International Journal of Assessment Tools in Education
2025, Vol. 12, No. 2, 293–316
https://doi.org/10.21449/ijate.1467609
journal homepage: https://dergipark.org.tr/en/pub/ijate
Research Article

Preschool teachers' awareness and views of children's self-regulation scales: A professional development program's effect

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ARTICLE HISTORY

Received: Apr. 12, 2024

Accepted: Mar. 6, 2025

Keywords:

Preschool teachers' awareness and views,
Self-regulation skills,
Professional development.

Abstract: There has been increased evidence about the importance of supporting children's self-regulation skills in early childhood and the role of teachers in this process. This current research consisted of two studies. Study 1 aimed to develop two scales: one to assess preschool teachers' awareness of children's self-regulation and the other to determine their views of children's self-regulation skills. To examine the scales' construct validity, Exploratory Factor Analysis (EFA- $n = 201$) and Confirmatory Factor Analysis (CFA- $n = 123$) were conducted for both the awareness and views scales. EFA yielded two subscales for the awareness scale: self-regulation (7 items- $\omega = .81$) and relation to learning (3 items- $\omega = .76$). CFA results showed that the awareness scale's 10-item and two-factor structure had good fit indices. A single factor emerged in EFA results for the teachers' views of children's self-regulation skills scale (8 items- Cronbach's $\alpha = .92$). CFA results demonstrated that the views scale's 8-item and single factor structure exhibited good fit indices. Based on the results, these two scales can be utilized validly and reliably to determine teachers' cognizance of self-regulation and opinions about children's self-regulation. Using these two scales in a pretest-posttest design, study 2 examined a professional development program's effect on preschool teachers' ($n = 21$) awareness and views about children's self-regulation. The Wilcoxon Signed Rank Test was utilized to analyze the data. The results showed a statistically significant difference between the participant teachers' pretest and posttest awareness and views scores on children's self-regulation. Implications for future research and teacher professional development programs were discussed.

1. INTRODUCTION

The promising research findings on the impact of children's strong self-regulation skills have encouraged educators, policymakers, and researchers to focus on this topic. The first years of life are essential for children's development of self-regulation (SR), which is defined in numerous ways in the literature (Berger *et al*., 2007; Kopp, 1982; Murray *et al*., 2016). According to Berger *et al*. (2007). SR is about monitoring and adjusting cognition, emotion, and behavior to reach a goal and comply with the cognitive and social requirements in a context. Another definition focuses on regulating thoughts and emotions to facilitate goal-oriented actions, including behavior organization, impulse control, and constructive problem-solving

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e-ISSN: 2148-7456

(Murray *et al*., 2016). For McClelland and Cameron (2012), SR is "the capability of controlling or directing one's attention, thoughts, emotions, and actions" (p. 136). Evident in these definitions, self-regulation consists of cognitive, emotional, and behavioral domains (Jahromi & Stifter, 2008; Murray *et al*., 2016), reflecting a threefold model. Still, self-regulation is also approached as emotionality and regulation and as a one-dimensional construct (Raffaelli *et al*., 2005). The threefold model investigates these structures independently, yet these three processes interact (Raffaelli *et al*., 2005). As Murray *et al*. (2016) stated, the interaction between cognition and emotion procures a basis for behavioral regulation.

Cognitive self-regulation encompasses a broader range of executive functions, extending beyond their traditional conceptualization (Roebers, 2017). Essential executive functions are working memory (keeping and manipulating information in mind), inhibitory control (intentional control of attention, behavior, thoughts, and/or emotions to prevent predominant responses) (Diamond, 2012), and attentional flexibility (altering perspective/thinking, adjusting to change) (Blair & Diamond, 2008; Diamond, 2012). Cognitive SR enables children to utilize and enhance cognitive processes essential for academic learning and problem-solving (Bodrova & Leong, 2006). Emotional regulation refers to managing, controlling, and modulating feelings (Murray *et al*., 2016), while behavioral SR is about the conscious application of essential executive functions to behaviors in social contexts (McClelland *et al*., 2007). In a classroom context, executive functions help children learn how to consciously and effectively manage their behavior: play with other children, follow directions, calm down when upset, remember directions, and persist when challenged (McClelland & Tominey, 2014). On the contrary, low SR skills are associated with difficulty paying attention, calming down when needed, acting appropriately, and coordinating information from different sources during learning (Bautista *et al*., 2024).

Studies have been increasingly investigating the relationship between early SR and socio-demographic factors (Lenes *et al*., 2020), early math and reading skills (Ivrendi, 2011; Welsh *et al*., 2010), its longitudinal influence on academic skills (Ribner *et al*., 2017), and the impact of intervention programs (McClelland *et al*., 2019). Many studies have provided evidence about self-regulation's relation to academic skills, such as early mathematics, language, and literacy skills (Howse *et al*., 2003; Korucu *et al*., 2022; Sezgin & Ulus, 2020; Uyanık *et al*., 2021; Welsh *et al*., 2010). In their longitudinal study, Ribner *et al*. (2017) found that children's executive function levels at the age of five predict academic skills in the fifth grade. Children with strong executive function skills but low early math skills can catch up to those with strong academic capacities. Furthermore, research on the intervention programs' effect in supporting SR skills in early childhood environments is promising (Dias & Seabra, 2015; Schmitt *et al*., 2015).

Other studies focus more on enhancing teachers' SR skills while paying less attention to teachers' gains concerning the conceptual foundations of children's SR (Perels *et al*., 2009). Evidence supports this claim, demonstrating a lack of focus on teachers' knowledge and effective practices to enhance children's SR skills in the classroom (Bautista *et al*., 2024; Hamre *et al*., 2017; Montoya *et al*., 2023; Willis *et al*., 2014). In an interview study with 71 kindergarten teachers, Bautista *et al*. (2024) found that teachers had a limited understanding of SR and lacked knowledge of strategies to strengthen these skills. Given the importance of SR in children's learning as well as such skills' impact on later education levels, it would seem essential to support these skills from the first years of life (Howse *et al*., 2003; Ribner *et al*., 2017), and teachers are the key facilitators in this process (Ackerman & Friedman-Krauss, 2017; Silkenbeumer *et al*., 2018).

1.1. Place of Self-Regulation in Early Childhood Programs/Curriculum Frameworks

Researchers who view self-regulation as a developmental achievement question how much early childhood curriculum frameworks include SR (Størksen *et al*., 2015; Vasseleu *et al*., 2022), how to foster these skills in early childhood, and how to implement intervention

programs accordingly (Schmitt *et al*., 2015). Early childhood programs/frameworks appear to not fully reflect the critical role of SR in children's well-being (Lenes *et al*., 2020; Vasseleu *et al*., 2022). For instance, Lenes *et al*. (2020) reported that the Norwegian Framework Plan for the Content and Tasks of Kindergartens does not mention children's SR. Similarly, the Turkish Ministry of National Education-Preschool Education Program (MoNE-PEP, 2013) does not explicitly emphasize SR. However, MoNE-PEP (2013) is a child-centered and play-based program, and some of its principles relate to this construct, such as fostering autonomous behaviors and self-control which is a feature of inhibitory control (Diamond, 2014). As Lenes *et al*. (2020) state, child-centered and play-based programs may foster children's SR skills. Meanwhile, the literature emphasizes the importance of intentionally planned support for children's self-regulation skills (Vasseleu *et al*., 2022). For this to happen, teachers need to be cognizant of the SR construct. Yet, the topic is relatively new for some preschool teachers, who need to become more familiar with its theoretical foundations and means of systematically supporting such skills in the classroom (Vasseleu *et al*., 2022; Willis *et al*., 2014).

1.2. Teacher Professional Development on Children's Self-Regulation

If provided with training and support, preschool teachers can enhance children's executive function skills (Diamond & Lee, 2011). The necessity of professional development (PD) on children's SR skills is tied to the teacher's central role in improving such skills in early childhood (Silkenbeumer *et al*., 2018; Venitz & Perels, 2018). The PD activities have the potential to assist teachers in acquiring the necessary knowledge, skills, and dispositions to promote children's development and learning (Atmaca & Ertürk Kara, 2023; Snyder *et al*., 2012). This is because providing teachers with a theoretical and practical component is crucial in building a strong foundation for children's SR skills (Willis *et al*., 2014). Iriogbe-Efionayi (2020) conducted a study with 97 pre-service and in-service early childhood teachers, finding a positive relationship between the teachers' level of SR knowledge, years of teaching experience, and the amount of professional development (PD). Another study involved conducting SR teacher training with 35 kindergarten teachers and 97 children. The training included trainers acting as a model for teachers, relating content on SR with kindergarten activities, opportunities for being proactive in learning, such as sharing experiences, fostering the transfer of training to the classroom through assignments, and keeping diaries about self-regulation. The results showed positive effects of teacher training on both teachers' knowledge about SR and children's self-regulated learning (Perels *et al*., 2009).

The PD content on SR seems essential to adopting a broader perspective, including teachers' beliefs, classroom interactions, guidance, and structure (Diamond & Lee, 2011; Rosanbalm & Murray, 2017; Silkenbeumer *et al*., 2018). These are considered key aspects of the teacher's knowledge and instruction of SR skills in the classroom. Literature calls this perspective an indirect intervention to improve such skills (Venitz & Perels, 2018). Direct interventions specifically train children on executive function skills (Mattera *et al*., 2021), such as storytelling and games in which they will have to inhibit their behavior and strengthen memory through repetitive songs (Mann *et al*., 2016). Supporting indirect intervention, Diamond and Lee (2011) emphasize that attending to socio-emotional and physical development rather than solely focusing on dimensions of executive function may increase the effect of SR training on teachers. This type of intervention aims to establish a learning environment that promotes the development of executive function skills (Mattera *et al*., 2021). Evidence reinforcing the effectiveness of direct intervention (Schmitt *et al*., 2015) and indirect intervention was found in research showing that close teacher-child interactions and high classroom quality were related to children's high SR skills (Cadima *et al*., 2016). In a study, Dias and Seabra (2015) provided preschool teachers with six hours of training to implement the Intervention Program for Self-Regulation. The training's content consisted of knowledge, discussions on research results, teacher roles, modeling, and intervention program practice. Children in the trained teachers' classrooms showed better attention and inhibition abilities performance than their

counterparts. The authors concluded with a remark on the program's positive effect in supporting children's executive function skills.

Existing research highlights a complex challenge in supporting preschool children's self-regulation, revealing nuanced and sometimes conflicting perspectives on teachers' roles. The first issue is that preschool teachers lack or have limited knowledge about child SR, as demonstrated by research conducted in different cultures (Bautista *et al*., 2024; Vasseleu *et al*., 2022; Willis *et al*., 2014). For instance, a study with 115 early childhood teachers found that teachers lack knowledge and instruction about SR skills. Over half were unaware of this construct, and over two-thirds did not engage in PD activities to support these skills (Willis *et al*., 2014). A recent study showed that Australian teachers mainly focus on examples of dysregulation when discussing SR (Vasseleu *et al*., 2022). Therefore, it appears that teachers need PD activities related to children's SR.

Another issue is that the effectiveness of a few PDs is evaluated in the literature (Popova *et al*., 2022). When PD is effective, a change could occur in the form of enhancements in teachers' knowledge, instructional practice, and student learning outcomes (Wei *et al*., 2009). Determining how much PD activities attain their goals (Markussen-Brown *et al*., 2017) is essential and approached differently (Guskey, 2003; Schachter, 2015). Schachter (2015) analyzed 73 PD studies regarding the design, delivery, and measurement of the PD's effectiveness. The results showed that half of them investigated how teacher practice changed, 18% evaluated how teachers' knowledge changed, 40% measured how children's learning changed, and 11% evaluated how children's behavior changed. That is, less attention is paid to the change in teacher knowledge, which is also evident in the current literature indicating that there is little evidence on what teachers know about SR and how well they support these skills (Bautista *et al*., 2024; Montoya *et al*., 2023). One reason is linked to the scarcity of measurement tools for assessing what teachers know and/or have learned about SR (Vasseleu *et al*., 2024).

The effectiveness of PD programs can be determined by considering teachers' self-reports of PD features that enhance their knowledge and transform instructional practices (Guskey, 2003). Although limited in number, some instruments specifically measure preschool teachers' knowledge and practices of SR (Adagideli *et al*., 2015; Perels *et al*., 2009; Vasseleu *et al*., 2021; Willis *et al*., 2014). For example, Adagideli *et al*. (2015) developed an instrument to measure preschool teachers' practices to foster self-regulated learning in young children. The scale consisted of five subscales: "emotional and motivational regulation," "metacognitive regulation during the task," "metacognitive knowledge of the task and strategy," "metacognitive regulation after the task," and "metacognitive knowledge of the person" (p. 431). Perels *et al*. (2009) constructed a scale to measure teachers' knowledge about SR before and after an intervention program to determine the effectiveness of the PD program. This scale included items about the kindergarten teachers' use of support, encouragement, verbal rewards, and modeling for the preschoolers. Another study developed an instrument to measure early childhood teachers' knowledge and instruction of SR. This measure had three factors: teacher attitudes and beliefs, classroom management techniques, and child behavior (Willis *et al*., 2014). Moreover, a scale developed by Vasseleu *et al*. (2021) measures early childhood educators' beliefs about fostering children's self-regulation. It had the subscales of perceived knowledge, attitudes, and self-efficacy, which are considered cognitive beliefs.

The current research encompasses two studies that address the issue of less emphasis on assessing teachers' knowledge (Study 1) and the lack of SR knowledge among teachers (Study 2). In Study 1, two brief teacher self-report scales were developed by examining the literature on the conceptual basis of self-regulation (e.g., Berger *et al*., 2007; Kopp, 1982; Murray *et al*., 2016). The first scale assesses preschool teachers' awareness of children's SR. The second scale measures preschool teachers' views of children's SR skills. Previous studies provide proper

instruments for assessing SR from different perspectives, such as classroom management skills and modeling for preschoolers (Perels *et al*., 2009; Willis *et al*., 2014), practices for fostering self-regulated learning (Adagideli *et al*., 2015), and cognitive beliefs (Vasseleu *et al*., 2021). The scales developed in this present study differ from the previous instruments (Adagideli *et al*., 2015; Perels *et al*., 2009; Vasseleu *et al*., 2021; Willis *et al*., 2014) in terms of focus. The awareness scale explicitly targets whether preschool teachers know the conceptual basis of SR's cognitive dimension and self-regulation's relation to learning. The views scale focuses on the indicators of children's self-regulatory behaviors observed in a typical classroom environment. Using these two measurement tools, Study 2 investigated the effect of a PD program on preschool teachers' awareness and views about children's SR skills. The research questions were:

1. What are the psychometric properties of preschool teachers' awareness and views scales regarding children's self-regulation (Study 1)?

2. How does the PD program affect the preschool teachers' awareness and views about children's self-regulation skills (Study 2)?

2. STUDY-1

2.1. Method

Study 1 included developing two scales using the survey method, which is approached as a proper research model in studies aiming to identify certain group features (Christensen *et al*., 2015). The characteristics determined through the developed scales in this study were preschool teachers' awareness and views about children's self-regulation.

2.1.1. *Study group*

A convenience sampling method was used to determine the participants of Study 1. The scales were filled by preschool teachers (exploratory factor analysis (EFA)) n = 201 and confirmatory factor analysis (CFA), n = 123, for a total of 324 participants). Based on EFA data, the average teaching experience was 14.43 years (*SD*=5.71). Considering the educational status of the teachers in the EFA study group, 180 (89.6%) had an undergraduate level of education, and 18 (9%) had a graduate level of education. Some teachers did not report their educational level.

The average teaching experience of the CFA study group was 9.50 years (*SD*=6.06). The educational backgrounds of CFA study group teachers were as follows: Three (2.4%) had associate degrees, 103 (83.7%) had bachelor's degrees, and 17 (13.8%) had master's degrees.

2.1.2. *Scale development*

The development process of the two teacher self-report scales, one measuring awareness about children's SR and the other assessing views on children's SR skills, involved a literature review and pursuing field experts along with preschool teachers' opinions. First, a literature review focusing on the conceptual explanations of SR (behavioral SR, cognitive SR, including dimensions of executive functions; working memory, attention flexibility, and inhibitory control) and related research was conducted (e.g., Berger *et al*., 2007; Bronson, 2000; Diamond, 2014; Diamond, 2012; Kopp, 1982; McClelland *et al*., 2019; McClelland & Tominey, 2015; McClelland & Cameron, 2012; Murray *et al*., 2016; Raffaelli *et al*., 2005; Savina, 2021; Tominey *et al*., 2018). The awareness scale was structured to measure the extent to which preschool teachers know the conceptual foundations of SR and its relation to learning. Therefore, only the theoretical explanations of SR and information on its relationship with learning were considered in determining the items of the awareness scale. This procedure resulted in the creation of an item pool and the determination of a draft of 24 items for the awareness scale. The views scale aimed to measure the extent to which teachers identify indicators related to children's SR skills in the context of preschools (e.g., raising a hand before talking, following rules). Hence, the scale included only items related to children's SR skills

that are more likely to occur in the preschool environment. This process resulted in the creation of a draft of the views scale, which included 12 items.

Four field experts and two preschool teachers examined the scope and face validity of both scales' draft items. The field experts primarily offered revisions to improve the clarity of the items, such as "Self-regulation is effective in learning academic skills (e.g., mathematics and language)." After adjusting both scales' items in line with experts' feedback, teachers were asked to fill in the scales by examining the clarity and comprehensibility of the items. Teachers generally suggested word choice (e.g., regulating instead of adjusting) and ambiguous statements. The scales' items were revised according to the teachers' feedback and were re-examined by a field expert and the researcher.

This procedure resulted in the construction of the final versions of the two scales: the awareness scale with 24 items and the views scale with 12 items. Both scales were teacher self-report measures that asked preschool teachers to rate their level of agreement about the items on a five-point Likert-type scale (1-Strongly Disagree-5-Totally Agree). The scales were delivered to preschool teachers via an online survey platform and face-to-face. Concerning the data collection process[†], first, data for EFA was collected to investigate the structure of the two scales. Then, data for CFA was collected to confirm the structure of the awareness scale obtained from EFA.

2.1.3. *Data analysis*

Data analysis consisted of EFA and CFA to explore the scales' construct validity, the McDonald's Omega (ω) and Cronbach's Alpha (α) coefficients to determine internal consistency reliability, and the Pearson correlation coefficient to examine the relationship between the awareness and views scales. The data was examined as part of the pre-analysis to determine missing values and outliers. There were no missing or extreme values in the EFA data. The data for CFA contained missing values. Six cells were left blank in the data set. These missing values were addressed with the series mean method. The views scale data contained 13 outliers identified by examining the box plot and *z* scores +-3 (Çokluk *et al*., 2012), which were removed from the data set.

By examining initial item-total correlations, items with a correlation under .30 were excluded from the scales to strengthen the structure (Büyüköztürk, 2009; Çokluk *et al*., 2012). EFA was conducted for both scales on data from 201 preschool teachers. The varimax method was preferred to obtain a more interpretable structure since it minimizes the complexity of the factors by maximizing the variance of the loadings on each factor (Tabachnick & Fidell, 2015). The Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity were inquired to decide whether the data was appropriate for factor analysis. Factors with an eigenvalue greater than 1 and the scree plots were utilized to determine the number of factors in the scales (Henson & Roberts, 2006). Decisions regarding inclusion and exclusion of items were made based on item loadings, cross-loadings, and a minimum of three salient loadings in a factor (Carpenter, 2018). Hence, the distribution of each item to the factors and the factor loadings were examined. Items with factor loadings between .30 and .59 are considered moderate for the correlation between the item and the factor (Çokluk *et al*., 2012). Based on these value ranges, items with .45 or higher factor loadings were retained in the scales, and items loading more than one factor were excluded. The EFA data's normality was examined using kurtosis and skewness values. The awareness scale's total and subscales' skewness values changed from -0.17 to .38, and the kurtosis values were between 0.52 and 0.87. The views scale's skewness value was -0.48, and

[†] EFA data of Study 1 and Study 2 were funded by the Scientific and Technological Research Council of Türkiye. Only CFA data were collected after the project was completed.

the kurtosis value was 1.45. The normality assumption was met since these values were between -1.5 and +1.5 (Tabachnick & Fidell, 2015).

CFA was conducted on data obtained from a different sample of 123 preschool teachers to verify the structure determined by EFA. For CFA data, the multivariate normal distribution of variables was tested with Mardia's skewness and kurtosis coefficients. Results showed that the awareness data (χ^2 =753; p <.001) and views scale data (χ^2 =788; p <.001) did not meet the multivariate normality assumption. Therefore, Robust Maximum Likelihood was utilized as the estimation method. In CFA, the following acceptable fit values were evaluated by considering the value ranges specified by Çokluk *et al*., (2012): Chi-square ratio = $\chi^2/df \leq 2.5$; RMSEA = ≤ .08; SRMR = ≤ .08; CFI = ≥ .90; TLI ≥ .90).

The Jamovi 2.3.28 program was used for CFA only, and SPSS version 23 was used for the other analyses.

2.2. Results

The findings obtained from the validity and reliability analyses of the awareness and views scales are presented below.

2.2.1. *Validity and reliability results for the Teachers' Awareness of Self-regulation in Children (TASRIC) Scale*

The construct validity of the TASRiC scale was examined with EFA. Initial corrected item-total correlations showed that eight items having low correlations with other items (under .30) were excluded from the scale (Büyüköztürk, 2009; Çokluk *et al*., 2012). EFA was conducted with the remaining items. Based on the examination of item factor loadings and cross-loadings, six items that had under .45 factor loadings and entered more than one factor in the exploratory factor analysis were removed from the scale for optimizing scale structure (Büyüköztürk, 2009). The corrected item-total correlations of TASRiC's with the remaining 10 items were presented in Table 1.

Table 1. *Item-total statistics of TASRiC.*

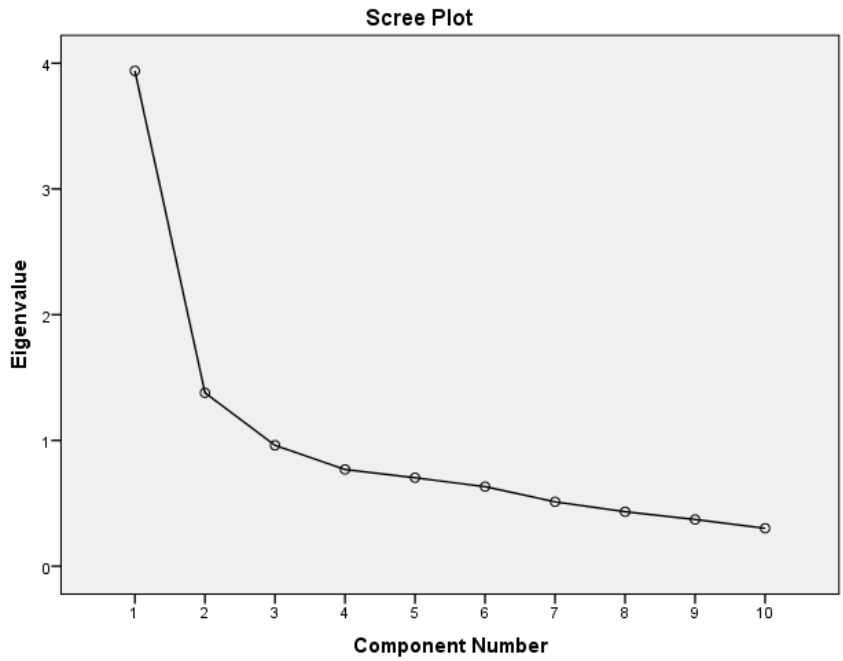
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	34.6169	15.158	.553	.800
2	34.8060	14.447	.507	.805
3	34.9055	14.346	.544	.800
4	34.4527	15.209	.581	.798
5	34.5323	15.020	.575	.797
6	34.7711	14.877	.436	.813
7	34.3532	15.370	.505	.804
8	34.4428	15.848	.405	.814
9	34.4129	15.454	.555	.801
10	34.6020	15.351	.439	.811

Table 1 shows that the lowest item-total correlation value is .41, and the highest value is .58. The values higher than .30 demonstrate that each item sufficiently correlates with the other items in the scale measuring preschool teachers' awareness of cognitive self-regulation.

The Kaiser-Mayer-Olkin (KMO=.817) and Bartlett Test of Sphericity (χ^2 = 611.050; p < .05) values were found to be suitable for factor analysis of the data. Factors with an eigenvalue greater than 1 and the scree plot were used to determine the number of factors (Büyüköztürk, 2009). The scree plot is presented in Figure 1. The plot shows that the scale does not exhibit precise lines after the second factor, indicating the presence of two factors in the scale. The first

factor, named self-regulation (eigenvalue = 3.94; variance (%) = 31.62), loaded seven items that related to cognitive self-regulation's aspect of executive functions: working memory, attention flexibility, and inhibitory control. "Relation to Learning", the second factor, loaded three items reflecting the associations between self-regulation and learning (eigenvalue = 1.38; variance (%) = 21.56). The cumulative explanation rate was 53.18%.

Figure 1. *The scree plot for TASRiC.*



The item loadings are presented in Table 2. According to Table 2, the factor loadings for the self-regulation subscale were between .58 and .74, and for the relation to learning subscale, they were between .67 and .90. The mean (*M*), standard deviation (*SD*), and reliability coefficients of the TASRiC's subscales were as follows: *M* = 3.79; *SD* =0.479; ω =.81, α=.80 for self-regulation, *M* =3.94; *SD*=0.519; ω=.76, α=.74 for relation to learning, and *M* =3.87; *SD*=0.423; and ω = .83, α= .82 for the total scale.

Table 2. *The TASRiC's factor loadings.*

		Factor Loadings	
	Items	1	2
Self-regulation	1.	.737	.105
	2.	.704	.102
	3.	.687	.066
	4.	.659	.282
	5.	.644	.306
	6.	.593	.247
	7.	.575	.102
Relation to learning	8.	.038	.896
	9.	.271	.796
	10.	.216	.669

CFA was performed to confirm the two-factor structure of the TASRiC scale obtained from EFA. Acceptable fit values were not reached in the first CFA results for the scale (Chi-square χ^2/df = 95.3/34 = 2.802; RMSEA = .107; SRMR = .066; CFI = .897; TLI = .864). In other words, RMSEA, CFI, and TLI showed poor model-data fit since the RMSEA value was greater

than .08, and CFI and TLI values were lower than .90 (Çokluk *et al*., 2012). Therefore, three modifications (1 to 4, 4 to 7, and 6 to 7) were made by examining the modification index. All these items were within the subscale of self-regulation. Moreover, modifications between these items theoretically make sense since they all reflect the executive functions aspect of cognitive self-regulation, including attention flexibility, working memory, and inhibitory control (Roebers, 2017). For example, item 1 (using/assessing sudden opportunities) is related to attentional flexibility, and item 7 (behaving by the rules in the absence of a teacher or adult) is associated with working memory and inhibitory control. After these modifications, CFA results were as follows: Chi-square χ^2/df =63.5/31 =2.048; RMSEA=.074; SRMR =.058; CFI = .934; TLI =.904. These indices showed acceptable model-data fit. As a result, the scale's 10-item two-factor structure showed an acceptable fit, which verifies the structure obtained in EFA.

2.2.2. *Validity and reliability results for the Teachers' Views on Children's Self-Regulation Skills (TVoCSRS) Scale*

Exploratory factor analysis was used to investigate the views scale's construct validity. The initial corrected item-total correlation values showed that two items had low correlations with other items (under .30), so they were removed from the scale. The corrected item-total correlations of the remaining 10 items were given in Table 3.

Table 3. *Item-total statistics of TVoCSRS.*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	34.7910	24.016	.824	.895
2	34.8408	23.605	.785	.896
3	34.9005	24.330	.729	.900
4	34.8955	23.754	.725	.899
5	34.9353	23.911	.733	.899
6	34.9303	23.925	.708	.900
7	34.9154	24.458	.634	.905
8	35.1841	23.181	.629	.907
9	34.9154	24.288	.630	.905
10	35.0796	24.764	.477	.916

Table 3 shows that the lowest item-total correlation value is .48, and the highest value is .82. The corrected item-total correlations are higher than .30, which indicates that each item adequately correlates with the other items in the scale measuring preschool teachers' views of children's SR skills. EFA was conducted using the remaining 10 items. The Kaiser-Mayer-Olkin (KMO = .906 - excellent) and Bartlett Test of Sphericity (χ^2 = 1282.731; $p < .05$) values show that the data is suitable for factor analysis (Büyüköztürk, 2009; Çokluk *et al*., 2012). EFA revealed a single-factor structure with 10 items (eigenvalue = 5.780; variance (%) = 57.80). The explanation rate was 58%. The scree plot is presented in Figure 2. It demonstrates that very precise lines did not separate the scale after the first factor, which reveals a single-factor structure. The TVoCSRS's factor loadings were presented in Table 4. It demonstrates that the item loadings of the TVoCSRS ranged from .55 to .88. The mean (M = 3.88) and standard deviation values (SD = 0.541) were computed. The internal consistency coefficient (Cronbach's α) was .91.

CFA was performed to verify TVoCSRS's structure. The first CFA results for the scale didn't indicate model-data fit (Chi-square χ^2/df = 236/35 = 6.74; RMSEA =.216; SRMR =.092; CFI =.773; TLI =.709). The RMSEA and SRMR values were greater than .08, and CFI and TLI values were lower than .90 (Çokluk *et al*., 2012). Parameter estimates revealed that standardized

regression coefficients were between .169 and .616, standardized beta coefficients ranged from .321 to .935, and explained variance-R^2 were between .103 to .875. Specifically, these values were low for items 8 (Standardized regression coefficient =.169, standardized beta coefficient = .321, R^2 =.103) and 10 (Standardized regression coefficient =.320, standardized beta coefficient = .466, explained variance-R^2 =.217), and thus they were removed from the model.

Figure 2. *The scree plot for TVoCSRS.*

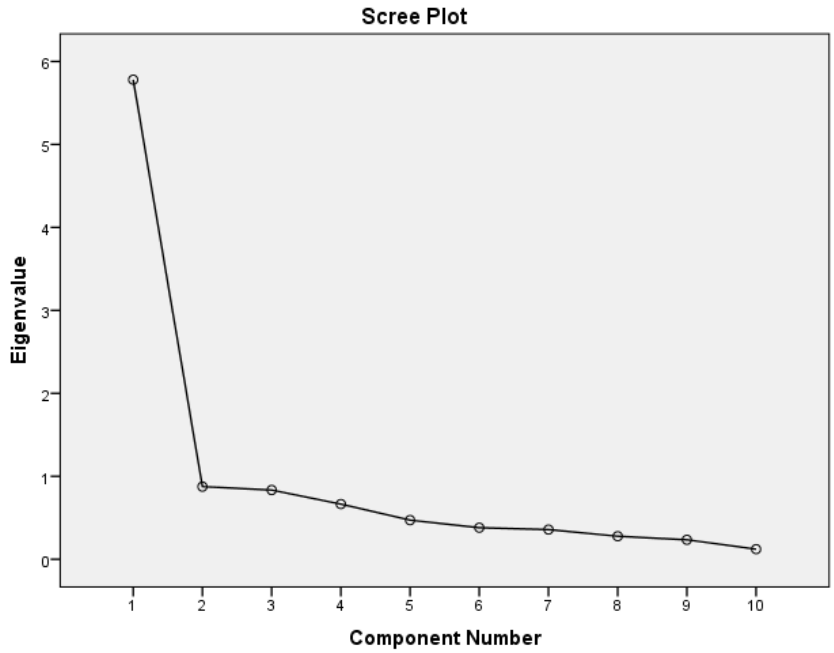


Table 4. *The TVoCSRS's factor loadings.*

Item no	Factor Loadings
1	.884
2	.856
3	.802
4	.801
5	.797
6	.776
7	.704
8	.690
9	.688
10	.546

After removing items 8 and 10 from the model and conducting modifications between items (6 and 7, 2 and 4), the goodness of fit values improved (Chi-square χ^2/df = 29.6/18 = 1.64 (Excellent); RMSEA=.028 (Excellent); SRMR=.031 (Good); CFI=.998 (Good); TLI=.997 (Good)). Theoretically, items 6 and 7 measure working memory, and items 2 and 4 are about working memory and inhibitory control. Therefore, it was thought that modifications could be made to these items since they measure similar skills related to self-regulation. With modifications, the remaining 8 items' standardized regression coefficients were between 0.321 and 0.655, standardized beta coefficients ranged from .579 to .964, and the explained variance was between .336 and .929. As a result of this procedure, the model data fit was obtained. After removing items 8 and 10 based on parameter estimates, EFA was repeated to examine the

construct validity of the remaining 8 items. The corrected item-total correlations of the items and factor loadings were presented in Table 5.

Table 5. *Item-total statistics and factor loadings of TVoCSRS.*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Factor Loadings
1	27.4129	14.704	.855	.894	.904
2	27.4627	14.360	.815	.896	.877
3	27.5224	14.991	.746	.902	.816
4	27.5174	14.561	.734	.903	.812
5	27.5572	14.798	.719	.904	.793
6	27.5522	14.679	.720	.904	.787
7	27.5373	15.170	.629	.912	.706
8	27.5373	15.260	.581	.916	.663

According to Table 5, the lowest item-total correlation value is .58, and the highest value is .86. The KMO (.894 - excellent) and Bartlett Test of Sphericity (χ^2 = 1107,306; p <.05) values indicate that the data is appropriate for factor analysis (Büyüköztürk, 2009; Çokluk *et al*., 2012). The results of EFA showed a single-factor structure (eigenvalue = 5.098; variance (%) = 63.72), and item loadings were between .663 and .904 with an explanation rate of 63.72%. The mean (M = 3.93) and standard deviation (SD = 0.546) were computed. The internal consistency coefficient (Cronbach's α) was .92.

Additionally, the relationship between TASRiC and TVoCSRS scales was calculated using the Pearson correlation coefficient. The findings are presented in Table 6. As seen in Table 6, there is a high level of positive correlation between the total TASRiC score and the self-regulation subscale (r = .84; p < .01) and in relation to learning (r = .86; p < .01). TVoCSRS positively correlates at a moderate level with TASRiC's self-regulation subscale and TASRiC's total score (r = .649; p < .01, r = .545; p < .01, respectively) and positively at a low level with TASRiC's relation to learning subscale (r = .29; p <.01).

Table 6. *Correlations between TASRiC and TVoCSRS (N=201).*

	1	2	3	4
1. TASRiC- Self-regulation	-			
2. TASRiC – Relation to learning	.439**	-		
3. TASRiC - Total	.835**	.861**	-	
4. TVoCSRS -	.649**	.289**	.545**	-

**p<.01

2.3. Discussion and Conclusion

Study 1 sought to construct two scales, one to assess preschool teachers' awareness of self-regulation and the other to measure their views on children's self-regulation skills. As discussed previously, preschool teachers' knowledge and skill levels on this issue have not been investigated sufficiently (Bautista *et al*., 2024; Montoya *et al*., 2023). Relatedly, the limited number of measurement tools on the subject also creates a methodological constraint; that is, measuring the construct quantitatively becomes difficult (Vasseleu *et al*., 2024).

EFA, conducted to examine the construct validity of TASRiC, revealed a two-factor structure: self-regulation and relation to learning. The scale's total explanation rate was 53.18%, which is sufficient based on the recommendation that the explained variance should be between 40% and 60% (Tabachnick & Fidell, 2015). Testing the TASRiC's internal consistency demonstrated that the McDonald's Omega coefficient of the self-regulation subscale and total scale is good.

The internal consistency of the relation to learning subscale is acceptable (Nunnally, 1978, cited in Streiner, 2003). It can be concluded that the scale's items are consistent and measure the construct of teachers' awareness of children's self-regulation. Moreover, CFA showed that the fit indices of the two-factor structure related to teachers' awareness of self-regulation were sufficient. The second scale developed in this study is TVoCSRS. The results of EFA indicated that the scale has a single-factor structure with an explanation rate of 63.72%. The scale had high internal consistency measured with Cronbach's alpha, demonstrating that its items are closely related as a single factor measuring preschool teachers' views on children's self-regulation skills. CFA results demonstrated that the fit indices obtained were adequate.

Further, the Pearson correlation coefficient was calculated to determine the relationship between TASRiC and TVoCSRS. The results showed a high level of positive correlation between the total TASRiC score and the self-regulation subscale and in relation to learning subscale. TVoCSRS had a moderately positive relationship with TASRiC's self-regulation subscale and TASRiC's total score. It also had a lowly positive relationship with TASRiC's relation to learning subscale. In conclusion, the correlations between the two scales were positive and ranged between low and moderate.

A moderate positive correlation between TASRiC and TVoCSRS implies that as the teachers' awareness about children's SR increases, their views on identifying children's self-regulatory skills in the classroom environment increase. It is intriguing that there is a positive but low correlation between TVoCSRS and TASRiC's relation to learning subscale. This suggests that teachers' understanding of the relationship between SR skills and learning, such as their effectiveness in academic learning and their learnability, weakly associates with their opinions about the indicators of these skills. Although adults may identify children's difficulties in following rules and ignoring distractions (Ackerman & Friedman-Krauss, 2017), they may not relate these difficulties to the SR construct or to their influence on learning, as seen in the correlations between TASRiC and TVoCSRS. As Blair and Razza (2007) proved, inhibitory control was an eminent correlate of early math and reading ability.

Although the findings of this study provide evidence for the construct validity and reliability of awareness and views scales, they should be interpreted with caution. One of the limitations of this study is related to the modified model obtained after conducting modifications in CFA. Despite the modified model's good fit with the CFA data, Çokluk *et al*. (2012) recommend testing it on a new sample to ensure its generalizability. Further research with a different study group is necessary in this case to evaluate the modified model fit, potentially providing further evidence about the construct validity of the awareness and views scales. Another limitation of this study relates to the study group's features. Both the EFA study group, with an average teaching experience of 14.43 years (*SD* = 5.71), and the CFA study group, with an average teaching experience of 9.50 years (*SD* = 6.06), seem to comprise experienced teachers. Subsequent studies have the potential to re-examine the structure of these measurement tools, incorporating study groups with demographic characteristics such as those new to their profession and those working in rural areas.

Along with these limitations, this study contributes to the literature by providing two scales to measure preschool teachers' awareness of SR and their views on SR skills in a valid and reliable way. English and Turkish versions of the scales are presented in the Appendix. As emphasized earlier, there is less focus on determining teacher knowledge, partly because of a lack of measurement tools (Vasseleu *et al*., 2024). Teachers' in-service training needs regarding this issue can be determined using these scales. Similarly, these scales can be useful in cultures where practicing teachers are unfamiliar with the concept of children's SR and in preschool education programs that do not explicitly address this construct. Furthermore, gathering data from teachers via scales is becoming increasingly challenging due to their intense workload. The TASRiC and TVoCSRS are short scales. They are not time-consuming for teachers to fill

out. Future research may benefit from using these brief scales to identify teachers' awareness and views of SR and how they correlate with children's SR skills.

3. STUDY-2

3.1. Method

Study 2 examined the effect of the PD program on the preschool teachers' awareness of self-regulation and their views about children's self-regulation skills, using a pretest and posttest design in an experimental group without a control group.

3.1.1. *Study group*

The participants were determined by using a criterion sampling technique. These criteria included teaching children in the 4-5 age group, volunteering, and not having previously participated in any training related to children's SR. Public preschool teachers working in a mid-sized city in the southwestern part of Türkiye applied to this PD program by completing an online application form. Then, 23 teachers were determined among the applicants by drawing lots online. Due to missing data, the analysis did not include data from two participants. Participants' average teaching experience was 14.10 years (*SD* = 3.12). Most were (81.0%) college graduates, and only four (19.0%) had a graduate degree. The average number of children in their classrooms was 18.71 (*SD* = 4.38). Nine of them (42.9%) worked with five-year-olds, nine participants (42.9%) taught four-year-olds, one (4.8%) worked with 3-4-year-olds, and two of them (9.5%) worked with 5-6-year-old children.

Two questions in the demographic information form determined the participants' ratings of their level of knowledge and practical skills about SR (see below). According to the participants' self-report, eight (38.1%) had either no knowledge or a low level, 13 (61.9%) had a moderate level, and none had a good/advanced level of knowledge about children's SR skills. Regarding the practical skills needed to support children's SR skills, approximately half of the participants had either no skills or a low level (47.6%), 10 participants (47.6%) had moderate skills, and 1 participant (4.8%) had advanced skills.

3.1.2. *Data collection tools*

Study 2 employed the demographic information form, the awareness (TASRiC), and views (TVoCSRS) scales created in Study 1 as data collection tools.

Demographic information form: An information form was used to ascertain the characteristics of the participants, including teaching experience, the number of children in their classrooms, educational status, and items for self-assessment of their knowledge and practical skills about children's SR. The items for self-assessment asked teachers to rate their knowledge (1 = no knowledge to 5 = advanced level of knowledge) and skill levels (1 = I do not have any to 5 = I have advanced skills) regarding children's self-regulation using a five-point rating system.

Teachers' Awareness of Self-Regulation in Children (TASRiC): TASRiC aims to assess preschool teachers' awareness of children's self-regulation. The instrument has 10 items with two subscales: self-regulation (7 items—e.g., self-regulation is about keeping in mind what is said/described) and relation to learning (3 items—e.g., self-regulation skills make it easier to learn a knowledge/skill). Teachers rate their level of agreement on a five-point Likert-type scale (1-Strongly Disagree-5-Totally Agree). The scale's explanation rate was 53.18%. The reliability coefficients of the subscales were ω =.81, α =.80 for self-regulation, ω =.76, α =.74 for relation to learning, and ω =.83, α =.82 for the total scale.

Teachers' Views on Children's Self-Regulation Skills (TVoCSRS): This scale assesses preschool teachers' views on the indicators of children's self-regulation skills. It has a single-factor structure with 8 items (e.g., raising a hand and waiting a turn at an activity). Preschool teachers rate their level of agreement on a five-point Likert-type scale (1—Strongly Disagree—5—

Totally Agree). The scale has a 63.72% explanation rate with Cronbach's alpha coefficient of .92.

3.1.3. *Data collection and analysis*

The participant teachers completed the TASRiC and TVoCSRS scales as pretests at the beginning of the PD program. After teachers participated in the PD program for five days, the same instruments were implemented as posttests. Then, the pretest and posttest data were entered into the SPSS program. In data analysis, descriptive statistics about the pretest and posttest were computed. Due to the low number of participants in Study 2 (n = 21), the PD program's effect on teachers' awareness of children's SR and views on children's SR skills was examined using a nonparametric technique known as the Wilcoxon Signed Rank Test, and calculating the effect size by using the formula given in Equation 1 (Fritz *et al*., 2012). For effect size, 0-0.29 means small, and 0.30-0.49 indicates medium effect. Values 0.50 and above are considered large effects (Cohen, 1988).

$$r = \frac{z}{\sqrt{N}} \quad (1)$$

3.1.4. *Procedure: Teacher PD program on children's self-regulation*

The preschool teachers' PD program lasted five days and approximately four to six hours daily. Six early childhood faculty members were responsible for constructing and conducting the PD program sessions (see Ivrendi *et al*., 2022) for details about the theoretical framework used for this PD). The first purpose of the program was to raise preschool teachers' awareness about the concept of self-regulation, its domains, and the different ways of supporting it on a typical preschool day. The second purpose was to foster teachers' understanding and skills to implement the Red Light Purple Light Self-Regulation (RLPL) Intervention program in their classrooms. The RLPL is a game, music, and movement-based program developed by Tominey *et al*. (2018) (See details about the permission to use RLPL and its adaptation to Turkish in Ivrendi *et al*., [in press]). The sessions were constructed by considering the two purposes of the PD and roughly had the following structure: a theoretical introduction, questions, an exchange of experiences, practice examples, and small-large group discussions. A summary of the PD content is given below:

Day 1: The sessions centered on the theoretical explanations of SR, including its definition, development, and impact on various skills; the sharing of teachers' previous experiences with SR; and strategies for promoting such skills in a typical classroom setting.

Day 2: The sessions focused on providing parental guidance for SR, introducing the RLPL, watching sample videos, discussing the RLPL's sessions, and singing songs from the RLPL.

Day 3: The sessions aimed to help the participants experience the RLPL games as if they were children. The researcher acted as a teacher, modeling the implementation of the games in a child-friendly manner. The focus of the aftermath discussions was on the participants' observations and thoughts about the games and their potential implementation in preschool classrooms.

Day 4: The role-play of RLPL games was conducted in which the participants acted as teachers and children while the researcher offered guidance when needed. The aftermath discussions centered on the participants' feelings about implementing the games, as well as their thoughts on potential problems and solutions that could arise when implementing them in the classroom.

Day 5: The sessions were about what teachers need to be careful about when implementing the RLPL in their classrooms, embedding the dimensions of cognitive SR (e.g., working memory, inhibitory control) in other traditional games and music, and in the Ministry of National Education Preschool Education Program (e.g., classroom organization, visual clues, giving choices) and evaluating the PD program.

This way of organizing the content and implementing the PD program aimed to assist the participants in progressing step by step, developing an understanding of the theoretical foundations of SR and related practical skills. Documentations that emerged from group activities and reflective journals were kept, but they are not included in this study. Although the participants received follow-up support through an online meeting, classroom visits, and online platforms after the completion of the PD, these supports were not ongoing.

3.2. Results

Descriptive statistics for participating teachers' pretest and posttest scores of TASRiC were as follows: Self-regulation subscale ((Pretest) = 4.00, *SD* = 0.39; (Posttest) = 4.75, *SD* = 0.28), relation to learning subscale ((Pretest) = 4.19, *SD* = 0.45; (Posttest) = 4.92, *SD* =0.18), and total of TASRiC ((Pretest) = 4.05, *SD* =0.35; (Posttest) = 4.80, *SD* =0.21). The pretest average mean score of the self-regulation subscale is lower than the relation to the learning subscale. All the posttest scores reflect the increase in teachers' agreement about whether the items related to children's self-regulation skills (5 = Totally Agree). The descriptive values of the TVoCSRS (pretest mean = 4.07, *SD* = 0.56; posttest mean = 4.82, *SD* = 0.25) demonstrate an increase in the participants' views about identifying the indicators of self-regulation skills exhibited in classrooms. The effect of PD on the participants' pretest-posttest scores regarding their awareness of children's SR was compared using the Wilcoxon Signed-Rank Test results (Table 7).

Table 7. *Wilcoxon Signed Ranks Test results about the pretest-posttest scores of the TASRiC.*

Posttest-Pretest		*N*	Mean rank	Sum of ranks	*Z*	*p*
Self-regulation posttest-pretest scores	Negative ranks*	1	1.00	1.00		
	Positive ranks**	19	11.50	209.00		
	Ties	1			-3.890	.001
Relation to learning posttest-pretest scores	Negative ranks	0	0.00	0.00		
	Positive ranks	17	9.00	153.00		
	Ties	4			-3.662	.001
TASRiC's total posttest-pretest scores	Negative ranks	0	0.00	0.00		
	Positive ranks	21	11.00	231.00		
	Ties	0			-4.015	.001

*Based on negative ranks; **Based on positive ranks

According to Table 7, there is a statistically significant difference between the participants' pretest and posttest (p <.001) scores in self-regulation, relation to learning, and total scale. These differences favor the posttest. The calculated effect size shows a large difference between the scores (r = .88). Hence, the PD program seems to increase preschool teachers' awareness about children's self-regulation. Using the Wilcoxon Signed Ranks Test, the participants' pretest-posttest scores about their views on children's SR skills were investigated, and the results are presented in Table 8.

Table 8. *Wilcoxon Signed Ranks Test results about the pretest-posttest scores of the TVoCSRS*

Posttest-Pretest		*N*	Mean rank	Sum of ranks	*Z*	*p*
Teachers' Views on Children's Self-Regulation Skills	Negative ranks*	1	2.50	2.50		
	Positive ranks**	18	10.42	187.50		
	Ties	2			-3.735	.001

*Based on negative ranks; **Based on positive ranks

Table 8 shows a statistically significant difference between the participants' pretest and posttest scores (p < .001), which favors the posttest. The calculated effect size demonstrates a large

difference between the scores (r = 82). According to these findings, the PD program increased teachers' views on children's self-regulation.

3.3. Discussion and Conclusion

Study 2 investigated the PD program's effect on the participant preschool teachers' awareness and views about children's SR. One of the findings of this study was that the statistically significant difference between the participants' pretest and posttest awareness scores measured by TASRiC was in favor of the posttest. This finding implies that after attending the PD program, participants' understandings of SR's cognitive domain and its facilitation of children's learning increased significantly compared to their pretest scores. They could relate features, such as retaining what is said in mind, responding appropriately to instructions, mentally associating parts of an event, and intentional control of attention, behavior, thoughts, and/or emotions, to children's SR. Possible explanations for this finding might be that the participants volunteered to participate in this PD program. Also, the descriptive statistics about the participants' level of knowledge and practical skills for supporting self-regulation indicated that SR was a novel notion for them. Their responses demonstrated that 38% of the participants either never heard of the term self-regulation or had limited knowledge about it. Considering these factors, the PD activities of this study appeared to match the participant teachers' need for knowledge about children's self-regulation, which coincides with the argument that promoting teacher learning and classroom practices reflects features of high-quality PD (Garet *et al*., 2001). This PD program provided participants with theoretical information about the definitions of self-regulation, its dimensions, and how it facilitates learning. In addition, the participants gained insight into how a broader perspective, which considers classroom interactions, guidance, and structure, can support SR (Diamond & Lee, 2011). They learned about the intervention program, RLPL, specifically designed to promote SR. Moreover, the participants had opportunities to share their thoughts, practice, and discuss new learning with their colleagues and research team. As emphasized in the literature, knowledge sharing (Lee *et al*., 2023) and PD activities that allow teachers to think and reflect on their practice (Vujičić & Tambolaš, 2017) are essential in encouraging them to implement appropriate classroom practices. The study's finding, which showed a difference in the participants' pretest and posttest awareness scores, aligns with research findings that link teacher knowledge to the PD activities they participate in (Atmaca & Ertürk Kara, 2023; Iriogbe-Efionayi, 2020). Additional support for this comes from current research, which found that educators' confidence in their knowledge of SR improved after participating in a program promoting children's SR (Vasseleu *et al*., 2024).

The results further showed that the participants' posttest scores regarding their views of children's SR skills were higher than their pretest scores. This indicates that the participants, after participating in this PD, were able to relate indicators such as raising hands, waiting for their turn, and complying with the rules regarding learning centers with SR. Without appropriate theoretical knowledge and explanations, teachers may have difficulty connecting such indicators to SR, and they may be unable to distinguish between children with well-developed and underdeveloped self-regulatory skills. As Vasseleu *et al*. (2024) point out, children with well-developed SR can sustain attention by ignoring distractions, interacting positively with others, and not giving up easily on challenging tasks. The descriptives in the study group section reveal that nearly half of the participants in this study either lacked or had low skills to support children's SR in the classroom environment. This finding is consistent with other research, indicating that teachers did not know about children's SR skills (Willis *et al*., 2014), lacked strategies to foster these skills (Bautista *et al*., 2024), and perceived this construct differently from the literature (Vasseleu *et al*., 2022). Teachers' shortcomings in conceptual and practical skills may stem from the lack of emphasis on children's SR skills in preservice teacher education and in-service training programs. Hence, pre-service teacher education and in-service training programs could be restructured to support the knowledge base about developing and promoting children's SR in early childhood settings.

Based on the results discussed above, the structure of this current study's PD effectively increased preschool teachers' cognizance and opinions about child SR. This study's PD program structure worked well in the context where SR is relatively new for early childhood teachers. However, PD providers may directly focus on practical skills and intervention programs in cultures where there is no need for theoretical foundations, which can be determined using measurement tools such as TASRiC and TVoCSRS. This approach increases the likelihood of creating PDs that are more purposeful and tailored to teachers' needs.

Although this current study found that PD activities effectively promoted teachers' awareness and views on SR, it also has limitations. One limitation is that the study employed a pretest-posttest design to examine the impact of PD activities on teachers' awareness of SR and their opinions of children's SR skills. More specifically, this study did not include a control group and a persistence test. Planning the research with a control group could aid in comparing the knowledge and skill levels of teachers regarding this concept between those who participated in PD activities and those who did not receive such training. Simultaneously, the PD activities can more clearly reveal the gains on this issue. Including a persistence test in the research may allow future research to determine the level of retained knowledge by using teacher self-report measures, such as TASRiC and TVoCSRS. Implementing newly learned knowledge is necessary for retaining PD knowledge (Liu & Phelps, 2020). Hence, other researchers may conduct follow-up studies that measure whether teachers retain gained knowledge and to what extent their knowledge influences children's skills. The small size of the study group (n = 21) is another limitation of this study. The study's findings indicated that PD activities effectively enhanced teachers' SR knowledge, suggesting the possibility of offering these activities to larger sample groups as part of preschool teachers' in-service training.

3.3.1. *Implications*

The present study underscores the need to empower preschool teachers by supporting them through targeted PD activities about children's self-regulation. Results indicated that teachers who experienced the PD program increased their awareness and views about children's SR. Therefore, given the significance of SR in children's lives and the lack of knowledge and strategies among teachers to promote such skills in the classroom (Bautista *et al*., 2024; Willis *et al*., 2014), it is necessary to implement teacher training programs that primarily focus on knowledge gain and practical skills. Evidence from research supports this, demonstrating a correlation between teachers' self-regulation knowledge and PD (Iriogbe-Efionayi, 2020). Also, research reports that only a small percentage of teachers participate in PD programs, but providing support on how to transfer theory to the classroom environment may increase their participation (Willis *et al*., 2014). Consequently, it is essential to provide PD programs that meet teachers' needs, incorporate differentiating features such as content that combines theoretical knowledge and practical skills, and methods that offer opportunities for small group reflection on the newly learned knowledge and past experiences.

Acknowledgments

This research was supported by The Scientific and Technological Research Council of Türkiye, grant 121B351. The opinions, views, and ascertains expressed are those of the author and do not represent the views of the Council.

Declaration of Conflicting Interests and Ethics

The author declares no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in IJATE belongs to the author. **Ethics Committee Number**: Pamukkale University, Protocol No:10.131.1.47 430 Dated: 2021, and 10.131.1.35 Dated:2023.

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APPENDIX

Appendix 1. *Turkish and English versions of the scales.*

Çocuklarda Öz-Düzenlemeye ilişkin Öğretmenlerin Farkındalığı

Öz-düzenleme	Kesinlikle Katılmıyorum	Katılmıyorum	Kısmen Katılıyorum	Katılıyorum	Tamamen Katılıyorum
1. Ani fırsatları kullanabilmesi/değerlendirebilmesi ile ilgilidir.					
2. Öğretmenin yönergelerine uygun bir şekilde tepki vermesi ile ilgilidir.					
3. Söylenenleri/anlatılanları aklında tutması ile ilgilidir.					
4. Farklı ortamlarda/etkinliklerde davranışlarının yoğunluğunu, sıklığını, süresini düzenlemesi ile ilgilidir.					
5. Bir olayın/durumun parçalarını zihinsel olarak ilişkilendirmesi ile ilgilidir.					
6. Bir görevi tamamlamama isteğine karşı koyabilmesi ile ilgilidir.					
7. Öğretmen ya da yetişkin yokluğunda kurallara uygun davranması ile ilgilidir.					
8. Akademik becerileri (matematik, dil gibi) öğrenmesinde etkilidir.					
9. Bir bilgiyi/beceriyi öğrenmesini kolaylaştıran becerilerdir.					
10. Öğrenebildiği becerilerdir.					

Teachers' Awareness of Self-Regulation in Children

Self-regulation is about	Strongly Disagree	Disagree	Partially Agree	Agree	Strongly Agree
1. Being able to use/assess sudden opportunities.					
2. Responding appropriately to the teacher's instructions.					
3. Keeping in mind what is said/told.					
4. Regulating behaviors' intensity, frequency, and duration in different environments/activities.					
5. Mentally associating the parts of an event/situation.					
6. Being able to resist the urge not to complete a task.					
7. Behaving by the rules in the absence of a teacher or adult.					
8. Self-regulation is effective in learning academic skills (such as mathematics and language).					
9. Self-regulation skills make it easier to learn a knowledge/skill.					
10. Self-regulation skills can be learned.					

Çocukların Öz-Düzenleme Becerileri ile ilgili Öğretmen Görüşleri

Öz-düzenleme becerileri	Kesinlikle Katılmıyorum	Katılmıyorum	Kısmen Katılıyorum	Katılıyorum	Tamamen Katılıyorum
1. Dikkatini, bitirilen bir etkinlikten sonra yeni başlanılan etkinliğe verebilmeyle ilgilidir.					
2. Diğer etkinliğe başlamadan önce yaptığı etkinlik ile ilgili materyalleri yerine koymayla ilgilidir.					
3. Yönergeleri takip ederek diğer etkinliklerden büyük grup zamanına ve büyük grup zamanından da diğer etkinliklere geçiş yapmayla ilgilidir.					
4. Güvenlik kurallarını takip etmeyle (örneğin, binaya girerken yürümek, kaydırakta bir seferde bir çocuğun kayması gibi) ilgilidir.					
5. Öğrenme merkezleri ile ilgili kurallara uymayla ilgilidir.					
6. Hikâyeye dikkat ettiğini gösteren sorular sorma ile ilgilidir.					
7. Öğretmenlerin ya da akranların sorularına cevap vermekle ilgilidir.					
8. Bir etkinlikte parmak kaldırmak ve sırasını beklemek ile ilgilidir.					

Teacher's Views on Children's Self-Regulation Skills

Self-regulation skills are about	Strongly Disagree	Disagree	Partially Agree	Agree	Strongly Agree
1. Being able to pay attention to a new activity after completing an activity.					
2. Putting the materials related to the activity he/she is doing before starting the other activity.					
3. Transitioning from other activities to large group time and from large group time to other activities, following directions.					
4. Following safety rules (e.g., walking when entering the building, going down the slide one child at a time, etc.).					
5. Complying with the rules regarding learning centers.					
6. Asking questions that show he/she is paying attention to the story.					
7. Answering questions from teachers or peers.					
8. Raising a hand and waiting a turn at an activity.					