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Teachers' stress as a moderator of the impact of a professional development intervention on preschool children's social-emotional learning

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ABSTRACT: This study examined the extent to which the impact of a universal professional development (PD) intervention program on children's early social-emotional learning (SEL) is dependent on early childhood education (ECE) teachers' stress levels. The program (POMPedaSens) aimed to promote children's (5–6-year-olds') SEL by supporting ECE teachers' PD. Intervention effectiveness was monitored using an 8-month randomized controlled trial design with an intervention group (IG; 26 teachers and 195 children) and a waiting control group (CG; 36 teachers and 198 children) that provided data before and after program implementation. ECE teachers in the IG were trained to implement the intervention program in their early childhood education and care groups. Latent change score analysis revealed that when teachers showed a low level of stress, children's prosocial behavior increased only in the IG. There were no significant results for the IG in terms of a change in antisocial behavior. The results suggest a promising application of the PD intervention for promoting prosocial behavior in ECE when teachers have low stress. A longer intervention period is likely needed to determine the moderating effect of ECE teachers' well-being on children's antisocial behavior change. Unexpectedly, when teachers showed a high level of stress, an increase in prosocial behavior and a decrease in antisocial behavior were found for children in the CG. This could result from demands for accountability and high expectations regarding early prosocial behavior without supporting teachers' PD and well-being, which can diminish social-emotional functioning in the

long run. Decreased antisocial behavior in the CG could stem from an acquired propensity towards compliant behavior driven by either a sense of obedience or fear. High stress in the CG indicates that teachers were trying to do their best at the risk of their own well-being.

Keywords: *early childhood, social-emotional learning, universal intervention program, professional development, teachers' stress*

Introduction

Social-emotional learning (SEL) is recognized as an essential part of early childhood education and care (ECEC) and vital for supporting children's development, well-being, and mental health to become well-functioning adults (for a review, see Herrenkohl et al., 2010; Jones et al., 2015; Moffitt et al., 2011). Teachers in early childhood education (ECE) play an essential role in promoting early SEL (Rodriguez et al., 2020). Yet, ECE teachers are often inadequately prepared to meet the expectations and fulfill the challenges of pedagogical work that are explicitly and implicitly required from them (Ugaste & Niikko, 2015), which may expose them to high stress levels. For example, numerous regulations, guidelines, high expectations, and continuous evaluations at the national and local levels determine what ECE teachers should do and how they should achieve educational objectives and goals, which can result in less space for organizing, controlling, influencing and assigning priority to their own work, and feelings of insufficiency (Ugaste & Niikko, 2015).

A recent national survey has shown that 42 percent of ECE teachers in Finland experience stress often or quite often (Golnick & Ilves, 2022). The high prevalence of stress among ECE teachers has been associated with several important outcomes, such as children's SEL (Jeon et al., 2019) and motivation (Pakarinen et al., 2010), teachers' perception of children's behavior (Jamil et al., 2022) and quality of the teacher-child interaction (Penttinen et al., 2020). It has been suggested that high-quality training, that is, professional development (PD), can equip ECE teachers with a sense of capability and agency, improving their self-efficacy, reducing their emotional exhaustion, and fostering children's SEL (Ng & Meow, 2022). However, previous studies have at least two limitations. Firstly, they have been based exclusively on targeted interventions. The growing need to strengthen the professional competence of ECE teachers through further training has been highly acknowledged in Finland (Fonsén & Ukkonen-Mikkola, 2019). A reasonable approach to meet this need is thus to implement high-quality universal PD interventions for ECE teachers to promote children's learning and development. The advantage of universal interventions compared to targeted interventions is that they target whole child populations regardless of their risk status or health (Greenberg &

Abenavoli, 2017). To this end, “POMPedaSens” was recently developed in Finland. The PD intervention program aimed to equip ECE teachers with adequate strategies to implement effective classroom management techniques and responsive and nurturing teacher–child interactions to create a positive learning environment and support children’s well-being and social-emotional behaviors in ECEC settings. Secondly, empirical studies that have examined the moderating role of ECE teachers’ stress on the impact of early PD interventions on children’s SEL are lacking. Consequently, the present study aimed to investigate the extent to which the impact of a recently developed universal PD intervention in Finland, namely POMPedaSens, on preschool children’s (5–6-year-olds’) SEL varies depending on ECE teachers’ stress at work.

Children’s Social-Emotional Learning

The process of acquiring and applying the knowledge, skills, and attitudes to develop healthy identities, establish and maintain supportive relationships, make responsible and caring decisions, manage emotions and achieve personal and collective goals, and feel and show empathy for others is defined as SEL (CASEL, 2020). Social-emotional competence in children is characterized by the ability to meet personal needs while maintaining positive relationships with others (i.e., social competence) and a reflective understanding of one’s own emotions and those of others, and effective emotion regulation (i.e., emotional competence) (Denham et al., 2009). Social-emotional competence can manifest in prosocial behaviors (e.g., helping, collaborating, sharing, and empathizing with peers) or antisocial behaviors (e.g., lack of empathy, impulsiveness, aggression, bullying, or rejecting peers) (Denham et al., 2009).

Children’s social skills, self-awareness, self-control, emotional regulation, and emotional understanding during preschool dramatically change (Bierman & Motamedi, 2015). Safe, stable, and nurturing interaction in the ECEC setting can offer a wide range of possibilities for preschoolers to obtain and practice social and emotional competencies (Denham et al., 2014; Housman et al., 2018). Longitudinal studies highlight the significant role that early SEL plays in children’s academic achievement and school adjustment (e.g. Denham et al., 2012; Nakamichi et al., 2021), well-being (Thomson et al., 2021), as well as in developing personal and public health outcomes (for a review, see Herrenkohl et al., 2010; Jones et al., 2015; Moffitt et al., 2011). For example, a longitudinal study (Jones et al., 2015) reported preschoolers’ SEL was positively linked to critical outcomes in adulthood, such as well-being, mental health, relationships, education, employment, and decreased likelihood of criminality and substance abuse. Further research has provided evidence that a higher level of social-emotional competence in preschoolers plays a significant role in peer acceptance (Paulus, 2017).

Professional Development Intervention and Children's Social-Emotional Learning

According to bioecological theory (Bronfenbrenner & Morris, 2006), children's immediate environment directly affects their behavior, and proximal processes (e.g., regular interactions with teachers) that are fundamental to children's development. High-quality teacher-child interactions, as conceptualized within the teaching through interactions framework (TTI; Hamre et al., 2013), that is, emotional support, instructional support, and classroom organization, stimulate children's social and emotional development (e.g., Salminen et al., 2021). Effectively training ECE teachers to implement SEL helps them provide emotionally healthy and well-functioning classrooms by building strong and supportive relationships with children, responding to them with warmth and sensitivity, managing their challenging behavior, and creating positive environments. ECE PD has been defined as "facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge in practice" (National Professional Development Center on Inclusion (NPDCI), 2008, p. 3).

Based on the prosocial classroom model (Jennings & Greenberg, 2009), ECE teachers' PD is fundamental to providing high-quality services. This model suggests that teachers with higher social-emotional competence and well-being can form a positive relationship with children, create healthier classroom settings, and foster children's social, emotional, and cognitive development (Jennings & Greenberg, 2009; for a review, see Brunsek et al., 2020). PD can support ECE teachers' well-being (for reviews, see Brunsek et al., 2020; Harding et al., 2019; Rodriguez et al., 2020) and children's positive social and emotional outcomes (Jensen et al., 2017; Koivula et al., 2020; Moazami-Goodarzi et al., 2021; Scheithauer et al., 2022; Zarra-Nezhad et al., 2023a; Zarra-Nezhad et al., 2023b). In a recent study, Jamil et al. (2022) explored ECE teachers' perceptions of preschool children's challenging behavior and "found that challenging behavior impacted teacher-child relationships but that this was influenced by the teacher's level of understanding and perceived malleability of the behaviors" (see also Stein et al., 2022, p. 2). Therefore, developing and implementing PD interventions to support ECE teachers' knowledge and skills to promote young children's SEL is crucial (Ferreira et al., 2021; Jamil et al., 2022; Stein et al., 2022). Limited existing European intervention studies have revealed that ECE teachers' PD could improve teachers' pedagogical practices and increase SEL and decrease behavioral problems in 3–6-year-old children (Jensen et al., 2013, 2017; Koivula et al., 2020; Moazami-Goodarzi et al., 2021; Scheithauer et al., 2022; Zarra-Nezhad et al., 2023a; Zarra-Nezhad et al., 2023b; for a review, see also Jensen & Rasmussen, 2019). So far, however, gaps remain in examining the impact of universal PD interventions on preschool children's SEL in Nordic countries (Jensen & Rasmussen, 2019; Määttä et al.,

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2017), specifically Finland (Fonsén & Ukkonen-Mikkola, 2019). According to Finnish law and the ECEC national core curriculum, ECEC needs to develop the child's cooperation and interaction skills, promote the child's functioning in a peer group, and guide them to ethically responsible and sustainable activities, respect for other people and membership in society (Act on Early Childhood Education and Care, 540/2018, aim 8). Consequently, POMPedasens intervention was designed to strengthen ECE teachers' PD along with supporting their pedagogical sensitivity, engagement, emotional availability, and overall quality of teacher-child interactions at the group level, thereby supporting children's early SEL and reducing the risk of cumulating behavioral problems.

Teacher's Stress and Children's Social-Emotional Learning

Teacher stress can be defined as teachers' experience of "unpleasant, negative emotions, such as anger, anxiety, tension, frustration or depression, resulting from some aspect of their work" (Kyriacou, 2001, p. 28). Based on Lazarus and Folkman's (1984) social-cognitive perspective, stress arises when teachers perceive situations, such as challenging behaviors in the classroom, to be beyond their control or overwhelming and appraise a situation as threatening because they do not have adequate resources or strategies to deal with its demands (Jamil et al., 2022). ECE teachers also deal with teaching stress – stress stemming from the emotionality of working with young children (Abidin et al., 2004, Wiltshire, 2022). According to the Teaching Stress Process model (Abidin et al., 2004), interactions with children are a primary source of stress for teachers and reflect the teacher's perceived quality of the relationship with a child and subjective perception of that child's behaviors (Gagnon et al., 2019).

ECE teachers often work under very demanding and stressful conditions (Ranchar & Moreland, 2023; Roberts et al., 2019) that can interfere with developing and maintaining social-emotional competency and well-being (Rodriguez et al., 2020, for a review, see Ng et al., 2023). They are expected to have a deeper understanding of early childhood development and challenging behaviors, connect with a diverse array of families, engage children with different abilities and backgrounds, provide all children with richer educational experiences (including children who are disadvantaged and vulnerable) (Sheridan et al., 2009), and respond actively to children's cognitive as well as social and emotional needs. Their job requires long hours of work with few breaks and constantly interacting with young children, who require caring attention and responsiveness to their physical and emotional needs (Rodriguez et al., 2020). They also deal with emotional demands from parents and ECEC center directors and experience various discrete emotions daily while interacting with children (for a review, see Chen, 2021). The greater demands for accountability sometimes come with fewer resources for ECE teachers and emotional exhaustion, which can erode their ability to manage their emotional reactivity and deteriorate their interactions with children (Jennings & Greenberg, 2009).

Based on social learning theory (Bandura, 1973), children may imitate the negative emotions or cognitions of stressed teachers. When teachers are stressed, children are likely exposed to environments filled with negative moods and affect, hampering children's social and emotional learning (Jeon et al., 2019). Being unable to reappraise stressful situations, teachers may be incapable of providing positive responsiveness toward children's negative emotions. ECE teachers' stress has been negatively associated with various child outcomes, including lower social and emotional skills and higher behavioral and adjustment problems (Ng & Meow, 2022). Teachers with higher levels of stress have less nurturing and teaching capacity to model positive emotions and promote a positive classroom climate (Jennings & Greenberg, 2009; Rodriguez et al., 2020), have more conflict with the children in their classroom, display more negative reactions to children's emotions or challenging behavior (e.g., Jeon et al., 2019; Whitaker et al., 2015) and have lower professional commitment (e.g., Buettner et al., 2016). However, to our knowledge, no study has examined the moderating effect of ECE teachers' stress on the impact of early PD interventions on children's SEL, which was the main aim of the current study.

The POMPedaSens Intervention Program

The POMPedaSens intervention program was launched at the University of Helsinki and the University of Eastern Finland in 2019. The program was developed to support ECE teachers' PD, engagement, and emotional availability, promote a sense of belonging, and overall quality of teacher-child interactions at the group level, children's self-regulation, peer relationships, and group involvement, and reduce the risk of cumulating behavioral problems and bullying (Zarra-Nezhad et al., 2023b). The POMPedaSens program's principles stem from the theories of positive psychology, that is, Seligman's (2011) PERMA model of well-being, and developmental neurosciences, namely, the interpersonal neurobiology (IPNB; Siegel, 2012) perspective, combined with pedagogical knowledge of high-quality interaction in the context of ECEC. The PERMA model (Seligman, 2011) suggests that flourishing arises from five pillars: positive relationships (closeness and connection with family and friends), positive emotion (hope, happiness, joy, and satisfaction), engagement (focus, interest, or absorption in an activity), a sense of meaning (membership in something larger than oneself), and accomplishment (high performance and achievement). According to the IPNB (Siegel, 2012), social experiences influence the developing mind shaping the neural circuitry. Therefore, following these theories, the POMPedaSens program aimed to increase well-being and flourishing at the group level and increase understanding of the growing mind, brain, and relationships in ECE teachers and children. The program also sought to raise teachers' awareness of what is "behind the behavior" and the fact that early behavior problems can be due to an imbalance in the brain, regulative system, and the mind (Zarra-Nezhad et al., 2023b).

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The program consisted of two components that could be applied in every preschool: 1) The Young Learning Mind (*Pieni oppiva mieli*, POM; launched at the University of Helsinki in 2014), which is aimed at implementing a mindsight-informed, evidence-based SEL intervention program (MindUP™) for preschool children (e.g., Crooks et al., 2020). POM training was designed to build children's prosocial, emotional, and self-regulation skills, attention, concentration, and stress management. The POM training included implementing recovery episodes, that is "brain breaks", during which the children were prompted to concentrate on breathing and, through that, to calm down. The program has been shown to increase children's prosocial development, emotion regulation skills, and social confidence (Häkkinen, 2017). 2) Pedagogical Sensitivity (PedaSens; launched at the University of Helsinki in 2013) was designed to strengthen the pedagogical sensitivity (i.e., the ability of adults to control the group's atmosphere by recognizing children's initiatives and signals and responding to them in a meaningful way) of ECE teachers in order to reduce children's stress in ECEC centers. The training included introducing ECE teachers to emotional availability dimensions (structuring, sensitivity, non-hostility, non-intrusiveness, and child responsiveness/involvement) by considering their practical use in group interactions (Harkoma et al., 2022). Teachers received theoretical and practical information on emotional availability and children's social and emotional development and video material demonstrating the best practice of group interaction. The PedaSens program has been shown to increase ECE teachers' emotional availability and non-intrusiveness (Harkoma, 2016; Harkoma et al., 2022).

Based on ECE teachers' feedback on POM PedaSens intervention effectiveness, teachers reported that the program improved children's SEL as well as their own behavior and/or well-being at work (Zarra-Nezhad et al., 2023b). This may indicate that the program has decreased ECE teachers' frustration and powerlessness when facing a challenging situation in the classroom and increased teachers' mind-reading skills (mentalization) regarding the children's behaviors that were part of the intervention program.

The Present Study

The present study contributes to the literature on ECE by using a longitudinal design to examine the impact of a universal PD intervention, namely POM PedaSens, on early SEL (in terms of prosocial and antisocial behaviors). The main aim of this study was to determine the extent to which the impact of the POM PedaSens program on children's prosocial behavior and antisocial behavior varies depending on teachers' stress levels.

The POM PedaSens program was designed to strengthen teachers' PD to support children's SEL. According to the prosocial classroom model (Jennings & Greenberg, 2009), teachers' PD (i.e., effectively training ECE teachers to implement SEL) and high well-being

(e.g., lower stress) can support a positive teacher-child relationship and promote children's SEL (Jennings & Greenberg, 2009; for a review, see Brunsek et al., 2020). Further, bioecological theory (Bronfenbrenner & Morris, 2006) suggests that children's immediate environment directly influences their development. Furthermore, based on social learning theory (Bandura, 1973), children may imitate the negative emotions or cognitions of stressed teachers. We thus hypothesized: 1) When teachers report a low level of stress, children in the IG will experience a significant increase in their prosocial behavior compared to the waiting control group (CG, which received the intervention training after the study); 2) When teachers report a low level of stress, children in the IG will experience a significant decrease in their antisocial behavior compared to the CG.

Method

Participants and Procedure

The present study was part of the POMPedasens intervention program carried out in 22 municipal ECEC centers in Finland (the provinces of Southern Finland and North Karelia) from September 2019 to December 2020. Recruiting municipalities/cities announced the ECEC centers interested in participating in the study. Staff members of the interested ECEC centers were instructed to inform and recruit potential families who had 5–6-year-old children. An initial sample of 417 children ($M_{AGE} = 72.27$ months, $SD = 5.48$ at pretest; 53% girls) and 111 teachers ($M_{AGE} = 43.82$ years, $SD = 11.71$ at pretest; 95% female) participated in the study. After initial measurements at pretest and random assignment to the IG and CG, 53 ECE teachers were part of the IG, and 53 were part of the CG (one teacher per ECE group). A total of 90 percent of teachers were full-time employed and 67 percent had a bachelor's degree or higher at pretest. A total of 69 percent of the parents had a bachelor's degree or higher at the baseline and 70 percent were employed. The sample was representative of the educational characteristics of the general population in Finland (Statistics Finland, 2021).

For the present study, data on children's social competence and ECE teachers' stress were used. This resulted in a total sample of 393 children ($M_{AGE} = 71.95$ months, $SD = 5.83$ at pretest; 51% girls) and 62 ECE teachers ($M_{AGE} = 43.82$ years, $SD = 11.71$ at pretest; 95% female) in the pretest (before program implementation). The COVID-19 pandemic decreased the response rate in the post-test (after full implementation of the program) measurements by approximately 20 percent, both in the IG and CG. During COVID-19 some children and teachers were absent, activities were partly restricted, and the program implementation could not be carried out as planned in some ECEC centers (for

more detail, see Zarra-Nezhad et al., 2023b). A detailed comparison between the IG and CG is presented in Table 1.

TABLE 1 Baseline Demographic and Characteristics of the IG and CG along with Tests for Comparison Across Groups

	IG	CG	χ^2 / F	<i>p</i>	η
	<i>n / M (SD)</i>	<i>n / M (SD)</i>			
Children	195	198			
Gender			$\chi^2(1) = 3.86$.049	.10
Female	105	87			
Male	90	111			
Age (years)	5.98 (5.75)	6.00 (5.92)	$F(1, 391) = 0.26$.609	
Multicultural background			$\chi^2(1) = 0.01$.944	
No	160	163			
Yes	35	35			
Special education needs			$\chi^2(1) = 0.09$.770	
No	155	155			
Yes	40	43			
Group size	18.07	20.25	$F(1, 391) = 26.61 < .001$.25
ECE Teachers	36	26			

The impact of the POMPedasens program on preschool children was monitored using an 8-month randomized controlled trial design with an IG and a CG that provided the data at pretest and post-test. The ECE teacher's program training was implemented and led by professionals with master's degrees in ECEC and specialized in both POM and Pedasens contents. The ECE teachers in the IG were trained to develop activities and renew their practices to promote children's SEL through inclusive learning environments and responsive and supportive interaction (Jensen et al., 2017). To implement the program, teachers in the IG practiced this approach through ongoing education and training sessions (9 workshops) and were also provided with games and activities to promote children's SEL. Teachers also had face-to-face meetings to support and maintain training quality and implementation reliability (for a detailed description of the program, see Zarra-Nezhad et al., 2023b). Further, as a part of the program, parents (whose children participated in the IG) received information about the intervention's educational procedures. Parents were provided with the material, information, and practical support on implementing SEL at home to support their children's SEL. ECE teachers in the CG did not receive training during the evaluation period and continued their routine educational care as usual. The study was conducted following the Finnish Advisory Board on Research Integrity and the ethical principles of the Helsinki Declaration and approved by the University of Eastern Finland Committee on Research Ethics. The informants of the

database (preschool directors, teachers, and children's parents/guardians) were asked for their informed consent before participating in the study. All participants were recruited voluntarily and guaranteed complete anonymity and could withdraw from the study at any time. Children's willingness to participate in or continue tasks was considered carefully (Phelan & Kinsella, 2013) regardless of parents' existing written consent. In the event of any verbal or non-verbal signs of discomfort, the child was freely allowed to discontinue the activity. ECE teachers participated in the intervention study during their work hours, and no additional work was involved.

Measures

Multisource Assessment of Social Competence Scale (MASCS)

MASCS (Junttila et al. 2006) is based on the School Social Behavior Scale (SSBS; Merrell, 1993). The MASCS items (13 in the present study) were rated (by electronic questionnaire) on a 4-point scale (1 = never, 4 = very frequently) by ECE teachers at the pre-and post-tests for the IG and CG. The MASCS comprises four dimensions: *Disruptiveness* (four items: "Acts without thinking;" "Argues and quarrels with peers;" "Bothers and irritates other children," and "Teases or makes fun of other children"); *Impulsivity* (three items: "Irritates her/himself easily;" "Has a short fuse;" "Has temper outbursts or tantrums"); *Cooperation* (three items: "Offers help to other children;" "Cooperates with other children;" and "Participates efficiently in group activities"); *Empathy* (three items: "Shows acceptance toward other children;" "Knows how to be a good friend;" and "Is sensitive to the feelings of others"). Cooperation and empathy form the scales for the domain of prosocial behavior. Disruptiveness and impulsivity form the scales for the domain of antisocial behavior. Higher scores for each dimension indicate higher levels of prosocial and antisocial behaviors.

We ran separate Confirmatory Factor Analysis (CFA) models at pre- and post-test to validate the two-domain solution. In both models, there were two factors, prosocial behavior, and antisocial behavior. In the pretest, the model fit was not good (Chi-Square (64) = 394.20, $p < .001$, RMSEA = .11, CFI = .88, SRMR = .07), so the model was modified by adding residual covariances between items within the same factor. When four residual covariances were added, the model fit was improved (Chi-Square (60) = 213.95, $p < .001$, RMSEA = .08, CFI = .94, SRMR = .06). The smallest standardized loading was .49. The correlation between factors was $-.68$. In the post-test, the model fit was not good (Chi-Square (64) = 488.22, $p < .001$, RMSEA = .13, CFI = .85, SRMR = .07), so the model was modified by adding residual covariances between items within the same factor. When seven residual covariances were added, the model fit was improved (Chi-Square (57) =

233.69, $p < .001$, RMSEA = .09, CFI = .94, SRMR = .06). The smallest standardized loading was .53. The correlation between factors was $-.62$.

Consequently, in the present analysis, the domain scores of social competences (i.e., prosocial behavior and antisocial behavior) were used (see also Junttila et al., 2012; Pakarinen et al., 2020). Cronbach's alpha values for prosocial behavior were .87 at pretest and .88 at post-test. For antisocial behavior Cronbach's alpha values were .92 at pretest and .91 at post-test.

Teacher stress

Teaching stress was measured using a modified version of the Parental Stress Inventory (Gerris et al., 1993). The modification involved changing the context from home to preschool (Pakarinen et al., 2010; Siekkinen et al., 2013). The three items measure feelings of stress in teaching and powerlessness in handling teacher-child situations (i.e., "I have a lot more problems in guiding the children in my group than I expected;" "When I think about what kind of teacher I am, I often feel guilty or inadequate;" "Guiding children sometimes seems like an overwhelming task"). The items were rated (by electronic questionnaire) on a 5-point scale (1 = not applicable, 5 = very applicable) by ECE teachers at the pretest for the IG and CG.

The CFA model was saturated (degrees of freedom = 0). Standardized loadings were .64, .35, and .61 and all were significant. Cronbach alpha reliability for teacher stress in the current study was .64, which is considered acceptable given the limited number of test items (Taber, 2018).

Analysis

Mplus version 8.6 was used to analyze the data. Latent change score (LCS) analysis using structural equation modeling (SEM) techniques with the Wald test was used to analyze the group \times time interaction, namely whether the two study groups (IG, CG) changed differently from pretest to post-test. LCS was estimated by using pre- and post-measurements (observed variables). In addition, the group \times time \times moderator interaction was analyzed using this method; in case of a difference, post hoc tests were conducted. Due to the hierarchical data (children were in different groups), intraclass correlation coefficients (ICCs) and design effects of the study variables were computed to see between-classes variation. ICCs for prosocial behavior were .20 at the pretest and .14 at the post-test. Design effects for prosocial behavior were 2.15 at pretest and 1.80 at post-test. For antisocial behavior, ICCs were .13 at pretest and .12 at post-test. The design effects for antisocial behavior were 1.77 at pretest and 1.68 at post-test. For design effects, a value greater than two often indicates significant clustering. Because there is between-

level variation and the design effect is larger than 2 for one variable (prosocial behavior at the pretest), clustering (the hierarchy of the data) needs to be taken into account by using multilevel analysis (Peugh, 2010). Thus, the complex method was used in the models to take into account sample clustering by correcting standard errors using a sandwich estimator, thus giving more reliable p values. Analyses were carried out with full-information maximum likelihood estimation. The estimation accounts for missing values at random (MAR) and includes all the available data. We did not have any missing cases. All the models were saturated, which means there were 0 degrees of freedom. The models fit perfectly to the data.

Results

POMPedaSens Intervention Effects on Prosocial and Antisocial Behaviors

To determine the overall impact of the POMPedasens program on children's prosocial and antisocial behaviors, group \times time interactions were tested at a significance level of .05. The following covariates were included in the analysis: baseline (pretest) scores of the outcome variables, sex, multicultural background, special education needs, and group size. No significant group \times time interaction was found regarding prosocial behavior (Wald test (1) = .001, $p = .971$): The change in prosocial behavior was not significant for both the IG ($\beta = .078$, $p = .097$) and the CG ($\beta = .093$, $p = .141$) (see Table 2). Further, no significant group \times time interaction was found regarding antisocial behavior (Wald test (1) = 1.26, $p = .262$): The change in antisocial behavior was not significant for both the IG ($\beta = -.046$, $p = .062$) and CG ($\beta = -.068$, $p = .111$).

TABLE 2 Mean Scores and Standard Deviations at Pre- and Post-Measurement in the IG and CG

Subscales	Group	Pre- measurement	Post- measurement	Wald test ($df = 1$) group \times time
		M (SD)	M (SD)	
Antisocial	IG	1.87 (0.66)	1.82 (0.65)	1.260 ^{ns}
	CG	1.72 (0.67)	1.65 (0.55)	
Prosocial	IG	3.04 (0.53)	3.12 (0.57)	0.001 ^{ns}
	CG	3.10 (0.55)	3.19 (0.49)	
Teacher's stress	IG	2.14 (0.60)	—	—
	CG	2.02 (0.59)	—	—

Note. ns = non-significant p value ($p > .05$).

Group (IG/CG) × Time × Teacher' Stress Interaction

The baseline scores of the outcome variables, sex, multicultural background, special education needs, and group size, were included in the group × time × moderator analysis. An overall significant group × time × stress interaction was found regarding prosocial behavior (Wald test (1) = 9.75, $p = .002$) and antisocial behavior (Wald test (1) = 8.8, $p = .003$). The estimated mean change in prosocial behavior was significant for both the IG and CG. That is, teachers' stress moderated the effect of change in prosocial behavior in both groups. Further, the estimated mean change in antisocial behavior was significant only for the CG. That is, teachers' stress moderated the effect of change in antisocial behavior for the CG.

The results revealed that when teachers' level of stress was low ($-1 SD$), a significant increase in the rate of prosocial behavior over time was found for the IG ($\beta = .141$, $p = .041$) (see Figure 1). No significant change was found for prosocial behavior in the CG ($\beta = -.035$, $p = .480$). Further, no significant change in the rate of antisocial behavior over time was found for the IG ($\beta = .095$, $p = .297$) and the CG ($\beta = -.026$, $p = .566$) when teachers' stress level was low ($-1 SD$).

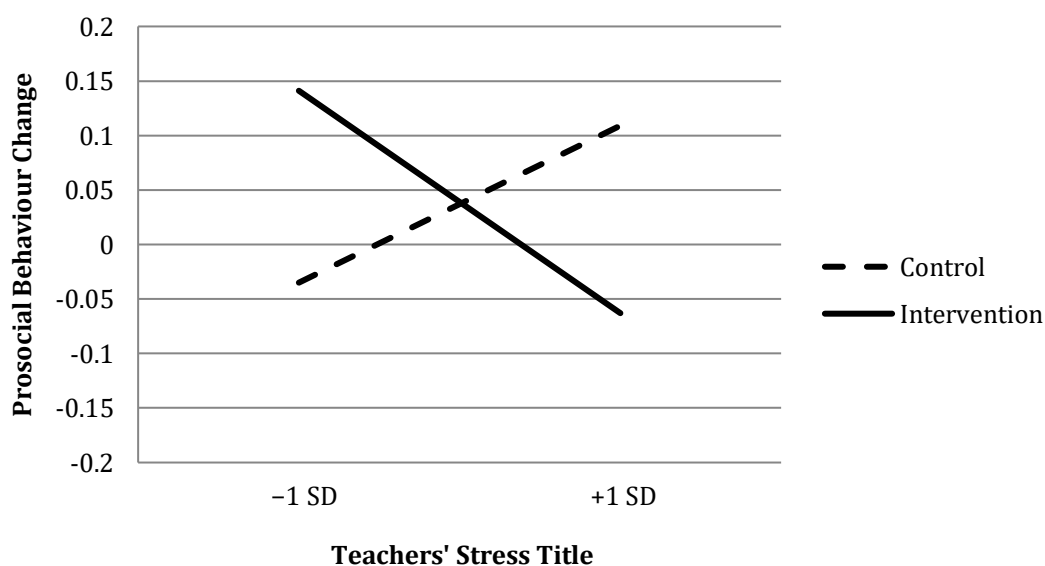


FIGURE 1 Moderation Effects of Teachers' Stress on Children's Prosocial Behavior Change.
Note. The X-axis presents teachers showing a relatively high level of stress (+1 SD , high) and teachers showing no signs of stress ($-1 SD$, low). The Y-axis presents the change in prosocial behavior across time.

However, when teachers' stress level was high (+1 *SD*), the estimated mean change in prosocial behavior was significant only for the CG. A significant increase in the rate of prosocial behavior over time was found for the CG ($\beta = .109, p = .049$) when teachers' level of stress was high (see Figure 1). No significant change was found for prosocial behavior in the IG ($\beta = -.063, p = .373$) when teachers showed a high level of stress.

Furthermore, when teachers' stress level was high (+1 *SD*), the estimated mean change in antisocial behavior was significant only for the CG. A significant decrease in the rate of antisocial behavior over time was found for the CG ($\beta = -.157, p < .001$) only when teachers' level of stress was high (see Figure 2). No significant change was found for antisocial behavior in the IG ($\beta = -.062, p = .293$) when teachers showed a high level of stress.

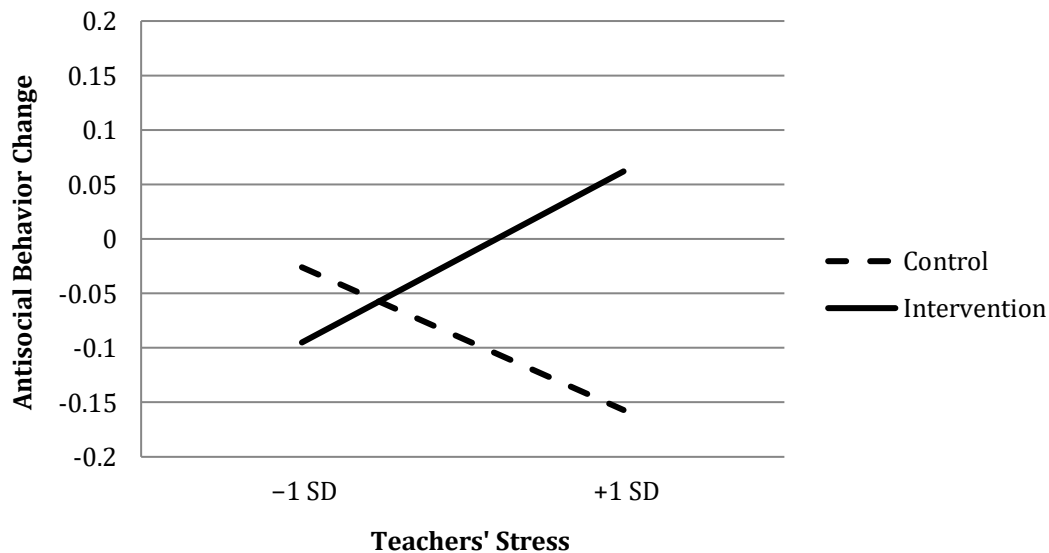


FIGURE 2 Moderation Effects of Teachers' Stress on Children's Antisocial Behavior Change.

Note. The X-axis presents teachers showing a relatively high level of stress (+1 *SD*, high) and teachers showing no signs of stress (-1 *SD*, low). The Y-axis presents the change in antisocial behavior across time.

Discussion

This study's main aim was to examine the impact of a universal PD intervention, namely POMPedasens, on the change in children's prosocial and antisocial behavior with the moderating role of ECE teachers' stress. The results indicate that the PD program might increase children's prosocial behavior (IG) only when teachers show low levels of stress.

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However, no significant results were found for the IG regarding change in antisocial behavior. When teachers showed a high level of stress, an increase in the rate of prosocial behavior and a decrease in the rate of antisocial behavior were found for the CG.

The main aim of this study was to examine the extent to which the impact of the POMPedasens program on children's prosocial and antisocial behavior varies depending on the teachers' stress levels. Our results suggest that when teachers showed a low level of stress, prosocial behavior increased for children in the IG. No significant effects were found for the IG regarding change in antisocial behavior. Also, no significant results were found for the CG when teachers reported low stress levels. These findings were partly expected. In line with our hypothesis (H1), children in the IG experienced a significant increase in their prosocial behavior compared to the CG when teachers reported a low level of stress. This finding is consistent with the prosocial classroom model (Jennings & Greenberg, 2009), highlighting the fundamental role of teachers' well-being and competency in SEL skills in contributing to their ability to develop a positive teacher-child relationship, healthier classroom settings, and implement children's SEL interventions. Research shows that ECE teachers' PD can lead to lower emotional exhaustion, high-quality ECEC, and positive developmental outcomes for children (Brunsek et al., 2020; Harding et al., 2019; Jensen et al., 2017; Moazami-Goodarzi et al., 2021; Rodriguez et al., 2020; Scheithauer et al., 2022; Zarra-Nezhad et al., 2023a; Zarra-Nezhad et al., 2023b). Teachers in the IG received PD training that may have supported their knowledge, abilities, skills, dispositions, and the way they are transformed into pedagogical practices (Gidari & Kakana, 2021). The PD provided teachers in the IG with more means to effectively manage children's behavior, particularly during the COVID-19 pandemic. The intervention focused on teachers' behavioral routines, organization, lesson planning, and SEL content expertise and taught them to reflect on their practice, which may boost their confidence in teaching. According to bioecological theory (Bronfenbrenner & Morris, 2006), children's immediate environment directly affects behavior, and a positive emotional atmosphere in environments affects young children's holistic development (for a review, see Britto et al., 2017). Lower teacher stress in the IG may have provided teachers with a better ability to implement the intervention program and attain higher attunement, that is, teachers' ability to acknowledge children's social dynamics and characteristics, including social positions and roles in the group (Ahn & Rodkin, 2014). Further, lower stress may have maintained a positive and safe learning environment and provided more shared intentions, a sense of belonging, cooperation, and joy, supporting possibilities for children to act in a more prosocial way. This finding indicates a promising application of the POMPedasens program for promoting prosocial behavior in early childhood.

Inconsistent with our hypothesis (H2), there were no significant effects for the IG in terms of a change in antisocial behavior when teachers' stress was low. One explanation could be that the relatively short time between the pretest and post-test measurements could not reveal the moderating role of teachers' stress on the impact of the intervention on children's problem behaviors in the IG. It is well known that changes in behavioral problems such as antisocial behavior (e.g., impulsiveness, aggression, bullying) could also partly relate to children's temperament and may require a relatively long intervention period (see Kiviruusu et al., 2016). Further, antisocial behavior could reflect maturing self-regulative skills, which affect behavior, especially during group activities. ECE teachers need to understand the roots of behavior and guide children toward cooperation through sensitive feedback. Furthermore, it takes more time and energy on the part of the teachers to take in, process, and implement a new method in the preschool curriculum (Kiviruusu et al., 2016), which might also explain the lack of moderating effect of teachers' stress on the impact of the intervention on children's antisocial behavior at this point.

Our results further revealed that when teachers showed a high level of stress, children in the CG showed increased prosocial behavior and decreased antisocial behavior. However, no significant effects were found for the IG when teachers reported high stress levels. Our results are inconsistent with previous findings indicating the negative impact of ECE teachers' stress on children's social and emotional outcomes (e.g., Jeon et al., 2019; Ng & Meow, 2022; Whitaker et al., 2015). The role of ECE teachers is consistently based on promoting preschool children's social, emotional and academic development in the preparation of school and long-term outcomes (Wiltshire, 2023). The increased children's prosocial skills in the CG where teachers reported high stress could be a consequence of demands for accountability and expectations of prosocial behavior in the ECEC without supporting teachers' PD and well-being. To manage children's challenging behaviors, ECE teachers in the CG may have tailored their support by providing more intensive support to children with problem behaviors and less to others (Thijs et al., 2006, see also Friedman-Krauss et al., 2014), which may increase the teachers' overall workload and, consequently, their stress levels (see Raver et al., 2012). Decreased antisocial behavior in the CG could thus be due to increasing obedience instead of maturing children's SEL, such as their self-regulation skills, which can be a short-term outcome. Emotional overload can cause intangibility, decrease sensitivity, and lead to inadequate practices in managing behavior both at individual and group levels. Consequently, children can learn to behave in the right way through obedience or fear. Therefore, ECE teachers in the CG seem to be at risk of improving children's SEL at the cost of their own and the children's well-being. In the long run, teachers' emotional exhaustion and stress could lower their professional commitment due to its deteriorating effect on teachers' well-being, which in turn can result in poor social-emotional functioning and lower well-being in children (e.g., Jeon et al., 2019; Ng & Meow, 2022; Whitaker et al., 2015).

The findings of this study are subject to at least four limitations. First, the Covid-19 pandemic impacted the POMPedasens program implementation. According to World Bank (2020) Covid-19 was the biggest shock to all educational systems in our lifetime. The pandemic disrupted young children's SEL by suspending normal early childhood activities, such as attending ECE, playing outside, and interacting with peers and extended family members, which are critical for healthy social-emotional development. Notwithstanding these limitations and the unavoidable new rhythm of life, feedback on the program's effectiveness suggested that teachers were highly satisfied with the program and that children's SEL and teachers' behavior and/or well-being improved (Zarra-Nezhad et al., 2023b). This suggests that the intervention was successful in equipping ECE teachers with adequate strategies to manage challenging situations and create a positive learning environment for children, thus supporting their own and the children's well-being. Second, the same teachers rated both teachers' stress and children's behavior. The Covid-19 pandemic decreased parents' participation rate in the post-test by approximately 50% in the IG and 44% in the CG. Thus, this study did not include parents' reports on children's behavior. Third, in the present study, we could not control parental SEL support and practices at home due to the Covid-19 pandemic. Fourth, the follow-up stage was not performed due to Covid restrictions. Further follow-up is therefore needed to evaluate the effectiveness of the intervention. Future research can address this limitation by assessing the moderating role of teacher stress on changing children's problem behavior over a more extended period.

Conclusions

This study contributes to filling some of the existing knowledge gaps on the moderating role of ECE teachers' stress on the impact of universal PD intervention programs on early childhood SEL. The results show that, contrary to the CG, when teachers showed low levels of stress in the IG children's prosocial behavior increased. However, no significant effects were found regarding change in antisocial behavior in the IG compared to the CG. The results suggest that ECE teachers' PD and knowledge of young children's behavior have the potential to be impactful in promoting early prosocial behavior. This result also indicates that changes in antisocial behavior may require a long learning period and that the intervention needs a relatively long time to display the moderating effect of ECE teachers' well-being on children's antisocial behavior change. Our results further revealed unexpected results suggesting that when teachers in the CG reported a high level of stress, children showed increased prosocial and decreased antisocial behavior. The high level of stress in the CG indicates that teachers are trying to do their best while putting their own well-being at risk. This could result from demands for accountability and high expectations regarding early prosocial behavior without supporting teachers' PD and

well-being, which can diminish social-emotional functioning in the long run. Decreased antisocial behavior in the CG could be due to learning to behave in the right way through obedience or fear.

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