposed by those collectives" (Triandis, 1995, p. 2). Collectivistic cultures emphasize behavior shaped by social norms, a strong sense of duty toward one's group, and interdependence with others.

Contemporary Chinese educational practice is primarily shaped by its collectivist cultural orientation (Choy, 2017; Xu et al., 2023). This orientation fosters a hierarchical, teacher-centered, and didactic classroom structure in which teacher's authority is strongly emphasized, and group harmony prioritizes over individual expression (Strand, 2020; Strand et al., 2019; Xie et al., 2023). In contrast, Greece, although situated within the Western tradition and embedded within the European framework - that emphasize the human rights for autonomy - has been characterized as "semi-collectivist" country. Greek education incorporates modern, child-centered pedagogies, which are often at odds with traditional teacher-directed methods (Gregoriadis et al., 2020). On the other hand, the rationale and structure of relationships in Greek society and within the family retain semi-collectivistic characteristics and tend to accept—if not encourage—dependent relationships. This blend of cultural and pedagogical influences creates a unique context that is neither strictly individualistic nor as hierarchically collectivistic as China.

1.4. Teacher-child relationships and cultural influences

Attachment researchers have identified pathways that describe the connection between the quality of adult-child attachment relationships and the influence of sociocultural frameworks on specific relational dimensions (e.g., Spilt & Koomen, 2022). For instance, the sociocultural context informs the daily practices of adults, including parents and teachers, which subsequently affects the quality of their relationships with children (Liu et al., 2020). Existing literature indicates that students and teachers from individualistic countries perceive their relationships differently than those from collectivistic countries (e.g., Franco et al., 2023). Recent studies have shown only partial invariance in student-teacher relationships between students from collectivistic and individualistic cultures, such as comparisons between Chinese and Dutch students (Chen et al., 2024). These findings highlight both similarities and differences in how teacher-child relationships are perceived across cultures. In collectivist cultures teachers are typically viewed as authoritative figures, and students are more likely to show deference to them, adhering to traditional norms of obedience and respect. In contrast, in individualistic cultures, teachers are often seen as facilitators of learning rather than figures of authority, and students are more likely to express their opinions and engage in open dialog with them (Keller et al., 2018; Xu et al., 2023).

Despite these differences between collectivist and individualist cultures, the quality of the relationship between teachers and students remains crucial for academic success and emotional well-being. Positive teacher-student relationships have been linked to high levels of engagement, motivation, and overall performance, regardless of cultural background (Chen et al., 2024; Yan et al., 2025). Furthermore, teachers act as significant role models and sources of guidance in both cultural contexts, influencing students' social and emotional development (Roorda et al., 2023).

1.5. Dependent teacher-child relationships and cultural influences

The literature reveals that the construct of dependency is perceived differently in Western individualistic cultures, which prioritize autonomy, exploration, and self-reliance, compared to Eastern collectivistic cultures, which emphasize social harmony and hierarchical relationships (Strand, 2020). Studies conducted in more individualistic countries, such as the US, Belgium, Germany, and Italy (Fraire et al., 2013; Milatz et al., 2014; Verschueren & Koomen, 2012; Webb & Neuharth-Pritchett, 2011), report negative or non-significant correlations between closeness and dependency. Conversely, research from more collectivistic or semi-collectivistic countries, such as China, Greece, Iran, and Turkey, indicates positive correlations between closeness and dependency (Gregoriadis et al., 2021; Vahidi et al., 2022; Zhang, 2010). These findings suggest that dependency is not viewed as a

negative attribute in collectivistic and semi-collectivistic cultures as it is in individualistic ones. While dependency may conflict with the individualistic pursuit of independence and autonomy, it aligns more closely with the collectivistic emphasis on interdependence, conformity to social norms, and social harmony (Spilt & Koomen, 2022). Individuals in collectivist contexts may learn hierarchical relationships, emphasizing self-in-relation-to-others, which is transmitted across generations, while those in individualist contexts may develop psychological autonomy, fostering a sense of separateness, uniqueness, and self-reliance (Keller et al., 2018).

Furthermore, a recent study Xu et al. (2023) found that teachers from collectivistic, semi-collectivistic, and individualistic cultures exhibited similar conceptualizations of closeness and conflict but differed in their understanding of dependency. For example, teachers from Belgium (individualistic), Italy (semi-individualistic), and China (collectivistic) identified behaviors such as excessive proximity-seeking, attention--seeking, and constant requests for help as indicative of overdependent children. However, these teachers differed in how they perceive and demonstrate care for their students. Belgian teachers tended to be more attuned to students' feelings, while Chinese teachers emphasized physical nurturing and instructional support. Italian teachers appeared to balance emotional and physical well-being in their practices.

Notably, discussing the variations in teacher-child relationships across collectivistic and individualistic contexts does not imply that all individuals within a specific population or cultural context behave uniformly. Triandis (1989) suggests that tendencies toward collectivism and individualism exist within every individual and societal group. Within each country or population, there are individuals who exhibit more individualistic or collectivistic behaviors. Green et al. (2005) also note that people can embody both individualistic and collectivistic traits simultaneously. Nonetheless, the prevailing social patterns indicate that most individuals within a specific cultural context tend to behave similarly (Triandis, 1995). Therefore, it is essential to account for variations in the socioeconomic context within countries to interpret and understand attachment dimensions, particularly dependency, from both behavioral and cultural perspectives.

1.6. The present study

This study was prompted by two central gaps in the existing literature. First, while teacher–child relationships are acknowledged as key predictors of children's socio-emotional and academic development, empirical evidence remains largely concentrated in Western, individualistic contexts (Spilt & Koomen, 2022). There is a paucity of research on how these relationships are conceptualized and experienced in collectivistic or semi-collectivistic societies, such as China and Greece. Second, the construct of dependency remains underexplored across cultures. In individualistic contexts, dependency has frequently been regarded as a maladaptive condition, whereas in collectivistic contexts it may be interpreted as a natural expression of closeness and secure attachment (Xu et al., 2023). The introduction of the Teacher-Child Dependency Scale (TCDS), a newly developed instrument, provides an opportunity to investigate this construct more systematically and examine its cultural relevance. Following the establishment of measurement invariance, it is essential to ensure that observed differences reflect genuine cultural variations rather than measurement inconsistencies (Cadima et al., 2015).

To address these gaps, this cross-cultural comparative study investigates the extent to which cultural orientations -specifically collectivism and semi-collectivism- shape teacher-child relationship quality and dimensions of dependency (physical and emotional) in Greece and China (cross-cultural aspect). Specifically, this study delves into cultural differences between Greece and China in teacher-child relationship quality and dependency. The study also examines the potential associations of teacher-child relationship quality and dependency with children's problems behavior across the two countries (cross-comparison aspect).

The study explores four research questions:

1) Does the TCDS demonstrate a two factor-structure?

2) Do the TCDS and STRS-SF demonstrate adequate reliability, validity, and measurement invariance across countries?

3) How do Greek and Chinese teachers report levels of closeness, conflict, and dependency int their relationships with their children?

4) To what extent are the patterns of associations different between TCDS and STRS-SF and children's problem behavior across the two countries?

Given Greece's semi-collectivistic and China's collectivistic country contexts, differences were expected.

1.7. Methods

1.7.1. Participants

The study included 346 children and 44 ECEC teachers from 18 ECEC settings in Greece (n = 170) and China (n = 176). Most teachers were women (97.6 %, n = 40), with a mean age of 36.71 years (SD= 10.93 years). Children were randomly selected from 45 classrooms (Greece= 24, China= 21), with 56.8 % being boys. Their ages ranged from 1.70 to 4.17 years (M ± SD =3.48 ±.33 years). Table 1 presents sociodemographic details.

1.8. Measures

1.8.1. Teacher-child dependency

To assess children's dependency on teachers, the second and fourth authors developed the Teacher-Child Dependency Scale (TCDS). Adapted from the Children's Dependency Questionnaire (Xie et al., 2023), the scale was modified to reflect teacher perspectives with additional items. The TCDS comprises 10 items, divided into two subscales: physical dependency (5 items) and emotional dependency (5 items). Physical dependency captures children's efforts to seek care from teachers (e.g., «*Asking to be dressed up*"). Emotional dependency reflects the frequency of emotional dependent behaviors (e.g., *"Always sticking close to me"*). Teachers rated items on a 4-point Likert scale (1 "*never happens*" to 4 "*always happens*"). Internal consistency was acceptable across both countries (Greece: Physical Dependency: ω=.75, Emotional Dependency: ω=.81; China: Physical Dependency: ω=.78, Emotional Dependency: ω=.79).

1.9. Teacher-child relationship quality

ECEC teachers rated their relationships with the target children using the Student-Teacher Relationship Scale-Short Form (STRS-SF; Pianta &

Table 1
Sample characteristics.

	Greece (n = 170)	China (n = 176)
	M(SD) or n (%)	*M(SD) or* n (%)
Children		
Gender		
Boys	93 (54.7)	103 (41.5)
Girls	77 (45.3)	73 (58.5)
Age in years	3.40 (.31)	3.55 (.32)
ECEC teachers (n = 44)		
Age in years	44.96 (6.59)	25.82 (2.43)
Years of teaching experience	17.75 (6.27)	5.15 (2.63)
Educational Level		
Vocational high school	-	1 (5.9)
Associate's degree	-	2 (11.8)
Bachelor	18 (75.0)	14 (82.4)
Master	5 (20.8)	-
Ph.D.	-	-
Other	1 (4.2)	-

Steinberg, 1992) on a 5-point Likert scale, ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*). The STRS-SF encompasses 15 items which demonstrate two subscales: Closeness (7 items) and Conflict (8 items). Closeness evaluates a teacher's feelings of affection, sensitivity and warmth with the child. Conflict estimates a teacher's perception of negative feelings with the child. High values for internal consistency have been found for both countries (Greece: Closeness: ω=.82, Conflict: ω=.89; China: Closeness: ω=.79, Conflict: ω=.85). Higher scores in the closeness scale and lower scores in the conflict scale indicate more positive teacher-child relationships.

1.10. Children's behavior problems

Internalizing and externalizing problems were assessed by specific items drawn from the respective Greek and Chinese versions of the Child Behavior Checklist (CBCL) for ages 1.5–5 years (Achenbach & Rescorla, 2000). The CBCL 1.5–5 is a teacher-reported measure designed to record the problem behaviors of preschoolers. Using a 3-point Likert scale ("0, *Not True*" to "2, *Very True or Often True*"), teachers report the extent to which a specific behavior applies to each child (e.g., "*Destroys properly belongings to others*"). A summary score was calculated for each subscale: Internalizing problem subscale comprises 18 items assessing anxiety and withdrawal (Greece: ω=.83 and China: ω=.81), and Externalizing problem subscale encompasses 34 items evaluating aggression and attention problems (Greece: ω=.95 and China: ω=.88).

1.11. Procedures

Data were collected during the fall of the 2023–2024 preschool year. ECEC directors were contacted by email or face-to-face visits and asked if they would be willing to participate in this study. Children were recruited from daycare and preschool centers in the metropolitan areas of Thessaloniki (Greece) and Shenzhen (China). Consent forms and invitations letters were distributed to teachers and parents. Upon parental consent, teachers completed and returned the questionnaires. No incentives were provided for participation. The study received approval from the Institutional Review Boards and Ethics committees of the authors' universities in both countries.

A translation and back-translation procedure were implemented for both TCDS and STRS-SF as no prior studies were identified using them. The research teams undertook rigorous translation procedures to develop a Greek and Chinese version of the instruments, adhering to established high-quality standards (Fenn et al., 2020). The research teams recruit independent bilingual experts to translate the scales into Greek and Chinese. Subsequently, the items were back translated into English by bilingual professionals. The discrepancies were then subjected to review by a panel of early childhood education teachers in both countries, with a view to ensuring conceptual, linguistic and cultural equivalence of each item. Minor adjustments were made to the wording to ensure contextual relevance, with particular attention paid to the terminology employed. In this study, the researchers employed a version of CBCL that had been previously utilized in Greek and Chinese contexts.

1.12. Data analyses

To address the research questions, the following strategies of data analysis in similar research were applied (e.g., Cadima et al., 2015). First, exploratory factor analysis (EFA) was applied on the whole sample to examine the original factorial structure of the TCDS. To keep the sample size as large as possible the missing values (< 1 %) were handled using full maximum likelihood estimation (Enders, 2001). The determination of the appropriate factor structure relied on several criteria, including parallel analysis, eigenvalue over 1.0, and factor interpretability. Items should preferably load greater than.40 (Stevens, 2002). Next, confirmatory factor analysis (CFA) was conducted in each country to test the factorial structure of the TCDS derived from the EFA. McDonald's Omega coefficient assessed the internal consistency of the TCDS across countries, with coefficient values above.70 considered acceptable and those above.80 preferable (Hayes & Coutts, 2020).

As a second step, the TCDS's and STRS-SF's equivalence between the two countries was explored by conducting measurement invariance (MI) through multi-group CFA. Establishing MI ensures that these instruments assess the same underlying constructs consistently across countries. Three levels of MI were tested: configural, metric, and scalar invariance. Four measurement models were separately examined for Physical and Emotional Dependency, and Closeness and Conflict following recommendations which suggest a minimum of 200 cases for a model consisting of two factors when there are missing values (Wolf et al., 2013). Configural invariance (unconstrained model) explores whether the TCDS and STRS-SF structures were consistent across countries without imposing constraints. Factor loadings, intercepts and residual variances were allowed to vary freely. Metric invariance investigates whether factor loadings were equivalent across countries, ensuring that participants interpreted the scale items similarly. Equality constraints were applied to factor loadings, while intercepts and residual variances were kept free. Salar invariance, the most restrictive model, required both factor loadings and item intercepts to be equal across countries, suggesting that the constructs had the same meaning and scale across countries (Hair et al., 2006).

Previous cross-cultural studies argued that the full measurement invariance could be too strict (Cadima et al., 2015; Chen et al., 2019) and proposed partial scalar invariance as the necessary condition to compare means. Some intercepts or loadings can be invariant across groups in a partial scalar model. If the scalar invariance is not achieved, modification indices can be used to identify which model parameters can be set free.

Model fit was evaluated using the criteria recommended by Hu and Bentler (1999), considering models to have an adequate fit if the Root-Mean-Square Error of Approximation (RMSEA) $\leq$ .08 and Standardized Root Mean Square Residual (SRMR) $\leq$ .10, and an excellent fit if CFI $\geq$ .95, RMSEA $\leq$ .06, and SRMR $\leq$ .08. The chi-square difference test with the Satorra-Bentler correction (Satorra & Bentler, 2010) was used to compare models, with a non-significant difference indicating measurement invariance.

In the third step, means comparisons of Physical Dependency, Emotional Dependency, Closeness, and Conflict were conducted across Greece and China to investigate cross-cultural differences. Finally, we examined the associations between teacher-child dependency, teacher-child relationship quality and teacher-rated children's internalizing and externalizing problems for each sample separately.

Factor analyses and measurement invariance analyses were conducted with R software (Lavaan package), whereas the third step of analyses was performed using SPSS v.27.

2. Results

2.1. Factorial structure of the TCDS

EFA using the Maximum Likelihood method factor analysis followed by varimax rotation revealed the presence of two eigenvalues above unity (2.31 and 2.08), explaining 43.8 % of the common variance (KMO=.83, Bartlett's test of sphericity = 1103, df= 45, p < .001). However, the examination of the factor matrix showed that the item 1 had factor loading < .40; thus, this item was excluded from further analysis, and the analysis was performed again. New results showed that TCDS can be initially described by two factors, explaining 46.3 % of the variance. All 9 items had statistically significant loadings, ranging from.51 to.85.

Based on the EFA results, the original two-factor model was put forward for CFA, conducted separately for both the Greek and Chinese samples. In both countries, the results from the CFA showed good fit. As shown in Table 2, the factor loadings were satisfactory forming the two

Table 2
Results from the confirmatory factor analysis of the TCDS.

	Factor loadings			
	Greece		China	
Items	F1	F2	F1	F2
Emotional Dependency				
q6: Always sticking close to me	.839		.799	
q7: Trying hard to attract my attention	.545		.674	
q8: Being unhappy if I don't pay attention to her/him	.581		.799	
q9: Asking to stay with him/her all the time	.806		.647	
q10: Asking to keep doing everything together	.681		.428	
Physical Dependency				
q2: Asking to be fed		.600		.531
q3: Asking to be picked up or take a piggy-back ride		.519		.674
q4: Asking to be dressed up		.656		.520
q5: Letting me help him/her to do what he/she can do by her/himself		.836		.875
Eigenvalues	2.55	1.92	2.12	1.99
Cumulative percentage of variance (%)	28.3	21.3	23.6	22.1

Note. F1 = Emotional Dependency, F2= Physical Dependency

subscales, which confirms the TCDS's factorial structure as suggested by the authors across countries. In both cases, models fit indices yielded acceptable results, for Greece $\chi^2 = 74.7$, $df = 24$, $p < .001$, CFI= .91, RMSEA= .09, SRMR= .08 and for China $\chi^2 = 64.6$, $df = 25$, $p < .001$, CFI= .95, RMSEA= .07, SRMR= .05.

3. Measurement invariance

First, multi-group CFA was employed to test the measurement invariance of the TCDS and subsequently the STRS-SF across countries. The model fit and model comparison statistics of multigroup models for teacher-child dependency and teacher-child relationships quality are provided in Table 3.

3.1. Teacher-child emotional dependency model

The baseline model of Emotional Dependency was not best fitted with the data, $\chi^2(10) = 26.192$, $p < 0.001$, RMSEA= .096, CFI= .877, SRMR= .057. The modification indices indicated a correlation between Item 7 ("Trying hard to attract my attention") and Item 8 ("Being unhappy if I don't pay attention to her/him"). These items appear to capture aspects of seeking attention within a dyadic relationship, so the correlation between them was added to modify the baseline model. This modified configural invariance model was acceptable, indicating an appropriate model fit: $\chi^2(8) = 17.14$, $p < .010$, RMSEA= .081, CFI= .931, SRMR= .042. This model served as a comparison for the further restrictive models. Constraining the factor loadings across the groups to be equal did not significantly undermine the model fit: $\chi^2(12) = 23.93$, $p < .010$, RMSEA= .075, CFI= .910, SRMR= .072. Moreover, the difference in chi-square between the model and the previous one was not statistically significant, $\Delta\chi^2(4) = 6.79$, $p = .169$ and therefore, metric invariance was supported. Also, the full scalar invariance model was supported: $\chi^2(16) = 29.71$, $p < .010$, RMSEA= .070, CFI= .900, SRMR= .075. The difference in chi-square between the modified configural invariance model and the scalar invariance model was not statistically significant, $\Delta\chi^2(8) = 12.57$, $p = .205$.

3.2. Teacher-child physical dependency model

The measurement configural model for Physical Dependency had a satisfactory fit, $\chi^2(4) = 5.10$, $p = .277$, RMSEA= .040, CFI= .992, SRMR= .022. The metric invariance model also fitted the data equally well, $\chi^2(7) = 10.48$, $p = .163$, RMSEA= .053, CFI= .975, SRMR= .060. The difference in chi-square between the model and the previous one was not statistically significant, which supported the metric invariance. However, the model with scalar invariance fitted the data worse than the model with configural invariance, $\chi^2(10) = 34.982$, $p < .001$, CFI= .820, RMSEA= .119, SRMR= .092. Consequently, we proceeded to examine the partial scalar invariance. Analysis of modification indices for the partial scalar model indicated potential differences in the thresholds of Item 4 ("Asking to be dressed up") across countries. The model with partial scalar invariance had satisfactory fit, $\chi^2(9) = 13.79$, $p = .130$, CFI= .965, RMSEA= .055, SRMR= .063. Finally, the difference in chi-square between the configural invariance model and the partial scalar invariance model was not statistically significant, which supported further the partial scalar model as the final model for further analyses, $\Delta\chi^2(5) = 8.69$, $p = .130$.

3.3. Teacher-child closeness model

The fit of the measurement model for Closeness was not optimal, $\chi^2(28) = 109.13$, $p = .163$, RMSEA= .129, CFI= .872, SRMR= .065. After checking the correlation residuals and modification indices above 10, we decided to add two residual correlations between Item 7 ("This child

Table 3
Model fit indices and model comparison statistics of testing for measurement invariance in full sample.

	χ^2(df)	CFI	SRMR	RMSEA	$\Delta\chi^2$(Δdf)	*p*
Emotional Dependency						
Configural invariance	26.19* (10)	.877	.057	.096	-	-
Configural invariance.2	17.14* (08)	.931	.042	.081	-	-
Metric invariance	23.93* (12)	.910	.072	.075	6.79 (04)	.205
Scalar invariance	29.70* (16)	.900	.075	.070	12.56 (08)	.205
Physical Dependency						
Configural invariance	5.10 (04)	.992	.022	.040	-	-
Metric invariance	10.48 (07)	.975	.066	.053	5.38 (03)	.130
Scalar invariance	34.98* (10)	.820	.092	.119	29.88 (06)**	.001
Partial Scalar invariance	13.79 (09)	.965	.063	.055	8.69 (05)	.130
Closeness						
Configural invariance	109.13 (28)*	.872	.065	.129	-	-
Configural invariance.2	22.00 (14)	.984	.031	.057	-	-
Metric invariance	30.48 (19)*	.977	.062	.059	8.48 (5)	.131
Scalar invariance	63.33 (24)**	.920	.087	.097	41.33 (10)**	.001
Partial Scalar invariance	35.42 (21)*	.971	.067	.063	13.42 (7)	.061
Conflict						
Configural invariance	40.35 (28)	.950	.049	.050	-	-
Metric invariance	44.86 (32)	.914	.104	.060	4.51 (6)*	.048
Scalar invariance	89.70 (40)**	.800	.124	.085	49.35 (12)**	.001

Note. χ^2=chi-square value; *df*=degrees of freedom; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error Approximation; SRMR=Standardized Root Mean Square Residual. *p<.001

spontaneously shares information about himself/herself") and Item 15 ("This child openly shares his/her feelings and experience with me"), and between Item 3 ("If upset, this child will seek comfort from me") and Item 5 ("This child values his/her relationship with me"). Adding these residual correlations led to an improvement of model fit, $\chi^2(14)= 22.00$, $p = .078$, RMSEA= .057, CFI= .984, SRMR= .031. The metric invariance model fitted the data equally well as the adjusted measurement model, $\Delta\chi^2(5) = 8.48$, $p = .131$. The scalar invariance model, however, fitted significantly worse than the configural model, $\Delta\chi^2(10) = 41.33$, $p < .001$. After checking the mean residuals and modification indices, we released the equality constraints on the intercepts of Items 5, 7, and 9. The model with partially strong invariance reached good fit $\chi^2(21)= 35.42$, $p = .025$, RMSEA= .067, CFI= .971, SRMR= .063, and fitted the data equally well as the model with configural invariance $\Delta\chi^2(7) = 13.42$, $p = .061$.

3.4. Teacher-child conflict model

The fit of the measurement model for Conflict was good, $\chi^2(28) = 40.35$, $p = .061$, RMSEA= .050, CFI= .950, SRMR= .049. The metric invariance model demonstrated an adequate fit to the data, $\chi^2(34)= 55.27$, $p = .012$, RMSEA= .060, CFI= .914, SRMR= .104. Next, the scalar invariance model was estimated and indicated an unsatisfactory model fit, $\chi^2(40)= 89.70$, $p = .012$, RMSEA= .085, CFI= .800, SRMR= .124. Given that the model yielded significant poorer fit compared to the model with configural invariance ($\Delta\chi^2(12) = 49.35$, $p < .001$), and the CFI and SRMR values were unacceptable, the analysis was terminated, indicating lack of support for scalar invariance.

3.5. Cultural differences in teacher-child relationships and teacher-child dependency

Based on the final models for teachers' relationship and dependency perceptions, we examined the mean differences of teacher-reported Closeness, Conflict, Emotional Dependency and Physical Dependency across the two countries. Results of independent sample *t*-test are provided in Table 4. Analyses revealed significant cultural differences for Physical Dependency, Closeness and Conflict with small and moderate effect sizes (.37,.57, and 27, respectively), with higher levels of physical dependency and closeness in China than Greece.

3.6. Patterns of associations

The means, standard deviations, and correlations between study variables across countries are presented in Appendix 1. To answer the last research question, a series of regression models were conducted to examine the prediction of 'Internalizing Problems" and "Externalizing Problems" from teacher-child closeness and dependency, and child's age. In the case of Greece, the results revealed that emotional dependency positively predicted children's internalizing (β =.264, $p < .001$) and externalizing problems (β =.160, $p < .05$). Teacher-child closeness negatively predicted children's internalizing ($\beta = -.470$, $p < .001$) and children's externalizing problems ($\beta = -.218$, $p < .001$). The overall regression models were statistically significant for both "Internalizing Problems" ($F_{(4, 168)} = 19.114$, $p < .001$) and "Externalizing Problems" ($F_{(4, 168)} = 3.58$, $p < .05$).

In the Chinese sample, the results showed that physical dependency positively predicted children's internalizing problems (β =.245, $p < .001$), teacher-child closeness was a significant negative predictor for both children's internalizing ($\beta = -.336$, $p < .001$) and children's externalizing problems ($\beta = -.367$, $p < .001$). The overall regression models were statistically significant for both "Internalizing Problems" ($F_{(4, 175)} = 12.859$, $\beta = p < .001$) and "Externalizing Problems" ($F_{(3, 175)} = 9.315$, $\beta = p < .001$) (Table 5).

Table 4
Observed means scores and differences in teacher-child relationship and dependency.

	Mean (SD)			Mean		Cohen's
	Greece	China	*t*	diff	SD	d
Emotional Dep.	6.06 (1.81)	6.25 (1.70)	1.022	.19	.18	.11
Physical Dep.	5.34 (1.70)	6.03 (1.98)	3.47**	.68	.19	.37
Closeness	22.29 (4.59)	24.75 (3.97)	5.33**	2.45	.45	.57
Conflict	10.01 (3.82)	9.00 (3.61)	2.54*	1.01	.39	.27

Note: Observed means were calculated by computing the sum scores of the observed items measuring teachers' relationship and dependency perceptions. *$p < .05$, **$p < .001$

4. Discussion

The overall goal of this cross-cultural study was to expand and strengthen the knowledge base on teacher-child relationship quality and teacher-child dependency. First, a newly developed instrument, the Teacher-Child Dependency Scale (TCDS), was introduced to capture the multifaceted construct of dependency. The analysis revealed a two-factor structure of the TCDS, distinguishing between Emotional Dependency and Physical Dependency, in both countries. Second, this study investigated the cross-cultural measurement invariance of the scales (STRS-SF and TCDS) across Greece and China. Evidence regarding the dimensions of teacher-child relationships supports the existence of both universal patterns and cultural nuances. Third, this study examined the associations of teacher-child relationship quality and teacher-child dependency with children's problem behaviors. Results indicated significant associations between dependency and closeness and children's internalizing and externalizing problems in both Greece and China. Overall, this study highlights that culture is a significant factor in diverse educational settings.

4.1. The conceptualization of dependency: emotional and physical dependency

One of the central contributions of this study is the identification of a two-factor structure of the TCDS. The findings suggest that the distinction between emotional and physical dependency represents a critical theoretical contribution, particular given dependency's historical treatment as a unidimensional construct (Sroufe, 2021). Conceptually, this finding is consistent with existing literature, suggesting that the complex construct of dependency includes *emotional or interpersonal dependency* and *physical or instrumental dependency* (Heathers, 1955; Sroufe, 2021). From a methodological perspective, the cross-cultural validity of the TCDS confirms that emotional dependency and physical dependency are distinct yet interrelated constructs applicable in both Greece and China.

The two-factor model also contributes to the long-standing debate in developmental psychology concerning the distinction between "dependency" and "attachment" (Sroufe, 2021). Historically, these terms were often used synonymously, causing significant conceptual confusion. While Bowlby's attachment theory successfully differentiated between attachment, defined as a specific emotional bond with caregiver, and dependency defines as a more generalized "trait concept" (Bowlby, 1982), the present study's findings provide a framework for this distinction and offer a practical and promising measure for assessing the multidimensional nature of teacher-child dependency.

4.2. Cultural interpretation of teacher-child relationships and dependent teacher-child relationships

The broader analysis of teacher-child relationships, through the measurement invariance of the TCDS and STRS-SF, supports the

Table 5
Regression analysis results predicting children's problem behaviors from teacher-child dependency.

	Internalizing problems				Externalizing problems			
	β	t	R^2	F	β	t	R^2	F
Greece								
Children's age	.153*	2.30			.015	.191		
Emotional Dependency	.264**	3.69			.160*	1.93		
Physical Dependency	.126	1.72			.070	.823		
Closeness	−.470**	−7.01	.318	19.114**	−.218**	−2.79	.080	3.582*
China								
Children's age	−.016	−.231			−.096	−1.34		
Emotional Dependency	.136	1.78			.129	1.63		
Physical Dependency	.245**	3.12			.096	1.19		
Closeness	−.336**	−4.77	.231	12.859**	−.367**	−5.03	.179	9.315**

Note: *p < .05, **p < .001

existence of both universal and cultural-specific patterns. The results supported configural, metric, and scalar invariance for emotional dependency, with partial scalar invariance observed for physical dependency and closeness across Greece and China. However, only metric invariance was achieved for conflict. These findings suggest that teachers in both countries perceive and interpret emotional dependency similarly, while the partial invariance for physical dependency and closeness indicates that certain aspects of the teacher-child relationship manifest differently across cultures. This aligns with previous research indicating that in collectivistic cultures, children's reliance on teachers for emotional support is more normalized and even encouraged (Xu et al., 2023). Conversely, physical dependency appears to be influenced by socio-cultural expectations regarding autonomy, which can vary significantly across different educational contexts (Verschueren & Koomen, 2020). The lack of full scalar invariance for closeness further underscores these cultural differences, as the quality of teacher-child relationships is shaped by diverse expectations regarding warmth, authority, and socio-emotional support across cultural contexts (Fabris et al., 2023). Therefore, these findings contribute to the growing body of research that suggest dependency should be understood in the context of cultural norms, regarding autonomy, relationships, and the role of teachers (e.g., Fabris et al., 2023; Sroufe, 2021)

Regarding teacher-child conflict, the support of only metric invariance again highlights the varying interpretations across cultures. This finding is consistent with Chen et al. (2019), who found that Dutch and Chinese teachers perceive conflict differently, with teachers in individualistic cultures tolerating more assertive child behavior, while those in collectivistic cultures may discourage confrontation (Xu et al., 2023). Similarly, Wei et al. (2013) noted a positive association between emotional suppression and interpersonal harmony among Chinese-American students, but no such association was found among European-American students. Given these cultural differences, the threshold for what constitutes "conflict" may vary; for instance, in a semi-individualistic context such as Greece, a child's behavior may be perceived as mild disagreement, whereas it could be viewed as more conflictual in China, thereby reducing the likelihood of achieving scalar/intercept level's measurement invariance.

4.3. Cultural differences in teacher-child relationship quality and dependency across countries

Consistent with attachment theory, teachers in both countries reported high levels of closeness with their children, suggesting that warm and supportive teacher-child bonds are valued across cultural contexts (Carlson & Harwood, 2003). These findings highlight the universal importance of relational security in early childhood education.

At the same time, notable cultural differences were observed and can be interpreted through the lens of norms surrounding teacher-child interaction and broader caregiving values. Chinese teachers reported higher levels of closeness and physical dependency in their relationships with children compared to their Greek counterparts. This finding reflects China's collectivistic context, rooted in Confucian traditions, where teachers and parental figures are regarded as moral authorities, and close, obedient ties with teachers are strongly encouraged (Chen et al., 2024; Yuan et al., 2023). Previous research indicating that in collectivistic cultures, teachers often express warmth and closeness through tangible acts of physical nurturance, such as preparing children's favorite meals and providing structured educational support (Fabris et al., 2023; Xu et al., 2023). This practice is rooted in Confucian educational values, which emphasize hierarchical relationships and deference to authority figures (Xie et al., 2023). Furthermore, these practices not only strengthen teacher-child bonds but also reinforce the collective values of care, responsibility, long-term interpersonal relationships, and group cohesion that characterize this culture (Hofstede et al., 2010).

In contrast, Greek teachers reported lower levels of closeness and physical dependency, which may reflect European educational norms that place greater emphasis on fostering autonomy, dialog and mutual understanding, even within a semi-collectivistic cultural context (Gregoriadis et al., 2020). Greek teachers may maintain a certain level of distance, reflecting the coexistence of individualistic and collectivistic orientations, and express closeness through direct practices such as verbal praise, hugging, or kissing. Moreover, in Greece, teachers adhere to a child-centered national curriculum that promotes close teacher-child interactions and responsive caregiving (Gregoriadis et al., 2020). The high level of emotional support in Greek ECEC settings likely reinforces children's reliance on teachers for emotional security and task completion. This context may enhance teachers' effectiveness in fostering social interactions and developing affective teacher-child relationships, which can be beneficial for children's socio-emotional development. While this approach creates a warm and secure environment, it may also lead to increased dependency, particularly among children who struggle with self-regulation.

Dependency in teacher-child relationships remains an underexplored yet crucial factor influencing children's development. The results indicated no significant differences in emotional dependency between Greek and Chinese samples, suggesting that children in both cultures exhibit similar levels of emotional reliance on their teachers. This finding supports prior research indicating that emotional dependency is a vital aspect of teacher-child relationship quality across cultures, as children seek reassurance and emotional closeness regardless of their cultural background (Verschueren & Koomen, 2012).

4.4. Patterns between teacher-child relationship, dependency and children's problem behaviors

A consistent pattern emerged in both countries that teacher-child closeness negatively predicted both internalizing and externalizing problems. According to attachment theory, a supportive teacher-child relationship serves as a protective factor against psychological distress and behavioral issues (Fabris et al., 2023; Spilt & Koomen, 2022). This

finding emphasizes that positive teacher-child relationships may be universally beneficial, providing children with the secure base and safe haven they need to thrive socially and emotionally, regardless of culture.

However, the specific patterns of associations between dependency dimensions and children's problem behaviors varied across the two countries, reflecting deeply embedded cultural influences. In Greece, a semi-collectivistic culture in which European educational norms that value autonomy co-exist with close interpersonal relationships, emotional dependency was found to be a significant predictor of both internalizing and externalizing issues. Emotional dependency -defined as reliance on teachers for comfort and approval- was linked to both types of problems, suggesting a potential conflict with the societal expectation of independence, particularly in formal settings such as schools, where children are expected to mature and become self-reliant in their emotional lives (Gregoriadis et al., 2021; Roorda et al., 2021). This dynamic may contribute to internalizing problems such as anxiety or withdrawal in children who struggle to balance their relational needs with these expectations. In addition, physical dependency was associated only with externalizing problems in the Greek sample, suggesting that children's reliance on a teacher in this context may sometimes foster frustration and conflict in the classroom (Soininen et al., 2023).

Conversely, in China, a collectivistic culture that values social relatedness and interdependence, physical dependency was found to be a significant predictor of both internalizing and externalizing problem behavior. This result is particularly intriguing and requires careful interpretation. In collectivistic culture, where close relationships and nurturing are expected, a child's reliance on adults is often seen as a healthy part of forming social bonds (Strand et al., 2019; Xie et al., 2023). Such reliance is typically associated with emotional closeness and interdependence. In this context, the finding that emotional dependency showed a weak association only with internalizing problems, suggests that seeking emotional support may be less problematic in a society where close relationships with teachers are culturally normalized and valued (Chen et al., 2024; Yuan et al., 2023). By contrast, the finding that physical dependency -reflecting the need for tangible assistance and proximity- was linked to both internalizing and externalizing problems may indicate that this behavioral pattern signals difficulties in engaging successfully in the harmonious, group-based social interactions expected in Chinese classrooms (Strand et al., 2019).

5. Educational implications

These findings carry important implications for educational practice, teacher training, and future research. Given that teacher-child closeness consistently predicts fewer behavioral problems, fostering warm and supportive relationships should be a priority in both Greek and Chinese educational contexts. Therefore, interventions aimed at enhancing teacher-child relationships and addressing behavioral issues should adopt a comprehensive approach that recognizes the mutual influence of these factors. However, the differing impacts of emotional and physical dependency underscore the necessity for culturally tailored interventions. Teachers would benefit from professional development programs that focus on helping children build emotional resilience while maintaining supportive relationships and promoting self-sufficiency in a developmentally appropriate manner.

5.1. Strengths, limitations and future directions

The primary strength of this study lies in its novel conceptualization and validation of the two-factor dependency model, which contributes to the existing body of research on teacher–child relationships. A particular strength is the study's focus on a cohort of children, aged 2.5–4. This age range is a critical and formative period, as children's relationships with teachers during the earliest grades are highly predictive of their long-term social and academic success (Split & Koomen, 2022). By examining this developmental stage, the study provides a basis for understanding how dependency, as a two-factor construct, manifests itself at the very beginning of a child's school life.

However, there are several factors limit the conclusions that can be drawn from these findings. First, the study relied exclusively on teacher reports, which may introduce response bias. As previous research has noted, a teacher's report of a child's behavior is not an objective measure but can be influenced by their own subjective perceptions and expectations, including social self-efficacy, classroom experiences, and norms (e.g., Vatou et al., 2022). This suggests that the assessment may reflect the teacher's reaction to the child rather than their objective behavior. Moreover, while rigorous translation, back-translation and measurement invariance testing were employed to ensure the scales were conceptually equivalent, no instrument can fully capture the nuanced meanings of relational constructs in diverse socio-cultural contexts. Future research should use multi-informant designs (e.g., parent reports, child self-perceptions and observational measures) to confirm findings and reduce reliance on teacher perspectives. Second, the study's sample was confined to collectivist and semi-collectivist educational contexts, omitting individualistic settings. Future studies should explore the factorial structure of the TCDS and its measurement invariance across diverse cultural and educational contexts. Third, the study employed a cross-sectional design, which precludes establishing causal relationships among the variables. Future research could implement longitudinal studies to investigate how these relationships develop over time.

6. Conclusion

This study contributes to the field of early childhood education by providing one of the first cross-cultural comparisons of teacher–child relationship quality between Greece and China, with particular emphasis on the construct of dependency. A key contribution is the introduction and validation of the Teacher–Child Dependency Scale (TCDS), which revealed a two-factor structure -Emotional Dependency and Physical Dependency- supporting the theoretical understanding that children's reliance on teachers can be expressed in distinct ways (Sroufe, 2021). This novel conceptualization moves beyond treating dependency as a single dimension, offering a more nuanced framework for linking teacher–child dynamics to children's behavioral adjustment. The results underscore the importance of interpreting teacher–child relationship dimensions not only through a universal lens but also within specific cultural and educational contexts. Finally, the results revealed a significant association between dependency and children's behavioral problems, with emotional dependency being linked to internalizing issues in Greece and physical dependency having a more pronounced impact in China. These findings emphasize the need for educational practices that are responsive to culture and foster children's socio-emotional development, while taking into account cultural expectations of autonomy and teacher support.

Compliance with Ethical Standards

All procedures involving human participants in this study were performed following the ethical standards of the Department of the Early Childhood Education and with the 1964 Helsinki Declaration. Informed consent forms were obtained from participants included in the study.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used "Gemine" in order to improve grammar and syntax. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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Weiyi Xie: Writing – review & editing, Methodology, Investigation, Data curation, Conceptualization. **Anastasia Vatou:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Xiao Zhang:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Katerina Krousorati:** Writing – review & editing, Investigation, Data curation, Conceptualization. **Athanasios Gregoriadis:** Writing – review & editing, Writing – original draft.

Declaration of Competing Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix 1

Table A1
Descriptive statistics of and correlations among variables

	M (SD)		1	2	3	4	5	6
Variables	Greece	China						
1. Emotional Dependency	6.06 (1.81)	6.25 (1.70)	-	.404**	.168**	.319**	.179*	.105
2. Physical Dependency	5.34 (1.70)	6.03 (1.98)	.352**	-	−.160*	.365**	.357**	.228**
3. Closeness	22.29 (4.59)	24.75 (3.97)	.149*	−.150*	-	−.232**	−.352**	−.361**
4. Conflict	9.00 (3.61)	10.01 (3.82)	.165*	.041	−.192*	-	.379**	.644**
5. Internalizing Problems	4.14 (4.00)	1.64 (2.17)	.227*	.273**	−.442**	.218**	-	.509**
6. Externalizing Problems	7.27 (8.15)	4.10 (5.34)	.156*	.144	−.202**	.750**	.355**	-

Note. Correlations are presented for the Greece (below diagonal) and China (above diagonal), separately. $^{**}p < .01$, $^{*}p < .05$.

Data availability

The data that support the findings of this study are not publicly available as they contain information that could compromise research participant privacy and consent. The data analyzed during the current study are available from the corresponding author upon reasonable request.

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