

VALIDITY AND RELIABILITY STUDY OF THE SELF-REGULATION SKILLS SCALE FOR INFANTS

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Abstract

This study reports the development and psychometric evaluation of a novel instrument designed to assess self-regulation capacities in infants aged 6-24 months. The methodological framework of the study was grounded in contemporary measurement theory and relied on data obtained from 316 parents residing in the central districts of İstanbul through an online assessment procedure via an online assessment. Data were collected using a Demographic Information Form and the Self-Regulation Skills Scale for Infants, which, the latter of which was specifically constructed to capture early manifestations of self-regulatory functioning. The scale was conceptualized as a multidimensional construct encompassing cognitive, emotional, and behavioral components of self-regulation. ContentThe content relevance and representativeness of the items were established through systematic expert appraisal, and quantitative evidence was derived using the Lawshe content validity framework. The latent structure of the scale was tested via confirmatory factor analysis, and item-level performance was examined through item-total correlation coefficients. Internal consistency estimates were computed using Cronbach's alpha. The results demonstrated that the hypothesized three-factor model exhibited acceptable model fit indices, providing empirical support for the proposed dimensional structure. The final form of the scale consists of 29 items distributed across three subscales. The overall reliability coefficient ($\alpha = 0.919$) indicates a high degree of internal consistency. Taken together, the findings provide robust evidence that the instrument yields reliable and valid measurements of infant self-regulation and may serve as a methodologically sound tool for empirical research and applied practice in early childhood development.

Keywords: Infant, Reliability, Scale development, Self regulation, Validity.

INTRODUCTION

Self-regulation is conceptualized as a multidimensional construct examined within various theoretical frameworks. It is commonly defined as an individual's capacity to manage cognitive, emotional, and behavioral processes in a goal-directed manner (Nigg, 2017), while social-cognitive approaches emphasize the role of self-directed guidance and control of behavior (Zimmerman, 2017). From a developmental and neuropsychological perspective, self-regulation is viewed as a dynamic construct emerging from the interaction of attention, executive functions, and emotional processes (Doebel, 2020), with these components functioning in an integrated and complementary manner.

The literature suggests that cognitive self-regulation supports the regulation of emotional responses through attention control and executive functions, whereas emotional regulation capacity, in turn, influences behavioral control and goal-directed actions (Morawetz, Bode, Baudewig, Jacobs & Heekeren, 2020). Behavioral self-regulation is likewise shaped by cognitive planning and emotional regulation processes (Duckworth, Gendler, & Gross, 2019). Developmentally, these components are understood to form a mutually reinforcing system that becomes increasingly integrated through caregiver interactions and neurodevelopmental maturation from infancy onward (Bridgett, Burt, Edwards & Deater-Deckard, 2015; Robson, Allen & Howard, 2020).

This integrative perspective highlights that the development of self-regulation cannot be explained solely by individual maturation but must be considered within the context of caregiver-child interactions and environmental influences. Empirical evidence indicates that sensitive and consistent caregiver responses during infancy support the emergence of self-regulation through joint attention, scaffolding of emotional responses, and the structuring of behavior (Bridgett et al., 2015; Perry, Dollar, Calkins, Keane & Shanahan, 2018). In addition, environmental factors such as family context, socioeconomic conditions, and stress levels play a significant role in shaping these processes (Montroy, Bowles, Skibbe, McClelland & Morrison, 2016; Ursache & Noble, 2016). Accordingly, early assessment of self-regulation contributes to the identification of risk indicators and provides important insights into developmental trajectories (Robson et al., 2020).

In this context, a range of assessment tools has been developed to evaluate self-regulation in early childhood. However, these instruments predominantly focus on specific dimensions-particularly emotional or behavioral regulation (Mirabile, 2008; Shields & Cicchetti, 1997) and are largely designed for preschool- and school-aged populations (Acar & Arslan, 2022; Erol & İvrendi, 2018). There remains a limited number of tools specifically designed for infancy that comprehensively assess the cognitive, emotional, and behavioral dimensions of self-regulation. Therefore, the present study aims to develop a multidimensional assessment tool for infants aged 6-24 months.

MATERIAL AND METHOD

Research design

This study was designed as a methodological investigation based on scale development procedures. Methodological studies aim to develop new measurement instruments and examine their validity and reliability (DeVellis, 2017). In this context, the psychometric properties of the Infant Self-Regulation Skills Scale (ISRSS), developed to assess self-regulation in infants aged 6-24 months, were evaluated. Data collected via Google Forms were analyzed using the Lawshe technique for content validity, CFA and item analyses for construct validity, and Cronbach's alpha for reliability (Worthington & Whittaker, 2006).

Participants

The study sample was established to assess the self-regulation skills of both term (typically developing) and preterm infants; accordingly, efforts were made to ensure a balanced representation of parents of term and preterm infants. In determining the sample size, the commonly recommended ratio of 5-10 participants per item was considered (Cohen & Swerdlik, 2018). Accordingly, data were collected from a total of 316 parents, including 167 mothers and 149 fathers. The demographic characteristics of the participants are presented in Table 1.

Table 1. Frequency Distribution of Demographic Information of Parents and Their Infants

Demographic Information		N	%
Infant's Sex	Female	108	34.0
	Male	208	66.0
Gestational Age at Birth	32-34 weeks	91	29.0
	35-36 weeks	59	19.0
	37 weeks and above	166	52.0
Infant's Age	6-12 months	84	27.0
	13-18 months	137	43.0
	19-24 months	95	30.0
Birth Status	Full-term	166	53.0
	Preterm	150	47.0
Number of Children in the Family	One child	192	60.0
	Two children	91	30.0
	Three children	33	10.0
Birth Order	First child	212	67.0
	Second child	63	20.0
	Third child	41	13.0
Mother's Age	20-25 years	89	28.0
	26-30 years	157	50.0
	31-36 years	70	22.0
Father's Age	20-25 years	67	21.0
	26-30 years	102	32.0
	31-40 years	147	47.0
Total		316	100.0

Data Collection Instruments

For the present study, data were collected using two instruments: a researcher-developed Demographic Information Form and the ISRSS.

Demographic Information Form

The Demographic Information Form was designed by the researchers to collect data on infants' chronological age, biological sex, gestational age at birth, and birth order, and parental demographic variables, including parental age and number of children in the household.

Infant Self-Regulation Skills Scale(ISRSS)

A schematic overview of the scale development and validation process is presented in Figure 1.

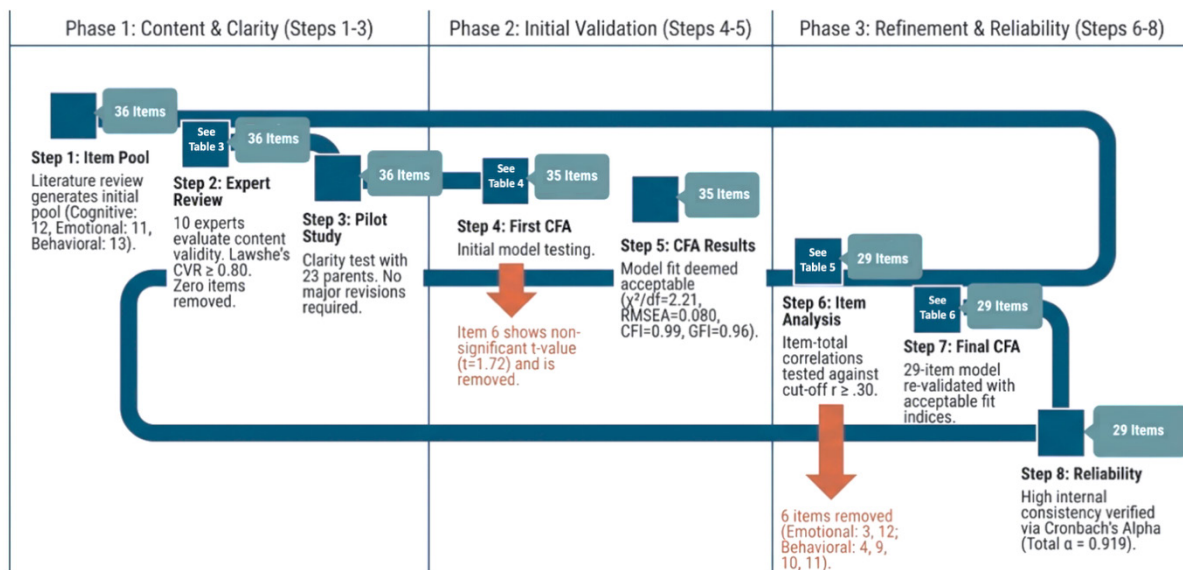


Figure 1. Schematic overview of the scale development, validity and reliability process

For the validity and reliability study assessing infants' self-regulation skills, a comprehensive literature review was initially conducted to define the characteristics of the construct to be measured. To this end, several relevant theoretical sources (De Gangi, 2017; Schunk & Greene, 2018; Vohs & Baumeister, 2016) and empirical studies (Bernier, Carlson, & Whipple, 2010; Dan, 2016; Montroy et al., 2016) were examined. The dimensional framework of the ISRSS was established on the basis of existing literature, delineating cognitive, emotional, and behavioral subdimensions.

The Cognitive Self-Regulation subdimension aims to assess infants' cognitive processes, such as focusing, sustaining, and sharing attention. The Emotional Self-Regulation subdimension focuses on behaviors like expressing emotions, calming down independently or with adult support, and managing emotional responses. The Behavioral Self-Regulation subdimension includes skills such as following instructions and adapting to daily routine activities (e.g., dressing, eating) with or without adult guidance. Sample items representing the subdimensions are presented in the table in the appendix.

Following a comprehensive review of the relevant literature, an item pool consisting of 36 items was developed for the Self-Regulation Skills Scale for Infants (SRSI). The initial item set comprised 12 items representing Cognitive Self-Regulation, 11 items reflecting Emotional Self-Regulation, and 13 items corresponding to Behavioral Self-Regulation. To assess the appropriateness of the scale items for their intended purpose and to establish content validity, expert judgments were obtained from ten specialists in child development. Based on their feedback, revisions were made, and the scale was finalized for the pilot implementation phase.

To assess the clarity and comprehensibility of the SRSI items, a pilot study was conducted involving 23 parents (13 mothers and 10 fathers) selected independently of the main study group. During the face-to-face pilot implementation, parents were provided with the scale and asked to read all items carefully. Before the administration, participants were instructed to note any unclear or ambiguous expressions in the designated blank section at the bottom of the scale. Completing the scale took approximately 10 to 15 minutes.

The SRSI was designed using a five-point Likert format and can be completed by both mothers and fathers. All items were scored in the same direction, with no reverse-coded items included in the scale. Higher scores on the subscales and the total score indicate greater positive development of self-regulation skills.

Data collection

The data collection phase for the validity and reliability analyses of the scale was originally scheduled for May–August 2021 and targeted parents attending pediatric outpatient services at hospitals in the central districts of Istanbul. However, due to restrictions on conducting scientific research at healthcare institutions following the COVID-19 pandemic, the researchers decided to collect data online. The data were ultimately collected between January and June 2022. Parents were first presented with an informed consent form via Google Forms, which provided detailed information about the study. Those who gave their consent were asked to complete the “General Information Form,” followed by the Infant Self-Regulation Skills Scale (ISRSS). The psychometric evaluation of the SRSI was based on data obtained from a sample of 316 parents.

Data Analysis

Data analysis was performed with IBM SPSS Statistics Version 21. The first phase of the psychometric evaluation focused on content validity, which was established by subjecting the initial item pool to expert review and applying the Lawshe technique to assess item appropriateness.

CFA was conducted to test the adequacy of the hypothesized measurement model. CFA is defined as the evaluation of the extent to which the subdimensions of a scale align with the theoretical framework derived from the literature (Çapık, 2014). Accordingly, CFA was initially conducted to test the construct validity of the SRSI. In scale development and adaptation studies, when the relationships among items are not yet clearly established, Exploratory Factor Analysis (EFA) is typically performed first to identify the factor structure, followed by CFA to confirm this structure (Worthington & Whittaker, 2006). However, if the number of factors is predetermined, CFA can be conducted without prior EFA (Kline, 2011). Since the number of factors for the SRSI (three subdimensions) had already been determined in the literature review, CFA was performed directly to evaluate construct validity.

The internal reliability of the scale was assessed using Cronbach’s alpha, the primary index of internal consistency. Additionally, item-total correlations (item validity coefficients) were examined to evaluate the suitability of individual items. Items performing below the established cutoff values were eliminated, and internal consistency indices and item–total correlations were subsequently recalculated. Following removal of these items, CFA was conducted again on the revised scale.

Limitations of the Study

This study has several methodological limitations. First, the sample was restricted to parents residing in the central districts of Istanbul and to term and preterm infants, which may limit the generalizability of the findings to populations with different regional, socioeconomic, and clinical characteristics. Second, the scale’s coverage of a broad age range (6–24 months) may introduce developmental heterogeneity. However, the instrument was designed as a dimensional measure rather than a normative developmental assessment tool. Finally, the absence of reverse-coded items may have limited control over acquiescence and social desirability biases.

Ethical Aspects of the Research

Approval for the research was obtained from the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University (Decision No. 800; August 29, 2024), and all study procedures were implemented in accordance with the ethical standards set forth in the Declaration of Helsinki.

RESULTS

The subsequent section outlines the findings obtained from the psychometric evaluation of the Self-Regulation Skills Scale for Infants (SRSI).

Results Related to Content Validity of the Scale

In order to evaluate the appropriateness of the items in relation to the scale’s intended purpose and to establish content validity, expert opinions were obtained from ten independent specialists holding doctoral degrees in child development. However, the feedback provided by the experts was primarily qualitative rather than quantitative in

nature(Shuttleworth, 2016).To obtain quantitative indicators of content validity, data necessary for calculating the CVR and CVI were generated through the application of Lawshe's(1975)method.

In this method, each item is evaluated by experts in terms of whether it accurately represents the construct being measured. Experts are asked to indicate whether each item should be retained, revised, or eliminated. In this study, the response options were adapted to three categories: “The item is appropriate,” “The item is not appropriate,” and “The item can be revised,” and experts were asked to provide their assessments accordingly.

Item-level content validity was quantified using the CVR, which reflects the normalized difference between expert endorsements and half of the total expert sample(see Figure 2).Overall content validity was indexed by the CVI, calculated as the arithmetic mean of the CVR values across items.

$$\text{CVR} = (\text{Nu} - N/2) / N/2. \quad \text{CVI} = \text{Avg} (\text{CVR})$$

*Nu: Those who indicated it as appropriate

*N: All experts who provided evaluations

Figure 2. Formulas for Content Validity Ratio (CVR) and Content Validity Index (CVI)

The CVR estimates obtained from expert appraisal are reported in Table 2.

Table 2. Item Appropriateness Ratios of the Self-Regulation Skills Scale for Infants (36 items)

Cognitive Self-Regulation	Item Appropriateness Ratios	Emotional Self-Regulation	Item Appropriateness Ratios	Behavioral Self-Regulation	Item Appropriateness Ratios
1	0.80	3	0.80	4	1.00
2	1.00	12	1.00	9	0.80
5	1.00	15	1.00	10	1.00
6	1.00	17	1.00	11	1.00
7	1.00	20	1.00	26	0.80
8	0.80	25	1.00	28	1.00
13	1.00	27	0.80	29	1.00
14	1.00	33	1.00	30	1.00
16	1.00	34	0.80	35	1.00
18	1.00	Average	0.93	36	0.80
19	0.80			Average	0.94
21	0.80				
22	1.00				
23	1.00				
24	1.00				
31	0.80				
32	1.00				
Average	0.94				

According to Lawshe(1975),items with positive Content Validity Criterion(CVR)values should be evaluated based on a minimum critical value. However, as the original critical values proposed by Lawshe were not derived from precise statistical calculations, the revised critical values provided by Ayre and Scally(2014),which are based on exact binomial probability, were use in this study. Considering the number of experts consulted(n=10),the

minimum acceptable CVR was set at 0.800. Items with values below this threshold should be removed from the scale. As shown in Table 2, no items fell below the minimum threshold.

The Content Validity Index (CVI) values, derived by averaging the Content Validity Ratios (CVRs) for each subscale (as detailed in the mean values shown in Table 2), exceed the Content Validity Criterion (CVC = 0.800), thereby confirming that the scale items possess adequate content validity (Lawshe, 1975). Accordingly, the items comprising the subdimensions of the Self-Regulation Skills Scale for Infants, developed by the researchers, demonstrated statistically significant content validity.

Results Related to the Construct Validity of the Scale

Given that the factor structure of the Self-Regulation Skills Scale for Infants—comprising three theoretically derived subdimensions—was specified a priori based on the literature, CFA was employed as the primary method to evaluate the construct validity of the instrument.

Results Related to Confirmatory Factor Analysis

Examination of the CFA outputs indicated that the assumption of multivariate normality was violated for the observed indicators. Accordingly, model parameters were estimated using the Unweighted Least Squares (ULS) approach. The analysis revealed that Item 6 within the Cognitive Self-Regulation subscale did not yield a statistically significant t-value ($t = 1.72$). As a result, this item was excluded from the instrument, and the CFA was re-estimated using the revised 35-item model. The corresponding findings are summarized in Table 3.

Table 3. Distribution of Item Factor Loadings, Squared Multiple Correlation Values, and Significance of Relationships (35 items)

Factor	Item No	Factor Loading	r ²	t-value
Cognitive Self- Regulation	1	0.39	0.15	4,33
	2	0.55	0.30	5,34
	5	0.35	0.12	3,70
	7	0.44	0.19	4,74
	8	0.37	0.13	3,79
	13	0.29	0.08	3,33
	14	0.71	0.50	11,61
	16	0.45	0.20	5,15
	18	0.26	0.07	3,06
	19	0.36	0.13	4,29
	21	0.39	0.15	4,66
	22	0.54	0.30	6,57
	23	0.48	0.23	5,91
	24	0.71	0.50	9,58
	31	0.44	0.19	4,63
	32	0.51	0.26	5,68
Emotional Self- Regulation	3	0.37	0.14	4,82
	12	0.22	0.05	2,51
	15	0.36	0.13	4,83
	17	0.53	0.28	7,57
	20	0.62	0.39	8,16
	25	0.64	0.41	8,58
	27	0.72	0.51	11,76
	33	0.71	0.51	13,24
Behavioral Self- Regulation	34	0.70	0.50	12,51
	4	0.69	0.47	10,21
	9	0.73	0.53	13,02
	10	0.76	0.58	14,46
	11	0.34	0.12	4,53
	26	0.55	0.30	7,72
	28	0.80	0.63	14,84
	29	0.66	0.44	9,95
	30	0.46	0.21	6,55
	35	0.65	0.42	9,93
	36	0.57	0.33	9,63

Table 3 presents the factor loadings, squared multiple correlation values (r^2), and t-values indicating the significance of the relationships for each item. Analysis of the remaining 35 items, showed that their t-values were statistically significant ($p < .05$), indicating that no further item removal was necessary.

Following the CFA, goodness-of-fit indices were evaluated to assess the extent to which the empirical data supported the hypothesized three-factor structure comprising 35 items.

With respect to model fit indices, the chi-square statistic was $\chi^2(557) = 1229.97$ ($p < .01$), and the ratio of chi-square to degrees of freedom (χ^2/df) was 2.21. Additional fit indices indicated satisfactory model fit, including a root-mean-square error of approximation (RMSEA) of 0.080, a comparative fit index (CFI) of 0.99, a goodness-of-fit index (GFI) of 0.96, a normed fit index (NFI) of 0.92, and a relative fit index (RFI) of 0.92. All indices exceeded the acceptable cutoff values recommended in the literature (Kline, 2011). Overall, these findings confirm the construct validity of the Self-Regulation Skills Scale for Infants, which comprises three subdimensions and 35 items.

Results Related to Item Analysis and Scale Reliability

To evaluate the degree of association between individual item scores and the overall scale score, item-total correlation coefficients-also referred to as item discrimination indices-were computed(Büyüköztürk, 2017).The results indicated that item-total correlation values varied from 0.10 to 0.66. In psychometric assessment, items demonstrating item-total correlation coefficients of 0.30 or higher are generally regarded as exhibiting sufficient discriminative capacity to adequately reflect the underlying construct(Büyüköztürk, 2017).Therefore, Items 3 and 12 in the Emotional Self-Regulation subdimension, as well as Items 4, 9, 10, and 11 in the Behavioral Self-Regulation subdimension, were removed from the scale. The scale was reanalyzed, and the updated item-total correlations are presented in Table 4. Item 30, which had an item-total correlation of 0.29, was retained because its removal did not produce a meaningful improvement in the overall scale structure.

Table 4. Distribution of Item Validity Coefficients(29 items)

Subscales	Item No	Item-total Correlation	Number of Items	Cronbach's Alpha
Cognitive Self-Regulation	M1	0.38	16	0.848
	M2	0.44		
	M5	0.37		
	M7	0.32		
	M8	0.58		
	M13	0.48		
	M14	0.40		
	M16	0.41		
	M18	0.37		
	M19	0.31		
	M21	0.54		
	M22	0.62		
	M23	0.61		
	M24	0.63		
	M31	0.47		
	M32	0.61		
Emotional Self-Regulation	M15	0.47	7	0.757
	M17	0.33		
	M20	0.36		
	M25	0.62		
	M27	0.58		
	M33	0.57		
	M34	0.41		
Behavioral Self-Regulation	M26	0.64	6	0.809
	M28	0.69		
	M29	0.68		
	M30	0.29		
	M35	0.59		
	M36	0.54		

In the subsequent phase of the validity and reliability assessment, the internal consistency of the scale was evaluated by computing Cronbach's alpha coefficients. The results obtained from the reliability analysis are summarized in Table 4.

Following the exclusion of six additional items, the refined 29-item instrument exhibited a high level of internal consistency, as evidenced by a Cronbach's alpha coefficient of 0.919. As indicated in Table 4, the internal consistency estimates for the subscales were 0.848 for the Cognitive Self-Regulation dimension (comprising 16 items), 0.757 for the Emotional Self-Regulation dimension (comprising 7 items), and 0.809 for the Behavioral Self-Regulation dimension (comprising 6 items).

The three-factor structure of the final 29-item scale was subsequently revalidated through CFA. All t-values obtained were statistically significant, and the path diagram illustrating the factor loadings of the ISRSS is presented in Figure 3.

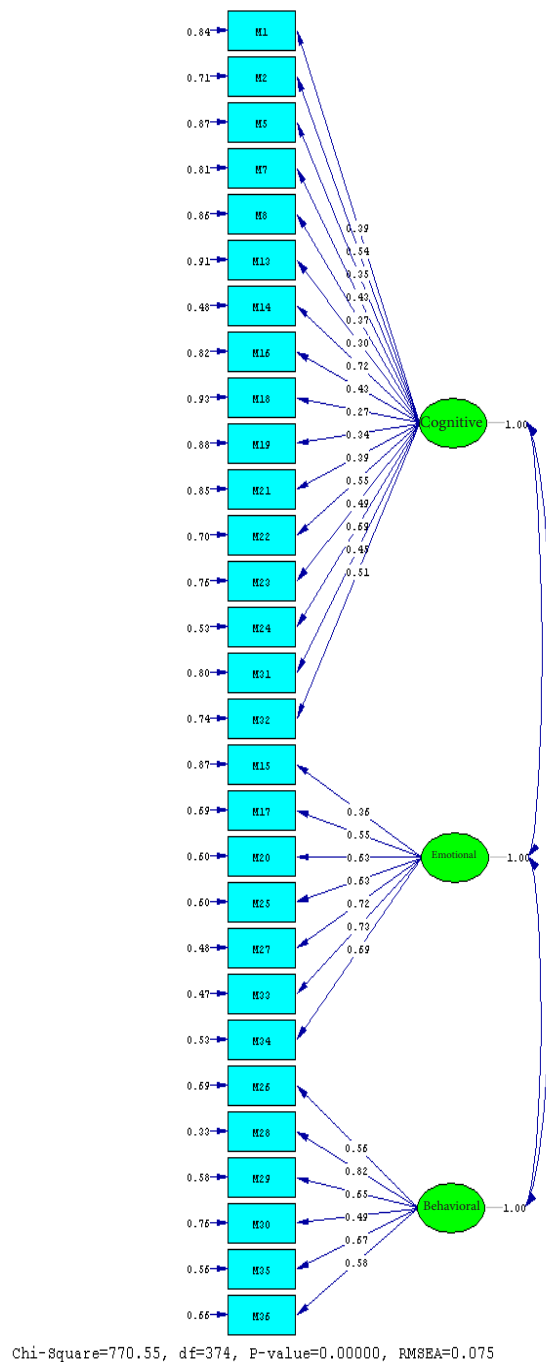


Figure 3. Path Diagram of Factor Loadings for the ISRSS(29 items)

Following the CFA, goodness-of-fit indices were examined to evaluate whether the observed data adequately supported the hypothesized model comprising three subdimensions and 29 items. The model–data fit indices for the scale are presented in Table 5.

Table 5. Model–Data Fit Indices of the Scale(29 items)

Fit Index	Acceptable Threshold*	Value
χ^2 / sd	<5 Moderate fit <3 Good fit	1229.97 / 557 = 2.21
GFI	>0.90	0.96
CFI	>0.90	0.99
NFI	>0.90	0.92
NNFI	>0.90	0.99
RFI	>0.85	0.92
RMSEA	< 0.08	0.080

The estimated values of the chi-square statistic, the chi-square to degrees of freedom ratio, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the goodness-of-fit index (GFI), the normed fit index (NFI), and the relative fit index (RFI) all fell within the acceptable cutoff intervals delineated in Table 5. Accordingly, the structural validity of the 29-item, three-subscale Infant Self-Regulation Skills Scale was confirmed.

Finally, additional analyses were conducted to examine the scale's sensitivity across age groups and to determine whether differences emerged based on preterm birth status. The results of these analyses are presented in Table 6.

Table 6. Examination of Scale Scores by Age and Preterm Birth Status

	ANOVA F (2,313)	p	η^2	Post-hoc (Games-Howell)	ANCOVA F (1,313)	p	η^2
ISRSS Total Score	53.81	<.001*	.26	1**<2***, 1**<3****	-	-	-
Cognitive Self-Regulation	38.84	<.001*	.20	1**<2***, 1**<3****	-	-	-
Emotional Self-Regulation	26.17	<.001*	.14	1**<2***, 1**<3****	-	-	-
Behavioral Self-Regulation	72.50	<.001*	.32	1**<2***, 1**<3****	-	-	-
Term/Preterm Birth Status	-	-	-	-	0.45	.505	.001
Age (Covariate)	-	-	-	-	94.08	<.001	.231

*p<.001, ** 1=6-12 months, ***2=13-18 months, ****3=19-24 months

An examination of Table 6 indicates that the total scale score and all subscale scores varied significantly across age groups ($p < .001$). Post hoc comparisons using the Games–Howell test demonstrated that infants aged 6–12 months scored significantly lower than those in the 12–18-month and 19–24-month groups, whereas no statistically significant differences were observed between the two older age groups. The magnitude of the effect sizes suggests that age exerts a substantial influence on self-regulation skills.

To further evaluate whether these differences could be attributed to age and preterm birth status, an analysis of covariance (ANCOVA) was conducted. The overall model was statistically significant ($F(2,313) = 48.047, p < .001$). Age was a strong and significant predictor of self-regulation scores ($F(1,313) = 94.075, p < .001, \eta^2 = .231$), whereas preterm birth status did not significantly predict self-regulation scores ($F(1,313) = 0.445, p = .505$).

Taken together, these findings suggest that the scale is sensitive to developmental differences associated with age, yet is not reducible to age-related variance alone. Rather, the instrument appears capable of capturing individual differences in self-regulation skills beyond the effects of preterm birth status.

DISCUSSION

The present study aimed to examine the psychometric validity and reliability of the Infant Self-Regulation Skills Scale (ISRSS), developed to assess self-regulation skills in infants aged 6-24 months. During the scale development process, an extensive review of the literature was conducted to establish the conceptual framework of the construct. Contemporary literature suggests that self-regulation is a multidimensional construct encompassing cognitive, emotional, behavioral, and physiological processes that dynamically interact throughout development (Doebel, 2020; Pinto & Figueiredo, 2023). Moreover, current developmental and neuropsychological perspectives emphasize that self-regulation emerges through the integration of attentional control, emotional processes, executive functioning, and behavioral regulation mechanisms during early childhood (Morawetz et al., 2020).

Recent studies further indicate that self-regulation should be evaluated within a multidimensional framework, as these components develop in an interrelated manner beginning in infancy and become increasingly integrated through caregiver interactions and neurodevelopmental maturation (Bridgett et al., 2015; Robson et al., 2020). In line with this perspective, the study conceptualized self-regulation within cognitive, emotional, and behavioral domains.

Following a comprehensive review of the relevant literature, a preliminary set of 36 items across three dimensions was generated and subjected to expert appraisal to establish content validity. Content validity was examined using the Lawshe technique (1975), with evaluation guided by the Content Validity Ratio (CVR) benchmarks specified by Ayre and Scally (2014). Expert judgments obtained from ten specialists indicated that all items met or exceeded the critical value of 0.800. The instrument was then refined and prepared for pilot administration. The pilot study, conducted with 23 parents, indicated that all items were clear and comprehensible. For the validity and reliability analyses, data were collected via Google Forms from parents residing in Istanbul with infants aged 6-24 months, yielding a total of 316 participants.

The instrument's underlying factorial structure was evaluated using CFA. As noted by Kline (2011), when the factor structure is theoretically predetermined, CFA is preferred over exploratory factor analysis; therefore, construct validity was assessed through CFA. Because multivariate normality was violated, the Unweighted Least Squares (ULS) estimation method was employed. The CFA results revealed that Item 6 within the Cognitive Self-Regulation dimension did not demonstrate a statistically significant t-value and was therefore excluded from the instrument. A follow-up CFA performed on the revised 35-item scale indicated that all remaining items yielded statistically significant t-values. The goodness-of-fit indices for the three-factor model comprising 35 items were as follows: $\chi^2(557) = 1229.97$, $p < .01$; $\chi^2/df = 2.21$; RMSEA = 0.080; CFI = 0.99; GFI = 0.96; NFI = 0.92; and RFI = 0.92. These indices are consistent with the acceptable model fit criteria proposed by Kline (2011). Taken together, the findings provide empirical support for the construct validity of the scale.

Item-level analyses indicated that item-total correlation coefficients ranged from .10 to .66. Given that item-total correlations exceeding .30 are considered indicative of adequate item discrimination and construct representation (Büyüköztürk, 2017), Items 3 and 12 from the Emotional Self-Regulation dimension, along with Items 4, 9, 10, and 11 from the Behavioral Self-Regulation dimension, were excluded from the scale. Following item removal, item-total correlations were recalculated, and the internal consistency of the revised instrument was subsequently evaluated using Cronbach's alpha coefficients. The coefficients were 0.848 for Cognitive Self-Regulation, 0.757 for Emotional Self-Regulation, and 0.809 for Behavioral Self-Regulation. The overall Cronbach's alpha coefficient was 0.919, indicating high internal consistency.

Building on these reliability results, subsequent analyses examined the scale's sensitivity to age-related differences and its capacity to capture the intended construct. The present findings indicate that self-regulation skills exhibit a clear developmental pattern during early infancy, with younger infants displaying lower levels

than older age groups. This pattern is consistent with theoretical perspectives emphasizing the rapid maturation of regulatory capacities during the first two years of life. Importantly, the lack of a significant effect of preterm birth status after controlling for age suggests that the observed differences are driven primarily by developmental progression rather than by birth-related factors. These results support the notion that the scale captures age-related changes while maintaining sensitivity to individual variability. Overall, the findings provide additional evidence for the construct validity of the instrument.

CONCLUSION

The results of the present study provide robust evidence that the Infant Self-Regulation Skills Scale (ISRSS), designed to evaluate self-regulatory competencies in infants aged 6-24 months, constitutes a psychometrically sound instrument with satisfactory validity and reliability. In conclusion, the scale, comprising 29 items organized into three subdimensions and rated on a five-point Likert-type scale, was demonstrated to be a valid and reliable measurement tool. Given its parent-report format, the instrument may be applied across diverse settings, enhancing its generalizability. Future research incorporating direct assessments alongside parent reports may further strengthen its psychometric properties.

Ethics Committee Approval: This study was approved by the Ethics Committee of [Istanbul Medipol University] (Approval No: 800, Date: 29.08.2024).

Informed Consent: Informed consent was obtained from all parents who participated in the study on a voluntary basis.

Peer-review: Externally peer-reviewed.

Author Contributions:

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Note: This study presents the validity and reliability analysis of the measurement instrument developed for use in the corresponding author's doctoral dissertation research.

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Appendix

Sample Items from the Self-Regulation Skills Scale for Infants(SRSI)

Subscale	Maddeler	Never	Rarely	Occasionally	Frequently	Always
Cognitive Self-Regulation	2.Expresses the desire to be held through facial expressions or body movements.					
	5.Shifts gaze several times from the object of interest to the adult to draw their attention.					
	14.Observes colorful visual materials (e.g., books, cards) with an adult for at least five minutes.					
Emotional Self-Regulation	8.Shows affection by hugging familiar adults or children.					
	18.When falling, indicates that they are not hurt through body language or verbal expression.					
	27.Waits for at least five minutes without crying when a parent or familiar adult leaves the environment.					
Behavioral Self-Regulation	19.Complies with an adult's request even when it does not align with their own desires.					
	22.Assists in the dressing process by appropriately moving arms and legs.					
	28.Stops engaging in undesired behavior when told "No!".					