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Teacher–child interaction quality and children's self-regulation in toddler classrooms in Finland and Portugal

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Abstract

This study examines the association between teacher–child interaction quality and children's self-regulation in Finnish and Portuguese toddler classrooms. The participants included 230 Finnish (M = 29; SD = 3 months) and 283 Portuguese (M = 30, SD = 4 months) toddlers and their teachers (n = 43 Finland; n = 29 Portugal). The children's behavioural self-regulation (attention, working memory, and inhibition control) was individually tested, and the teachers evaluated the children's self-regulation skills in the classroom. The quality of the teacher–child interactions (i.e., emotional and behavioural support and engaged support for learning) was evaluated using the CLASS-Toddler observation instrument. The analyses were conducted with path models using a complex option. The results for Finland show that the engaged support for learning was positively associated with children's attention and inhibitory control, and emotional and behavioural support was positively associated with children's inhibitory control. For Portugal, engaged support for learning was positively associated with children's attention. The results aid in recognizing the

characteristics of teacher support that is beneficial to the development of children's self-regulation skills in two socio-cultural contexts, hence being of relevance for teacher in- and pre-service training.

1 | INTRODUCTION

By the third year of life, an increasing number of toddlers transition from home to early childhood education and care (ECEC) settings, marking significant growth in the children's interactions with peers and adults. Children's abilities to maintain attention, regulate and inhibit their behaviour, while also bearing in mind the teachers' instructions, are major developmental steps of self-regulation during toddlerhood and are crucial for successfully navigating the new social and cognitive demands of the classroom (Kärtner, Borke, Maasmeier, Keller, & Kleis, 2011; McClelland & Cameron, 2012). These skills can best be practiced with support from ECEC teachers (Murray, Rosanbalm, Christopoulos, & Meyer, 2019; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009).

A body of research has shown that supportive teacher–child interactions, as assessed by the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008; La Paro, Hamre, & Pianta, 2012), have a significant role in shaping the development of children's pre-academic learning and social competence (e.g., Broekhuizen, Van Aken, Dubas, Mulder, & Leseman, 2015; Rimm-Kaufman et al., 2009) and that the quality of interactions can have long-lasting effects (Ulferts, Wolf, & Anders, 2019; Vandell et al., 2010). Prior studies with children above 3 years of age have further shown varying associations between a higher quality of teacher–child interactions and children's self-regulation skills (e.g., Cadima et al., 2016). However, studies have largely overlooked the associations between the interaction quality and self-regulation skills among children under the age of 3 (as an exception, see Broekhuizen et al., 2015). Consequently, both a theoretical and empirical understanding of how teacher–child interaction quality, can benefit children's self-regulation skill development, is largely influenced by information derived from older children and their teachers. The current study aims to respond to this need by exploring how the quality of teacher–child interactions is related to the development of behavioural self-regulation of very young children in ECEC classrooms.

Another limitation in the field is that even though the number of studies explicating the importance of teacher–child interactions on children's self-regulation skills is rapidly growing across countries (especially for older children), these studies continue to be conducted in single country contexts, such as in the United States (Rimm-Kaufman et al., 2009), Portugal (Cadima et al., 2016), Canada (Duval, Bouchard, Pagé, & Hamel, 2016), and Turkey (Yildiz, Kara, Tanribuyurdu, & Gönen, 2014), to name a few. These studies have systematically shown that the differing patterns of teacher–child interaction quality contribute to the association with self-regulation. However, these studies have only touched on the aspect of how the larger sociocultural context (Bronfenbrenner & Morris, 2006) in the form of different cultural norms and values, surrounding child development and learning, may influence the way ECEC teachers respond to and engage with children in the classroom and support the development of children's self-regulation skills (e.g., McClelland, Ponitz, Messersmith, & Tominey, 2010; Schirmbeck, Rao, & Maehler, 2020; von Suchodoletz, Lee, Premachandra, & Yoshikawa, 2017; Wang, Devine, Wong, & Hughes, 2016). The current study aims to increase the understanding of the role that the sociocultural context may play for teacher–child interaction quality and the development of self-regulation skills in two diverse European countries: Finland and Portugal. The two countries represent different sociocultural contexts with unique cultural values (i.e., individual and collectivist, respectively) which, in light of prior studies, are likely to frame the emphases and expectations towards young children's development of self-regulation skills through interactions with teachers in ECEC (e.g., Kärtner et al., 2011;

Schirmbeck et al., 2020; Tommssdorff, 2019). Teacher–child interactions in Finnish and Portuguese ECEC are also framed differently, for example, through the support of national curriculum for ECEC (Sylva, Ereky-Stevens, & Aricescu, 2015).

1.1 | Self-regulation in early childhood

Self-regulation is a complex and multidimensional construct that refers to children's ability to deliberately plan and accommodate thoughts, emotions, and actions for particular settings or situations (McClelland & Cameron, 2012). Children's neuropsychological, cognitive, and behavioural processes develop and integrate rapidly over the first 5 years of life, supporting the child's gradual transition from "other-regulated" (e.g., by parents and teachers) to "self-regulated" (Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011). In the context of ECEC classrooms, toddlers learn to control their behaviour, pay attention, and complete tasks in situations that may activate their emotions (Bassett, Denham, Wyatt, & Warren-Khot, 2012; McClelland & Cameron, 2012; Rimm-Kaufman et al., 2009). Consequently, we follow the definition of behavioural self-regulation from a cognitive perspective, taking into consideration three particularly related components—attention, working memory, and inhibitory control—that are essential for children to successfully navigate these classroom demands and regulate their behaviour in the myriad of classroom interactions (Cadima et al., 2016; McClelland & Cameron, 2012). These components of behavioural self-regulation, both together and independently, are closely related to children's concurrent well-being, but also to their later adjustment to school, positive learning experiences, and success in social interactions (e.g., Blair & Razza, 2007; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003; Schmitt, Pratt, & McClelland, 2014). Attention, working memory, and inhibitory control are typically defined as the components of executive functioning, but for the components of behavioural self-regulation, the perspective is on how the integration of executive function skills aids children in completing multiple tasks in the classroom context (McClelland et al., 2007).

In the context of toddler classrooms, *attention* refers to a child's ability to select and attend to relevant information, such as paying attention to instructions and tasks at hand, switching or dividing focus, and ignoring distractions (e.g., Colombo, 2001; Ponitz, McClelland, Matthews, & Morrison, 2009; Rothbart & Posner, 2005; Rueda, Posner, & Rothbart, 2004). Attentional functions start to develop in toddlerhood and rapidly allow children to increase the length of time spent focused and to deal with more complex tasks during the preschool and middle childhood periods (Diamond, 2002; Garon, Bryson, & Smith, 2008; see also Colombo, 2001).

Working memory refers to a child's ability to hold information in memory long enough to successfully complete a task, for instance, remembering simple instructions and then performing accordingly (Adams, Bourke, & Willis, 1999). For a toddler, this may emerge in completing a task with two parts (e.g., "take your paintbrush to the sink and wash your hands") or remembering simple rules in a game or in play. The basic components of working memory start to develop across the child's first year of life, while more complex working memory abilities, such as updating or manipulating representations develop during toddlerhood and throughout the preschool period (Alloway, Gathercole, Willis, & Adams, 2004; Gathercole, 1998; Pelphrey & Reznick, 2002).

Finally, *inhibitory control* denotes a toddler's ability to stop a dominant response and demonstrate more adaptive and socially acceptable behaviour (Diamond, Kirkham, & Amso, 2002; Rennie, Bull, & Diamond, 2004), for instance, by waiting for one's turn or cleaning up toys before playing somewhere else. Therefore, inhibition control skills have a special developmental role in the successful execution of tasks by providing the child with the flexibility and freedom to choose and control his/her actions (Dowsett & Livesey, 2000). Inhibition control skills develop rapidly between the ages of 22 and 33 months (Carlson, 2005; Kochanska, Murray, & Harlan, 2000), and the proportion of time children can wait for attractive rewards improves significantly between the ages of 30 and 42 months (Caughy, Mills, Owen, & Hurst, 2013).

Self-regulation skills are partially shaped by *internal factors*, such as child temperament (Heikamp, Tommsdorff, & Fäsche, 2013) and brain maturation. Therefore, it is likely that the individual differences in self-regulation are great

in toddlerhood. It is also known that these differences remain moderately stable into the preschool years (Carlson, Mandell, & Williams, 2004; Hughes & Ensor, 2007). Furthermore, because self-regulation skills rapidly develop across toddlerhood and the brain plasticity creates a sensitive period for external social support, the developmental process of behavioural self-regulation is likely to be impacted by *external factors*, such as the quality of teacher–child interactions in ECEC (e.g., Fuhs, Wyant, & Day, 2011; Ursache, Blair, & Raver, 2012).

1.2 | Teacher–child interaction quality and its association with self-regulation skills

The value of high-quality teacher–child interaction for child development has been broadly emphasized (e.g., OECD, 2018; Slot, Bleses, Justice, Markussen-Brown, & Højen, 2018; see also Seidel & Shavelson, 2007, for a review of effective teaching). ECEC teachers have an important role in fostering toddlers' development through supporting their engagement, cognition, and language (e.g., La Paro, Williamson, & Hatfield, 2014). Furthermore, guided by their intentions to influence children's development in line with prevailing cultural norms and values, ECEC teachers act as external regulators of the child's emotions and behaviours, gradually helping them to become self-regulated (e.g., Bernier, Carlson, & Whipple, 2010). In the present study, we conceptualize teacher–child interactions through the broad teaching through interactions framework (TTI; Hamre et al., 2013), which uses the Classroom Assessment Scoring System observation instrument (e.g., CLASS-Toddler; La Paro et al., 2012) to measure the quality of interactions; this instrument is built on a solid body of evidence from developmental theories and empirical studies. Within the CLASS-Toddler instrument, teacher–child interactions are divided across two broad domains: emotional and behavioural support and engaged support for learning. The first domain refers to the emotional tone of the classrooms, namely teachers' warm attunement, closeness, sensitivity, responsiveness, and ability to best take into account children's ideas and opinions and manage behaviour proactively. The second domain encompasses the extent to which teachers facilitate the learning process, provide chances for active exploration, give feedback, and engage with children in conversations that stimulate thinking and language skills (La Paro et al., 2012).

Several studies among kindergarten and school-age children have shown the associations between teacher–child interaction quality when assessed with the CLASS and a variety of child outcomes (Anderson & Phillips, 2017; Cadima et al., 2016; Leyva et al., 2015). However, studies on the impact of high-quality teacher–child interactions on children's self-regulation have only recently begun to emerge. The results for 4–5-year-olds in Portugal have shown that children experiencing higher-quality classroom interactions, which can be characterized by emotional warmth, constructive behaviour management, and cognitively rich stimulation, show more effective behavioural self-regulation, particularly improved compliance with rules (Cadima et al., 2016). The NICHD Study of Early Child Care (National Institute of Child Health and Human Development, and Early Child Care Research Network, 2002) showed that children in first-grade classrooms, where teachers are more supportive of child learning and development, had more positive interactions with their teachers as well as higher levels of attention and orientation towards tasks. In a study by Duval et al. (2016), the higher quality of emotional support provided in the kindergarten classroom was associated with children's better working memory and improved cognitive inhibition. Furthermore, higher-quality instructional support (characterized by cognitively stimulating and verbally rich support by the teacher) has been associated with better social competence and observed on-task behaviour among kindergarten-aged children (Pianta, La Paro, Payne, Cox, & Bradley, 2002).

For toddlers, the research findings on the association between teacher–child interaction quality and self-regulation are more scattered. In addition, there is only one study using the CLASS-Toddler (La Paro et al., 2012) to evaluate the observed classroom quality and its relations to toddler's self-regulation skills based on our current understanding. This one study, examining the association between teacher–child interaction quality and toddlers' self-regulation (Broekhuizen et al., 2015), showed the association between children's lower self-regulation skills (inhibition control) when there was low quality of emotional and behavioural support. Furthermore, studies using observational instruments other than CLASS have indicated that observed quality of teacher–child interactions plays a

role in the development of toddlers' self-regulation skills. For instance, a study using the Observational Record of the Caregiving Environment measure (ORCE; National Institute of Child Health and Human Development, and Early Child Care Research Network, 1996) to evaluate the teacher–child interaction quality showed that toddler settings characterized by teachers' sensitivity, positive regard towards children's exploration and development, positively predicted preschool children's executive functions, including attention and inhibitory control (Son & Chang, 2018).

Finally, in the context of parent–child interactions, studies have shown that a mother's autonomy support (e.g., intervening and adapting along child's needs, encouragement and the use of hints, taking the child's perspective and following the child's lead) facilitates the development of self-regulation skills (i.e., attention, inhibition control, and working memory) in toddlerhood (Bernier et al., 2010; Piotrowski, Lapierre, & Linebarger, 2013). These results speak for the significance of interactions between toddlers and parents and toddlers and significant others (e.g., teachers) for the development of self-regulation skills.

1.3 | Teacher–child interaction and self-regulation in the sociocultural context of Finland and Portugal

Based on prior studies, cultural norms and values may play a role in shaping the interactional experiences children share with their teachers, and by doing so, further impact the development of children's self-regulation (Schirmbeck et al., 2020; Tommssdorff, 2019). Prior studies using the CLASS measure among 6-year-olds in Finland (e.g., Pakarinen et al., 2010) and Portugal (Cadima, Leal, & Burchinal, 2010) have reported that the average domain scores are higher for Finnish classrooms than for Portuguese ones and that the variation in scores is larger in the Portuguese classrooms for each domain, implying that the children are exposed to somewhat different interactional experiences with their teachers in these two countries. Finland and Portugal represent two different sociocultural contexts, namely individual and collectivist, holding differing values towards upbringing and education, which are likely to frame the emphases and expectations towards young children's developing self-regulation skills through interactions in ECEC (e.g., Kärtner et al., 2011; Markus & Kitayama, 2010; Schirmbeck et al., 2020; Tommssdorff, 2019).

Finland can be seen as representing the Nordic individual (also referred to as independent or autonomous; see Markus & Kitayama, 2010) culture, where the goal of education and upbringing is characterized by supporting a child's individuality and autonomy in relation to socialization goals. Therefore, toddlers in Finland are more likely to be steered towards seeing the value and impact of their own actions and behaviours as keys to overcoming tasks and constructively collaborating with each other (see also Tommssdorff, 2019). Respectively, Portugal represents the Southern European collectivist (also interdependent or relational) culture (Cadima, Doumen, Verschueren, & Leal, 2015; Markus & Kitayama, 2010), where the goal of education and upbringing strives towards supporting the child's goals and beliefs in close concert with the relational socialization expectations of others. Therefore, toddlers in Portugal might be more likely to be encouraged to shape their actions and behaviours together with others (cf. co-regulation; Hadwin, Järvelä, & Miller, 2011), while the expectations towards individual regulation are not emphasized to the same extent.

Based on several cross-national studies (e.g., Heikamp et al., 2013; Kärtner et al., 2011), we assume that the impact of cultural norms and values is particularly likely to be filtered through the interactional experiences children have with teachers in ECEC. Teachers can be considered as socialization agents, whose behaviours are guided by "their intentions to influence children's emotional, social and cognitive development in line with prevailing cultural norms and values" (Heikamp et al., 2013, p. 194), hence also shaping the development of self-regulation skills. Beyond this, we acknowledge that cultural values steer and inform national curriculum (e.g., Vlasov et al., 2019; Wang & Mao, 1996), making it likely that cultural values are indirectly filtered through the curriculum informed pedagogical approaches in educational settings. Through this effect of teaching and instruction on child learning and development (e.g., Seidel & Shavelson, 2007), cultural values further contribute to the expectations of children's self-regulation. Conducting cross-cultural studies can help in further understanding the role that cultural and contextual specificities play in shaping teacher–child interactions and children's self-regulation skills.

1.4 | The current study

The present study aimed to broaden the current understanding of the importance of teacher–child interaction quality on toddlers' self-regulation development in two socioculturally different countries—Finland and Portugal—by asking the following question: To what extent is the quality of teacher–child interactions associated with children's self-regulation skills? Along with prior studies, which have been conducted mainly with children above the age of 3, we expect to find associations between a higher quality of observed teacher–child interactions and behavioural self-regulation (e.g., Cadima et al., 2016). More specifically, we expect that a higher quality of engaged support for learning (also referred to as instructional support) is associated with children's attention skills (e.g., National Institute of Child Health and Human Development, and Early Child Care Research Network, 2002) and that a higher quality of emotional and behavioural support is associated with both working memory and inhibition control (e.g., Broekhuizen et al., 2015). Furthermore, in light of evidence from studies conducted in cross-national contexts, we anticipate that the sociocultural context (in terms of values) might impact the results between teacher–child interaction quality and self-regulation skills (e.g., Cadima et al., 2016; Duval et al., 2016), making country-specific patterns of associations emerge.

2 | METHODS

2.1 | Participants

The participants were 242 Finnish and 268 Portuguese children and their teachers (N = 43 Finland; N = 29 Portugal, respectively). Both samples were part of a broader research project, Quality Matters (2017–2019), designed to examine the relationships among activity settings, teacher–child interactions, peer interactions, and self-regulation development during toddlerhood across four European countries. Informed consent with detailed information about the project was obtained from the centres' directors, teachers, and parents prior to data collection. Meetings and information briefs were exchanged with teachers and school directors about the project goals and methods. For descriptive statistics regarding the children, teachers, and classrooms for both countries, see Table 1.

In Finland, on average, the participating children were 28.7 months of age (SD = 3.5) at the first data collection wave (T1) and were enrolled in 43 toddler classrooms distributed across 36 public centres. The day care centres were recruited from one medium-sized city, from a public (non-profit) municipal sector, as part of a shared development project between the city and university. The number of participating children per classroom varied between 1 and 11 (M = 6 children per classroom). Regarding the mothers' education levels, 33.3% attended high school or less, and 66.7% had a vocational or higher education degree (n = 195). The participating Finnish teachers had an average teaching experience of 18 years (SD = 9.4). Most groups had 0–3-year-old children (77.5%), whereas in the remaining groups (22.5%), the age range was wider. Group sizes ranged from 8 to 45, with an average of 17 children enrolled per classroom (SD = 7). With classroom sizes up to 45 children, the large groups were further separated into two (or more) smaller functional groups, for example, two groups of 17 children with three adults. Daily practices took place in these groups, and each had their own space in the settings, making them independent groups for most of the day (e.g., Salminen, 2017).

In Portugal, on average, the participating children were 29.6 months of age (SD = 4.2) at the first data collection wave (T1) and were enrolled in 29 toddler classrooms distributed across 22 centres, including private non-profit and private for-profit. To have geographic variability, both urban and rural areas were selected. To be included in the study, the Portuguese centres had to be aligned with national guidelines regarding structural characteristics (e.g., group size and teacher qualifications) and had to be considered of a high quality per expert judgement. Here, the experts were professors involved in ECEC teachers' training programmes and researchers working closely with ECEC centres. Selection was based on the centre's educational approaches and innovating practice, as well as on

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TABLE 1 Descriptive statistics for child, teacher, and classroom demographics and CLASS-Toddler domains for Finland and Portugal

Variables	Finland					Portugal				
	N	%	M	SD	Range	N	%	M	SD	Range
Child characteristics										
Male	128	52.9				139	51.9			
Age (months)	242		28.67	3.46	23–34	268		29.63	4.18	16–47
Teacher characteristics										
Female	42	97.7				29	100			
Age (years)	40		45.93	9.62	23–60	26		38.31	7.64	24–54
Experience (years)	39		17.54	9.40	4–36	21		12.62	5.92	2–24
Intermediate vocational	5	12.5				0	0			
Bachelors' degree in ECE	34	85				18	66.7			
Masters' degree in ECE	1	2.5				9	33.3			
Classroom characteristics										
Group size	40		16.90	7	8–45	28		16.04	3	8–22
Adults	40		3.45	1.41	2–9	28		2.14	0.65	1–4
CLASS-toddler										
Emotional and Behavioural support	42		5.58	.43	4.56–6.25	29		4.53	.97	2.06–6.06
Engaged support for learning	42		3.35	.48	2.33–4.25	29		3.17	.84	1.33–5.08

previous collaboration between the ECEC centre and universities or teacher training centres. In each centre, the participating classrooms served 2-year-old children. The number of participating children per classroom varied between 7 and 10 (M = 9 children per classroom). Regarding the mothers' education levels, 23.3% had attended high school or less, and 76.7% had a higher education degree (n = 227). The participating teachers were the classroom lead teachers, who had an average of 12.6 years (SD = 5.9) of teaching experience. The classrooms' age group was for 2-year-olds, although all classrooms included slightly younger (1-year-olds) and older children (3-year-olds), depending on the child's birthdate. Group sizes ranged from 8 to 22, with an average of 16 children enrolled per classroom (SD = 3).

There are substantial differences between the two countries in terms of how the ECEC is organized and how the national curriculum surrounds the teacher–child interactions with the youngest in ECEC. The Finnish ECEC model is the Nordic model of the universal provision of ECEC (see, for example, Salminen, 2017). ECEC forms the first stage of the educational system, and it is under the auspice of the Ministry of Education and Culture. Currently, around 33% of children under 3 years old attend ECEC in Finland (European Commission/EACEA/Eurydice, 2019). At least one in every three staff members in each day care centre must have a bachelor's degree in education (from a university) or a bachelor's degree in social sciences (from a university of applied sciences) and other staff members, (e.g., practical nurses) must at least have a vocational upper secondary qualification in the field of social welfare and health care. Qualification requirements apply equally to younger and older children's classrooms. The binding National Core Curriculum for ECEC (Finnish National Agency for Education, 2018) steers the implementation and equal provision of ECEC (0–5) across the nation by transmitting the core goals of ECEC legislation; through this, common values are attached to the upbringing and education of young children in society. In terms of self-regulation, the curriculum highlights the importance of interaction for child development, supporting the child's ability to find constructive ways to collaborate within a close environment and in wider society, supporting the children in learning to become self-regulated both in terms of their emotion and behaviour (Finnish National Agency for Education, 2018). Teacher–child interaction is recognized as one of the key competences of ECEC professionals (e.g., Repo et al., 2020) through which they are working to meet the developmental needs of all children.

Portugal has a split system in which crèches are provided for children starting from 4 months to 3 years of age, and preschool is provided for children from 3 to 6 years of age. Currently, around 48% of children under 3 years old attend ECEC in Portugal (European Commission/EACEA/Eurydice, 2019). Crèches are under the auspice of the Ministry of Labor and Social Security and can be either private for-profit or non-profit, while preschools are under the auspice of the Ministry of Education and can be either public or private. For crèches, there are national guidelines about their structural characteristics, such as group size and teacher training. Specifically, for children over 1 year of age, teachers must have at least a bachelor's—and more recently, a master's—degree and should be aided by at least one auxiliary staff worker whose minimum qualification level is not regulated. Currently, steering documents to guide teachers' pedagogical practices are available for preschool teachers (Ministry of Education, 1997), but there are no specific pedagogical guidelines for crèches. The Ministry of Labor and Social Security issued a practical guide for crèches that aim to promote quality in education for children under 3 years of age (Instituto de Segurança Social, 2011). This document addresses several administrative, managerial, safety, and health processes, along with some suggestions for evaluating and monitoring children's development and ECEC centres' quality. Nonetheless, currently, neither the national guidelines for preschool nor this practical guide for crèches explicitly address support for self-regulation.

2.2 | Procedures

In both countries, each toddler classroom was visited on two different mornings in the middle of the school year (between January and May in Portugal and February and May in Finland). During these visits, one observer videotaped four activities (15–20 minutes of recording each) that typically occur in a toddler classroom: free play,

emerging academic activities, aesthetics/arts activities, and a meal. These four activities are commonly used by teachers worldwide to organize toddlers' daily routines in ECEC settings (e.g., Slot, Cadima, Salminen, Pastori, & Lerkkanen, 2016). The teachers were asked to stay as close to the classroom's daily routines as possible, and visits were scheduled to capture a regular day, with no special events taking place. In Finland, when the observed activity did not fit in the initially planned category, two research team members discussed and reached a consensus on the activity type, per the description above. In Portugal, the research team double-checked with the teachers if the observed activity actually corresponded to the previously assigned category. On average, the videos were 17 minutes long for both countries.

Individual assessments and teacher evaluations of children's self-regulation skills were completed in the fall (T1) and spring (T2) in both countries, about 6 months apart. Assessments were conducted during a regular day by trained research team members in a quiet room located at the ECEC centre. Each assessment lasted for approximately 25 minutes for both country samples. Before data collection, the assessment protocol was piloted with two children both in Portugal and in Finland. In both countries, two team members exchanged questions and concerns after conducting these first evaluations, and based on their experiences and decisions, they drafted and updated a practical guide to lead data collection. The practical guide included detailed instructions and procedural rules for administering measures during data collection, along with specific tips, a list of the required materials, and a response sheet. With the support of these two team members and the practical guide, two additional team members were trained to further aid with data collection in Portugal and three team members (research assistants) in Finland. Throughout data collection, unexpected or peculiar cases in individual assessments were discussed in national team meetings when needed. This procedure was further applied between Portuguese and Finnish team members to ensure the reliability of the data gathering, and coding across the two countries.

2.3 | Measures

Teacher–child interaction quality: The CLASS-Toddler (La Paro et al., 2012) instrument was used to measure the quality of teacher–child interactions. The CLASS-Toddler is an observational tool designed to analyse the interactions between teachers and children aged 15–36 months old. Eight dimensions related to two broad domains— namely emotional and behavioural support and engaged support for learning—comprise this tool. Emotional and behavioural support encompasses the dimensions of positive climate, negative climate, teacher sensitivity, regard for child perspectives, and behaviour guidance. The second domain, engaged support for learning, comprises the dimensions of facilitation of learning and development, quality of feedback, and language modelling (La Paro et al., 2012). Each dimension is scored on a seven-point scale across 20-minute observation cycles and is based on behavioural markers provided in the manual (scores of 1 and 2 are considered as reflecting a low quality, scores of 3–5 are considered mid-range, and scores of 6 and 7 are considered as reflecting a high quality).

Previous studies have demonstrated the structural validity of the CLASS-Toddler (Bandel, Aikens, Vogel, Booler, & Murphy, 2014; La Paro et al., 2012; Thomason & La Paro, 2009). In line with previous research, the results from the confirmatory factor analyses showed that the two-factor model (emotional and behavioural support and engaged support for learning) fitted the data well in both Finland and Portugal but only after excluding the negative climate dimension, $\chi^2(13) = 9.132$, $p = .763$, CFI = 1.00, TLI = 1.04, RMSEA = .00 and $\chi^2(13) = 19.607$, $p = .106$, CFI = .987, TLI = .981, RMSEA = .084, respectively. Measurement invariance analyses further showed that metric invariance could be established but not scalar invariance, preventing a comparison of the mean levels across countries (see Cadima et al., 2021 for further details). The Cronbach's alphas for emotional and behavioural support were .86 and .95 in Finland and Portugal, respectively, and for engaged support for learning were .87 and .92, respectively, suggesting very good internal consistencies.

Two trained observers coded the CLASS-Toddler for both countries. Prior to coding, all observers took a 2-day CLASS-Toddler training session with a certified trainer. At the end of the training, for reliability purposes, each

observer coded five master-coded videos and passed the reliability test within 1 scale point of at least 80% of the master codes. In addition, a subset of the video-recorded cycles was double coded to ensure reliability within country and across countries. In Finland, the inter-rater agreement within 1 scale point was 98% on average, ranging from 94% (regard for child perspectives; 97% teacher sensitivity and quality of feedback) to 100% (remaining CLASS-Toddler dimensions). Intra-class correlations averaged .85, ranging from .81 (teacher sensitivity) to .93 (facilitation of learning and development), suggesting very good consistency across observers. In Portugal, the inter-rater agreement between observers within 1 scale point was 96% on average, ranging from 89% (regard for child perspectives, behaviour guidance and quality of feedback) to 100% (remaining CLASS-Toddler dimensions). Intra-class correlations averaged .66, ranging from .43 (positive climate) to .85 (language modelling), which suggests good consistency across the observers. Intra-class correlations for cross-country coders averaged .84, ranging from .73 (teacher sensitivity) to .93 (quality of feedback).

Direct assessment of self-regulation: To assess children's behavioural self-regulation, measures for selective attention, working memory, and inhibitory control were used.

Selective attention: To assess children's selective attention, we used the visual attention subtest of the Developmental Neuropsychological Assessment (NEPSY; Korkman, Kirk, & Kemp, 1998); this test assesses the speed and accuracy of visual attention. The child is asked to scan a linear array of black and white pictures (an A3 sheet of paper) and mark the target pictures as quickly and accurately as possible. Here, the targets were bunnies in the first trial and cats in the second trial, and the child's task was to find them from an array of differing pictures and then mark the target picture with a stamping pen. There was a time limit of 3 minutes for both trials (bunnies and cats). The number of correct items, incorrect items, and time elapsed was recorded separately for both trials. To calculate the standardized scores, the sum of the incorrect responses for both trials was subtracted from the sum of correct responses for both trials, and this score was divided by the total time used in both trials. The standardized scores were then determined with the normative, age-specified tables provided in the NEPSY manual (Korkman et al., 1998). The task has been used in prior research and has shown good psychometric properties (Korkman, 1999; Visu-Petra, Cheie, Benga, & Miclea, 2012).

Working memory: To measure the children's working memory, we used the hidden toys task (Mulder, Hoofs, Verhagen, van der Veen, & Leseman, 2014). For this task, the researcher hides six small toys inside six identical boxes displayed in two rows on a table in front of a child. The child is then asked to find all the toys. Each time the child finds a toy, that toy is retrieved, and the box is left empty. The child is then distracted for 6 seconds (by blocking the visual field) before the next trial and is asked to discover the toys remaining inside the boxes. In this task, the child must realize which boxes have already been emptied and which boxes still contain a toy, in addition to holding this information in memory over the delay. The test includes a practice trial with two boxes, which is followed by six test items. The task has been used with toddlers in prior research, showing good reliability (Mulder et al., 2014).

Inhibitory control: To tap into the children's inhibitory control skills, we used the toy wrap task from the Preschool Self-Regulation Assessment (PSRA; Smith-Donald, Raver, Hayes, & Richardson, 2007). For this task, the researcher starts by telling the child that he/she has something nice to play with, but it is a surprise that still needs to be wrapped; the researcher asks the child to look away and not to peek while the gift is being noisily wrapped behind the child's back. The researcher then records the child latency to peek, that is, how much time the child waits until he/she first peeks while the gift is being wrapped. In case the child does not peak, a score of 60 seconds is recorded. Although this task has most typically been used with children above 3 years of age (see, for example, Cadima et al., 2016), showing good psychometric properties, research indicates its validity already among a sample of 2.5-year-old children (Caughy et al., 2013).

2.4 | Teacher-reported self-regulation

Classroom behavioural self-regulation: In addition to direct child measures of self-regulation, the teachers used the subscale Classroom Behaviour Regulation from the Child Behaviour Rating Scale (CBRS; Bronson, Goodson, Layzer, &

Love, 1990) to assess children's classroom behavioural self-regulation. Classroom behavioural self-regulation assesses children's classroom goal-oriented/mastery behaviours and the strategies used to regulate behaviour in academic and social situations (Bronson, 1994; Lim, Rodger, & Brown, 2009; McClelland & Morrison, 2003). The subscale comprises 10 items rated on a scale from 1 (never) to 5 (always). For the current study, an average score of 10 items (e.g., "Observes rules and follows directions without requiring repeated reminders") was used to indicate children's classroom behavioural self-regulation (α = .90 for Finland and .95 for Portugal). For every item, the answers ranged from 1 to 5, except for item 7, to which the answers ranged from 2 to 5 in both countries, indicating a use of the full scale in evaluating toddlers' behaviours. To the best of our knowledge, the psychometric properties of the CBRS have not been examined yet for toddlers, so an exploratory factor analysis (EFA) with an orthogonal rotation was conducted. All loadings were equal or greater than .47, explaining a total of 48% of data variance in Finland and 63% of data variance in Portugal. The skewness and kurtosis were adequate (see Table 2).

Covariates: Aligned with prior evidence (OECD, 2018; Slot, Boom, Verhagen, & Leseman, 2017), to better understand the effects of interactional quality on self-regulation skills, a set of covariates was used in the models. A child-to-teacher ratio variable was calculated by dividing the number of children per the number of teachers, the numbers of which were registered during the CLASS assessment. Teachers' working experience in ECEC and their initial training were derived from the teachers' questionnaires on socio-demographic information.

2.5 | Data analysis

In the current study, we estimated a series of path models to determine the effects of teacher–child interaction quality on children's self-regulation skills, controlling for the children's age, sex, and previous skill. The effects of teachers' working experience in ECEC, teachers' initial training, and child-to-teacher ratio were added in the models to control for their effects on interactional quality and self-regulation. The models were computed for each country separately to let country-specific patterns emerge. The complex option in Mplus was used for all models to address nesting and the non-independence of observations (Muthén & Muthén, 1998). This approach adjusts the standard error estimates for biases from the clustered design of the sample (Williams, 2000). A full information maximum likelihood was used to handle missing data, preventing reductions in sample size that could lead to a loss of statistical power (Enders & Bandalos, 2001).

3 | RESULTS

The means and standard deviations for the teacher–child interactions are presented in Table 1. In Portugal, the average for emotional and behavioural support was in the mid-range, while in Finland, the average for emotional and behavioural support was in the high range. In both countries, the engaged support for learning was in the middle–low range. Descriptive statistics of the children's self-regulation skills for both time points are presented in Table 2. Simple correlations between the study variables are presented in Table 3.

Table 4 shows the models predicting self-regulation skills for Finland and Portugal. The results for Finland suggest that the engaged support for learning domain was positively associated with children's selective attention, β = .14, SE = .05, p = .011, and inhibitory control, β = .15, SE = .06, p = .018. The emotional and behavioural support domain was positively associated with children's inhibitory control, β = .15, SE = .06, p = .015. No statistically significant effect emerged when the analysed outcome was working memory or behaviour regulation per the teachers' reports. Regarding the covariates, older children exhibited better selective attention and behaviour regulation per teacher reports. In the Finnish sample, boys appeared to exhibit the poorest selective attention and inhibitory control skills when individually assessed, as well as the poorest behaviour regulation, per the teachers' reports. Previous skill (i.e., selective attention, working memory, and inhibitory control at T1) was a positive predictor of all outcome

TABLE 2 Descriptive statistics for self-regulation skills at assessment time points 1 (T1) and 2 (T2), for Finland and Portugal

Variables	Finland						Portugal					
	N	M	SD	Range	Skewness	Kurtosis	N	M	SD	Range	Skewness	Kurtosis
Selective attention T1[a]	225	7.89	1.97	5–14	.90	.84	249	7.92	1.70	5–13	.54	.11
Working memory T1[a]	226	4.46	.91	3–6	.21	–.75	252	4.22	1.06	1–6	–.19	–.49
Inhibitory control T1[a]	225	25.19	23.05	1–60	.68	–1.32	249	13.71	17.24	0–60	1.81	2.20
Selective attention T2[a]	198	8.77	2.53	5–14	.31	–.88	249	9.64	2.04	5–14	–.04	–.48
Working memory T2[a]	196	4.46	.92	2–6	–.16	–.67	249	4.96	.82	3–6	–.36	–.52
Inhibitory control T2[a]	196	40.56	23.03	1–60	–.56	–1.43	245	25.02	22.0	0–60	.54	–1.25
Behaviour regulation T2[b]	171	3.42	.62	1.4–5	–.14	.30	175	3.52	.80	1.40–5	–.46	–.21

[a]Direct assessment.
[b]Teacher report.

TABLE 3 Simple correlations between study variables for Finland and Portugal

Finland

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Child age	1										
2. Child sex	.06	1									
3. Teacher experience	−.14*	−.10	1								
4. Teacher training	.09	−.16*	.11	1							
5. Child-to-teacher ratio	.14*	−.07	−.25***	.30***	1						
6. Selective attention T2	.26***	−.24**	−.12	.10	.05	1					
7. Working memory T2	.12	−.05	−.14	−.04	.08	.23**	1				
8. Inhibitory control T2	.24**	−.28***	−.11	.22**	.16*	.33***	.13	1			
9. Behaviour regulation T2	.19*	−.22*	.06	.08	.14	.34***	.24**	.36***	1		
10. Emotional and behavioural support	.11	−.07	−.16*	.45***	.17**	.11	−.03	.20**	−.07	1	
11. Engaged support for learning	.02	.00	−.27***	.30***	.00	.13	−.02	.15*	.01	.67***	1

Portugal

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Child age	1										
2. Child sex	.01	1									
3. Teacher experience	.06	.15*	1								
4. Teacher training	.05	−.16**	−.63***	1							
5. Child-to-teacher ratio	−.11	−.02	.39***	−.25***	1						
6. Selective attention T2	.39***	−.10	.01	−.02	.03	1					
7. Working memory T2	.18**	−.11	−.03	−.01	.04	.16**	1				
8. Inhibitory control T2	.32***	−.19*	.03	−.03	.05	.37***	.13	1			
9. Behaviour regulation T2	.36***	−.17*	.09	−.12	.07	.33***	.29***	.33***	1		
10. Emotional and behavioural support	.08	.09	.01	−.20**	−.28***	.06	−.09	−.03	.09	1	
11. Engaged support for learning	.05	.05	−.07	−.22**	−.35***	.11	−.04	−.02	.03	.90***	1

TABLE 4 Models predicting self-regulation skills for Finland and Portugal

Models	Finland								Portugal							
	Selective attention T2		Working memory T2		Inhibitory control T2		Behaviour regulation		Selective attention T2		Working memory T2		Inhibitory control T2		Behaviour regulation	
	β	(SE)	β	(SE)	β	(SE)	β	(SE)	β	(SE)	β	(SE)	β	(SE)	β	(SE)
Child-level variables																
Sex[a]	−.21**	(.08)	−.10	(.07)	−.16*	(.08)	−.18*	(.08)	−.04	(.07)	−.06	(.09)	−.20**	(.07)	−.15**	(.05)
Age	.28***	(.07)	.08	(.09)	.08	(.08)	.17*	(.08)	.37***	(.06)	.13	(.09)	.28***	(.07)	.30**	(.10)
Previous skill T1[b]	.20**	(.07)	.16*	(.08)	.32***	(.06)	.26***	(.07)	.28***	(.08)	.11	(.08)	.32***	(.07)	.07	(.09)
Teacher experience	−.09	(.07)	−.13	(.10)	−.06	(.06)	.15	(.10)	−.12	(.08)	−.10	(.07)	−.05	(.08)	−.03	(.26)
Teacher initial training	.00	(.06)	−.06	(.09)	.02	(.06)	−.09	(.12)	−.12	(.09)	−.09	(.07)	−.03	(.07)	−.15	(.19)
Child-to-teacher ratio	−.08	(.07)	.03	(.09)	.17**	(.06)	.17	(.10)	.10	(.07)	.02	(.05)	.04	(.07)	.15	(.13)
Classroom-level variables																
Emotional and behavioural support	.00	(.07)	−.05	(.09)	.15*	(.06)	−.06	(.12)	.08	(.06)	−.06	(.07)	−.08	(.06)	.10	(.13)
Engaged support for learning	.14*	(.05)	−.03	(.09)	.15*	(.06)	.10	(.14)	.19**	(.07)	−.00	(.06)	−.07	(.06)	−.06	(.10)

[a] 1 = girl; 2 = boy.

[b] Previous skill entered in the model was the same as the outcome skill for selective attention, working memory, and inhibitory control. When the outcome skill was behaviour self-regulation (teacher report), the previous skill used as covariate was inhibitory control.

variables. Teacher experience and initial training showed no statistically significant associations with any of the outcome variables. The child-to-teacher ratio was associated with children's inhibitory control, but no further associations emerged between the child-to-teacher ratio and selective attention, working memory, and behaviour regulation.

For Portugal, the engaged support for learning domain was positively associated with children's selective attention, β = .19, SE = .07, p = .008. There were no further associations between the two CLASS-Toddler domains and children's selective attention, working memory, inhibitory control (individually assessed), and behaviour regulation (per teacher's report). Regarding the covariates, older children performed better on directly assessed selective attention and inhibitory control and had better behaviour regulation. When directly assessed, boys showed the poorest inhibitory control skills and behaviour regulation. Previous skill (i.e., selective attention and inhibitory control at T1) was a positive predictor of selective attention and inhibitory control. The child-to-teacher ratio, teacher experience, and initial training showed no statistically significant associations with any of the outcome variables.

4 | DISCUSSION

Although toddlerhood has been acknowledged as a significant developmental period and studies on toddlers in an ECEC context have been growing in number (see Mortensen & Barnett, 2015), teacher–child interaction quality and its associations with a toddler's development remains a surprisingly understudied area. The current study has explored the association between teacher–child interaction quality and toddlers' self-regulation skills in two socioculturally different countries: Finland and Portugal. The results revealed unique country-specific associations between teacher–child interaction quality and children's self-regulation skills. In Finland, the quality of emotional and behavioural support was associated with more effective inhibitory control, and engaged support for learning was associated with better attention and inhibitory control. In Portugal, engaged support for learning was related to toddlers' better attention.

4.1 | Teacher–child interaction quality in Finland and Portugal

The average quality of teacher–child interactions—as assessed by the CLASS-Toddler—was higher in Finnish toddler classrooms, especially in the domain of emotional and behavioural support. There was also a larger variation in the scores provided for Portuguese classrooms for both CLASS domains than those in Finland, suggesting that the overall quality of teacher–child interactions was more evenly distributed in the Finnish than Portuguese sample. This finding is well in line with the findings from prior national studies in Finland and Portugal using the CLASS Pre-K among 6-year-olds (Cadima et al., 2010; Pakarinen et al., 2010), further strengthening our argument that the sociocultural context may play a part in shaping the teacher–child interaction quality in these two countries because similar country-specific patterns are found across different age groups (e.g., Schirmbeck et al., 2020). It is possible that the stronger curricular emphasis being placed on teacher–child interactions, which here is performed by approaching content with children's perspectives and providing clear behavioural expectations, may have an impact on safeguarding the quality across classrooms in Finland. Moreover, because the teachers in the Portuguese sample were more highly qualified than their Finnish counterparts, the role of cultural values and curriculum in steering teacher–child interactions may be warranted in explaining the differences between countries.

4.2 | Teacher–child interaction quality and toddler self-regulation skills in Finland

First, the results indicate that toddler's attention and inhibitory control can be bolstered through high-quality engaged support for learning in Finnish toddler classrooms. For a child, being attentive means being able to select

the relevant information in the classroom, for example, following an instruction by the teacher and focusing on this. With young toddlers, sustaining attention might be intertwined with inhibition control because maintaining attention also requires that children can inhibit their responses to irrelevant events, for example, not letting the misbehaviour of a peer distract them (e.g., Rothbart & Posner, 2005). Part of toddler pedagogy in Finnish ECEC comprises teachers being present and able to intentionally facilitate activities with toddlers (e.g., Pursi & Lipponen, 2018), hereby engaging children in meaningful, interesting, and stimulating activities through different modalities. Teachers' active facilitation can support children's attentional focus and inhibitory control through engagement because it helps them become absorbed in the activity (see McClelland et al., 2010). Teachers high on engaged support for learning also provide effective, specific feedback and use language prompts that promote learning and understanding. This means that teachers are situationally able to express support for a child's self-regulated behaviours by providing timely, accurate, and clear feedback, as well as by using clear and guiding language (e.g., Downer, Sabol, & Hamre, 2010; McClelland et al., 2010). The common pedagogical way of dividing children into small groups to play and attend to teacher-led activities in Finnish ECEC classrooms provides an optimal way for teachers to be cautious regarding children's signals and in giving feedback and verbally guiding children towards appropriate behaviours, as the changing situations call for self-regulated actions.

Second, in the Finnish sample, we found a positive association between teachers' emotional and behavioural support and children's inhibition control; this finding is partially in line with prior studies using the CLASS Pre-K measure, which have reported an association between classroom management and children's improved self-control (Rimm-Kaufman et al., 2009). Our results also indicate that well-organized classroom environments and teachers' use of clear, proactive strategies in supporting behaviour create instructional predictability within the classroom that further enables the child to gain a sense of control and exhibit appropriate behaviour while inhibiting the more inappropriate behaviours; this finding might relate to the tendency to emphasize children's constructive ways to be in the group (inhibited behaviour and consideration towards others) along with autonomy supporting self-help strategies (e.g., cleaning up toys, indicating a need to use a bathroom) in Finnish ECEC, which are supported and encouraged through predictable routines and by respecting children's developmental potential as part of daily practices (Finnish National Agency for Education, 2018).

Children's ability to show better inhibition control in classrooms, where they experience higher emotional and behavioural support, also relates to the teachers' sensitivity and responsiveness towards children's needs and developing skills. Children's feelings of frustration can be reduced by establishing a safe and welcoming climate, showing interest in supporting toddlers' autonomy, understanding their way of seeing the world, and supporting their willingness to attend to instruction in a personally meaningful way (Hamre & Pianta, 2005; Ladd, Birch, & Buhs, 1999); these practices may further indicate to children that their own actions and decisions matter, hence sending out stronger signals of how to perform in an acceptable way. This finding may partially be explained by the sociocultural norms and values elaborated in the central goals of the Finnish ECEC (Finnish National Agency for Education, 2018), such as emphasizing teachers' active, responsive, and sensitive approaches towards children, along with embracing children's autonomy and seeing children as active agents. These goals broadly reflect the culturally shared value of steering the children as individuals towards socially acceptable goals in Finland (see also Markus & Kitayama, 2010), speaking in favour of the impact of the sociocultural context within child development.

Unexpectedly, there was no statistically significant association between teacher–child interaction quality and working memory in the Finnish dataset. Prior studies have also reported somewhat inconsistent findings regarding teacher–child interaction quality and working memory. For instance, Duval et al. (2016) reported a negative association between instructional support and children's working memory at the age of 5, but in their study, gross family income (as a proxy of socio-economic status [SES]) reduced the association between the quality of instructional support and working memory. The unexpected finding in the current study might relate to the fact that unlike for other child measures, there was no growth in children's working memory during the 6 months from measurement point T1 to T2, which might confound the results. It is likely that the development of children's working memory follows highly individual traits in toddlerhood, and the high intra-individual variance in skills may have confounded the final

score with this group of young children. For instance, Mulder, Verhagen, Van der Ven, Slot, and Leseman (2017) suggested that in early childhood, it is likely that the sub-components of self-regulation skills (herein attention, working memory, and inhibitory control) are not yet fully differentiated from each other. In light of the results from the current study, this might be the case for working memory, underlining the need to study working memory in young children in more depth (e.g., Garon et al., 2008).

4.3 | Teacher–child interaction quality and self-regulation in Portugal

Contrary to our expectations—and unlike in Finland—we found limited evidence of associations between teacher–child interaction quality and children's self-regulation in Portugal. One possible reason for this may be that high-quality interactions need to be combined with clear and intentional curriculum guidelines to have a positive influence on the development of self-regulation, as in Finland. The importance of an explicit curriculum designed to improve self-regulation and, through this, child outcomes has been emphasized elsewhere (Blair & Diamond, 2008; Burchinal, 2018). It is important to note that in Portugal, there are no curriculum guidelines for children under the age of 3. This calls for a need for further inspection and building research designs that take into account the extent to which teachers are implementing curriculum goals in their daily practice. It is also possible that the levels of emotional and behavioural support in Portugal did not reach a minimal level for toddlers to make substantial gains in self-regulation. Prior studies have found certain threshold effects, above which the association between ECEC quality and child outcomes was stronger (Burchinal, Vandergrift, Pianta, & Mashburn, 2010). Specifically, the findings from these studies taking advantage of the threshold approach have shown that the quality of teacher–child interactions was a stronger predictor of language, literacy, and math skills in higher-quality classrooms than in lower-quality classrooms, suggesting the need to ensure a minimum level of quality when it comes to teacher–child interactions to detect associations between ECEC quality and child outcomes. Thus, it is possible that the higher mean levels of quality in Portuguese classrooms were needed so that the teacher–child interaction quality was associated with improved child outcomes. The child-to-teacher ratio was also negatively related to the levels of interaction quality in Portuguese classrooms. Although speculative, it could be that the effects of quality would be stronger in classrooms with more favourable ratios because the teachers could more easily work in small groups and attend to children's cues and needs.

In addition, and as stated previously, children are likely to adopt social norms and perceived expectations, which, in turn, are influenced by sociocultural values (Chen, 2020; Tommssdorff, 2019). Accordingly, it is possible that Portuguese cultural values do not put such a strong emphasis on an individual's autonomy as the Finnish culture does. In particular, in the face of challenging situations, such as the demand to share toys and wait for one's turn in a game, toddlers may rely more on the teacher's assistance to solve these issues. It may be that Portuguese teachers expect toddlers to ask for help rather than having the teachers actively support the toddlers in solving their own issues. Although caution is needed when looking at cross-country differences in the latency of peeking, it is important to acknowledge the mean differences between the Portuguese and Finnish children, which suggest that Portuguese children struggle more than Finnish toddlers to suppress their reactions to challenging situations. According to Tommssdorff (2019), in collectivist societies, more than prioritizing autonomy, the underlying motivation for self-regulation can be relatedness, sense of belonging, and assurance. Although more research is needed, the lack of any effects of emotional and behavioural support on inhibitory control may be related to the underlying values and cultural expectations that give priority to dependency and relatedness rather than independence or autonomy.

Nevertheless, for selective attention, our findings suggest a positive association between engaged support for learning and improved levels of attention, which is similar to Finland. It seems that beyond cultural values and norms, teachers' active involvement, combined with clear feedback and thought-provoking interactions, helps children develop more effective attention, which is in line with prior findings for older children, including in Portugal (e.g., Cadima et al., 2016).

As was the case for Finland, it should be noted that contrary to the other self-regulation skills, the association between working memory as measured at the data collection points (T1 and T2) was very low and not statistically significant in the Portuguese sample. Looking at inconsistent patterns of results between teacher–child interaction quality and working memory across the countries, this calls for more research to measure working memory with more than one measure to more reliably capture the children's intra-individual differences.

Finally, teacher–child interaction quality did not yield significant associations with teacher-reported behaviour regulation either in Finland or Portugal. It is possible that the rater effect may be partially responsible for this lack of associations. Direct measures seem to capture the child's developmental stage more reliably when it comes to behaviour regulation, which has been noted elsewhere (von Suchodoletz, Uka, & Larsen, 2015).

4.4 | Limitations and future research

The present study has some limitations. First, the sample size was relatively small for both participating countries, which may have affected the power of the results, especially in Portugal. With a larger sample, the current results could have been strengthened; for instance, exploration of the development of self-regulation skills towards individual CLASS dimensions would have been possible. Second, data were gathered from one municipality in Finland, making us cautious when it comes to generalizing the results. Likely, the results from Portugal may not be representative of Portuguese toddlers and toddler classrooms given the specificity in the sample characteristics, namely in the selection criteria. Third, the observations of teacher–child interaction quality were conducted during preselected types of activities, which may have influenced the representativeness of the classroom observations. Despite this selectivity, there were several cycles observed per classroom that can add to the reliability and generalizability of the teacher–child interaction quality within the observed classrooms and coverage of different types of activities, also showcased in prior studies (e.g., Slot et al., 2016). Fourth, studies have suggested that using a broader variety of tasks to grasp the different—yet intertwined and rapidly developing—components of self-regulation should be more broadly used in studies with young children (e.g., Garon et al., 2008). Within the current study, we had one measure of attention, inhibition control, and working memory each. A broader set of measures could have provided a more nuanced understanding of the underlying characteristics of self-regulation, particularly in children under 3 years of age. Also, using all measures of self-regulation as one latent factor has been suggested (e.g., Mulder et al., 2017). However, the measures used in the current study are widely used and have shown promising results elsewhere (e.g., Caughy et al., 2013; Mulder et al., 2014).

In the future, more research is needed to explore the association between teacher–child interaction quality and the development of self-regulation skills across time points in early childhood education through entrance to primary school, along with the associations that teacher–child interaction and early self-regulation skills have on the development of emerging academic and social skills starting in toddlerhood (see Broekhuizen et al., 2015). Because studies with older children have shown that interactional experiences with teachers mediate the links between self-regulation and academic competence (e.g., Eisenberg, Valiente, & Eggum, 2010), exploring a longitudinal dataset would enable teasing apart the nuances of teacher–child interactions that are most relevant to supporting child development, already in toddlerhood. In the future, it would also be relevant to look at the association between teacher–child interaction quality and the development of self-regulation skills combined with an understanding of the role that parenting practices play in this developmental process. Furthermore, the present study has shown that the sociocultural context should be taken into consideration more carefully in future studies. One way to do this would be by directly assessing teachers' cultural beliefs regarding child development and the role that cultural context play in their teaching. This would help in understanding whether teachers hold and transmit the dominant culture of each country. By doing so, it would be possible to tease apart the specific characteristics in the given culture that either directly or through mediated effects constitute toddlers' interactional experiences and that can be further conveyed to their self-regulation.

4.5 | Implications and conclusion

The current study showed that teacher–child interactions in ECEC settings have an important impact on the development of children's self-regulation skills before the age of 3. In light of the current findings, paying attention to teachers' sensitive and responsive ways of acknowledging children, along with their constructive and proactive group management skills, may reduce the behaviour and concentration problems related to children's inhibitory control in the Finnish context. Toddlers also seem to benefit from a teacher's rich language input, specific and timely feedback, and active facilitation that sparks children's engagement in the form of improved attentional focus in both countries and improved inhibition control in Finland. We observed only low–mid-level scores of engaged support for learning in Finland and Portugal, meaning that this area should be encouraged to a much higher extent among teachers and should be specifically addressed during teacher training programmes. The results of the current study can particularly benefit pre-service and in-service teacher training programmes in both countries by providing new openings for intervention studies that strive to develop interactions and pedagogy among the teachers working in toddler classrooms. The current study provides a fruitful starting point for approaching self-regulation development through a culturally sensitive approach by adding to the understanding of the processes through which the larger sociocultural context may (also unintentionally) steer the pedagogical work in two different cultural contexts.

DATA AVAILABILITY STATEMENT
Research data are not shared.

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