GOAL-ORIENTED CONTROL IN EARLY ADOLESCENCE: DEVELOPMENT OF A SCHOOL-BASED SELF-REPORT SCALE

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Abstract

Goal-oriented control may support early adolescents in sustaining engagement with school tasks and responding adaptively to mistakes, yet developmentally appropriate self-report tools for examining these processes remain limited. This study developed and conducted a preliminary psychometric evaluation of the Goal-Oriented Control Scale–Early Adolescent Form (GOCS–EAF) for use in school contexts. An initial 18-item pool was examined with 54 students aged 11–14 years. Following item review and exploratory analyses, a refined 10-item form was administered to an independent sample of 280 lower-secondary school students in Türkiye. Exploratory factor analysis based on polychoric correlations, minimum residual extraction, oblique rotation, and parallel analysis supported two related dimensions: Goal-Focused Task Persistence and Error Monitoring and Corrective Regulation. The total scale showed acceptable internal consistency (Cronbach's $\alpha = .781$, ordinal $\alpha = .808$, McDonald's $\omega = .827$). Reliability estimates for the two subscales were adequate but comparatively modest, particularly for the shorter four-item factor. The findings provide preliminary evidence that the GOCS–EAF may offer a concise way of exploring how early adolescents perceive their persistence and regulation in the face of academic difficulty. In pastoral care, school counselling, and student-support settings, the scale may complement—not replace—interviews, teacher observations, and other assessment information when identifying areas for discussion and support planning. Further research should test the factor structure, measurement invariance, temporal stability, and associations with wellbeing, engagement, and academic outcomes.

Keywords: early adolescence; goal-oriented control; self-regulation; educational assessment; scale development; executive-function-related behaviour

1. Introduction

Executive functions refer to higher-order control processes that enable individuals to coordinate cognition and behaviour in accordance with their goals. These processes encompass interrelated capacities such as inhibitory control, attentional regulation, sustained task engagement, and behavioural adaptation to changing demands (Diamond, 2013; Miyake et al., 2000; Nigg, 2017). In educational settings, executive functioning is associated with academic achievement and everyday regulatory behaviours, including following instructions, maintaining attention, monitoring errors, and adjusting behaviour according to task requirements (Best et al., 2011; Gaskins & Pressley, 2007). However, performance-based executive-function capacities and their expression in everyday behaviour should not be regarded as interchangeable (Toplak et al., 2013).

Early adolescence is a developmental period characterized by substantial cognitive, emotional, and social changes (Blum et al., 2014). During this period, young people increasingly encounter demands involving task organization, sustained attention, independent learning, and behavioural regulation. Executive functioning continues to develop throughout childhood and adolescence, making the examination of regulatory behaviours particularly relevant during these years (Best & Miller, 2010; Diamond, 2013). Consistent with the developmental characteristics of the study sample, early adolescence was operationalized as the period between 11 and 14 years of age.

The present study addresses these regulatory processes through the construct of goal-oriented control. Goal-oriented control is conceptualized as a context-sensitive self-regulatory tendency involving the maintenance of goals, allocation of attention to relevant information, persistence

despite difficulties, monitoring of errors, and adjustment of behaviour following mistakes (Eisenberg et al., 2009, 2010; Nigg, 2017). This conceptualization is informed by theoretical approaches emphasizing the active maintenance of goal representations and the regulation of behaviour in accordance with task demands (Braver, 2012; Chiew & Braver, 2017). Furthermore, the unity-and-diversity framework indicates that executive functions involve both shared and distinguishable processes rather than constituting a single homogeneous capacity (Friedman & Miyake, 2017; Miyake et al., 2000). Accordingly, goal-oriented control is considered a focused domain of regulatory behaviour rather than a comprehensive representation of executive functioning.

Executive-function-related processes can be assessed through performance-based tasks, observer ratings, and self-report instruments. These approaches provide information from different methodological perspectives and should not be interpreted as equivalent measures of the same underlying processes (Kraemer et al., 2003; Toplak et al., 2013). Established instruments, including the Behaviour Rating Inventory of Executive Function (BRIEF), assess multiple aspects of executive-function-related behaviour in everyday contexts (Gioia et al., 2000). Within this broader assessment framework, a brief self-report measure focusing on goal maintenance, task persistence, and error-related regulation may provide complementary information about early adolescents' perceptions of their regulatory tendencies. Such self-reports should not be interpreted as direct indicators of executive-function performance or used as substitutes for comprehensive assessment procedures (Toplak et al., 2013).

Developing a psychological measurement instrument requires theoretically informed item construction, evaluation of content relevance and linguistic appropriateness, and empirical examination of its internal structure (Boateng et al., 2018; Clark & Watson, 1995). Developmental suitability and item comprehensibility are particularly important when constructing self-report measures for children and adolescents (Irwin et al., 2009). Accordingly, the present study aimed to develop the Goal-Oriented Control Scale–Early Adolescent Form (GOCS–EAF) and examine its initial exploratory psychometric properties. A two-stage scale-development procedure was employed. Initially, an 18-item draft form was examined in a pilot sample of 54 students to inform item refinement. Subsequently, the resulting 10-item form was administered to an independent sample of 280 students, and its exploratory factor structure and internal consistency were evaluated. The study was intended to provide preliminary psychometric evidence rather than establish definitive validation of the instrument.

2. Method

2.1. Research Design and Participants

A quantitative, cross-sectional, two-stage scale-development design was used; no intervention was implemented. The study involved students from two public lower-secondary schools in the Yıldırım district of Bursa, Türkiye. The pilot and main samples were independent, and pilot participants were not included in the main administration.

The pilot form was initially administered to 60 students. After exclusion of six forms with missing data or invalid response patterns, 54 students aged 11–14 years remained (25 girls, 46.3%; 29 boys, 53.7%). The main administration initially included 301 students. Sixteen forms with missing responses and five with invalid response patterns were excluded, leaving 280 students aged 11–14 years (147 girls, 52.5%; 133 boys, 47.5%). Eligibility required enrollment in lower-secondary education, parental consent, student assent, and voluntary participation. Students reported through school counselling services to have a developmental

or neurological diagnosis were not included, as described in the original study protocol. Analyses used complete and valid responses; no missing-data imputation was performed.

2.2. Item Development and Measures

The initial item pool was based on the literature on executive functioning, goal maintenance, attentional regulation, error monitoring, behavioural regulation, and self-regulation. Items were formulated as brief, behaviourally concrete statements relevant to school and everyday situations. An open-ended qualitative expert review assessed theoretical coverage, developmental appropriateness, clarity, and contextual relevance. Two academics in psychological counselling, one Turkish-language academic, one school psychological counsellor, and two Turkish-language teachers provided feedback. The scope of three items was narrowed, one item was reworded, and overlapping content was reconsidered, resulting in an 18-item draft.

The draft was administered in the pilot stage. Factor loadings, communalities, corrected item–total correlations, reliability indices, content overlap, and age-appropriate wording jointly informed item selection. Eight items were removed, and the 10-item version was administered to the independent main sample. Item removal was not determined by a single numerical cutoff; both statistical and substantive criteria were considered.

The GOCS–EAF assesses students' perceptions of how frequently they engage in goal-relevant regulatory behaviours. The final form contains 10 items scored on a 5-point Likert-type response scale (1 = Rarely, 2 = Occasionally, 3 = Often, 4 = Very often, 5 = Always). It has no reverse-scored items. Total and subscale scores are calculated as mean item scores and therefore range from 1 to 5; higher scores indicate more frequent self-reported goal-oriented control behaviours. A researcher-developed demographic form collected age, gender, and grade-level information.

2.3. Data Collection and Ethics

The measures were administered in classrooms under researcher supervision using standardized instructions. Participants were informed about voluntary participation, confidentiality, and their right to withdraw. Written parental consent and student assent were obtained before data collection. Ethical approval was granted by the Ethics Committee of Fatih Sultan Mehmet Vakıf University (Approval No. 2026-55/18), and the necessary authorization was obtained from the Republic of Türkiye Ministry of National Education and the participating schools. Data were anonymized and handled for research purposes.

2.4. Statistical Analysis

Analyses were performed in R 4.5.1 using the psych package. Item means, standard deviations, skewness, kurtosis, corrected item–total correlations, and alpha-if-item-deleted values were examined. Because responses were ordinal, exploratory factor analysis (EFA) was based on polychoric correlations. Sampling adequacy and factorability were assessed using the Kaiser–Meyer–Olkin (KMO) index and Bartlett's test. Parallel analysis informed factor retention, and minimum residual extraction was applied. Oblimin rotation was used in the main sample because correlated factors were theoretically plausible.

A one-factor solution was additionally examined in the main sample as a sensitivity analysis and compared with the parallel-analysis-supported two-factor solution using RMSR, RMSEA, TLI, and BIC. Cronbach's alpha, ordinal alpha, and McDonald's omega total were calculated for the total scale and subscales, and omega hierarchical was evaluated for the total score.

Participant-level bootstrap resampling (2,000 iterations) produced 95% confidence intervals for reliability indices. Factor labels were assigned after examining the item-loading pattern and item content.

3. Results

3.1. Pilot Sample and Item Reduction

For the 18-item pilot form (n = 54), the polychoric KMO index was .69, and Bartlett's test was significant, $\chi^2(153) = 755.96$, $p < .001$. Parallel analysis suggested a one-factor solution. Minimum residual EFA loadings ranged from .426 to .814; corrected item–total correlations ranged from .374 to .721. Reliability coefficients were Cronbach's $\alpha = .914$, standardized $\alpha = .917$, ordinal $\alpha = .933$, and McDonald's $\omega = .935$. The pilot findings were treated as preliminary indicators for item refinement rather than confirmation of a final dimensional structure.
Eight draft items (Items 4, 9, 11, 12, 13, 15, 17, and 18) were removed after combining the psychometric findings with content and developmental considerations. Item 9 had a loading of .426 and communality of .182 and was the clearest statistical candidate for removal; several other items with acceptable loadings were removed because of content redundancy and the short-form objective. The retained pilot-item identifiers were 1, 2, 3, 5, 6, 7, 8, 10, 14, and 16. These items were renumbered item_1 through item_10 for the main administration.

3.2. Exploratory Factor Structure in the Main Sample

In the main sample (N = 280), item means ranged from 2.96 to 3.87, standard deviations from 1.10 to 1.34, and corrected item–total correlations from .328 to .551. The lowest corrected item–total correlation belonged to item_2 (r = .328). KMO was .857, and Bartlett's test was significant, $\chi^2(45) = 641.27$, $p < .001$. Parallel analysis supported a two-factor solution, which was estimated from polychoric correlations with minimum residual extraction and oblimin rotation.
Factor 1, Goal-Focused Task Persistence, comprised six items (item_1, item_2, item_6, item_7, item_8, and item_10) with loadings from .461 to .698. Factor 2, Error Monitoring and Corrective Regulation, comprised four items (item_3, item_4, item_5, and item_9) with loadings from .426 to .684. The two factors accounted jointly for 36.5% of the total variance and were correlated at r = .601. Table 1 summarizes the item-level pattern loadings and corrected item–total correlations.

Table 1. Item-level exploratory factor analysis in the main sample (N = 280)

Item	Factor	F1	F2	h^2	Corrected item–total r
item_6	Task persistence	.698	−.112	.405	.459
item_1	Task persistence	.589	.148	.473	.551
item_10	Task persistence	.526	.109	.358	.455
item_8	Task persistence	.507	−.008	.253	.379
item_7	Task persistence	.492	.190	.391	.526

Item	Factor	F1	F2	h^2	Corrected item–total r
item_2	Task persistence	.461	−.051	.187	.328
item_4	Error regulation	−.113	.684	.388	.377
item_5	Error regulation	.106	.612	.465	.502
item_3	Error regulation	.099	.594	.434	.482
item_9	Error regulation	.173	.426	.300	.452

Note. F1 = Goal-Focused Task Persistence; F2 = Error Monitoring and Corrective Regulation; h^2 = communality.

3.3. Model Comparison and Reliability

The two-factor solution exhibited RMSR = .027, RMSEA = .048 (90% CI [.018, .073]), TLI = .952, and BIC = −103.97. The one-factor alternative showed RMSR = .046, RMSEA = .079, TLI = .868, and BIC = −101.00. The exploratory indices and parallel analysis therefore favored the two-factor solution (Table 2), although they do not establish confirmatory validity.

The total-scale reliability estimates were Cronbach's α = .781, ordinal α = .808, and McDonald's ω = .827. Omega hierarchical was ωh = .617 with a relatively wide bootstrap confidence interval [.355, .657]. For Goal-Focused Task Persistence, α = .708, ordinal α = .744, and ω = .748; for Error Monitoring and Corrective Regulation, α = .677, ordinal α = .714, and ω = .716 (Table 3). The four-item subscale consequently requires cautious interpretation.

Mean scores were 3.44 (SD = 0.78) for Goal-Focused Task Persistence, 3.75 (SD = 0.84) for Error Monitoring and Corrective Regulation, and 3.56 (SD = 0.70) for the total scale. The two subscale scores correlated at r = .503; correlations with the total score were r = .911 and r = .815, respectively. The complete wording of the 10 final items and their factor allocation are shown in Table 4.

Table 2. Exploratory model fit comparison

Model	RMSR	RMSEA	TLI	BIC
One-factor alternative	.046	.079	.868	−101.00
Two-factor (oblimin)	.027	.048	.952	−103.97

Note. RMSEA 90% confidence interval for the two-factor solution was [.018, .073].

Table 3. Internal-consistency estimates with bootstrap 95% confidence intervals

Scale	Items	Cronbach's α [95% CI]	Ordinal α [95% CI]	McDonald's ω [95% CI]	ωh [95% CI]
Total scale	10	.781 [.733, .818]	.808 [.762, .841]	.827 [.791, .861]	.617 [.355, .657]
Task persistence	6	.708 [.644, .760]	.744 [.682, .794]	.748 [.689, .797]	—
Error regulation	4	.677 [.593, .741]	.714 [.635, .775]	.716 [.640, .778]	—

Note. Estimates are coefficient [bootstrap 95% CI]. Intervals use 2,000 participant-level resamples; ωh refers to the total score.

Table 4. Final scale item content and factor assignments

Item	Factor	Item content
1	Task persistence	When I am given more than one task, I can complete them in sequence.
2	Task persistence	When I learn new information, I can replace previously learned information with it when necessary.
6	Task persistence	I can stay focused on a task that takes a long time to complete.
7	Task persistence	I try to overcome the difficulties I encounter.
8	Task persistence	I continue working even when something discourages me.
10	Task persistence	I motivate myself to finish a task I have started.
3	Error regulation	When I make a mistake, I try again so that I can do it correctly.
4	Error regulation	I take care not to repeat the same mistake.
5	Error regulation	I learn from my mistakes and act differently the next time.
9	Error regulation	When I make a mistake, I try to understand why it happened.

Note. Task persistence = Goal-Focused Task Persistence; Error regulation = Error Monitoring and Corrective Regulation.

4. Discussion

This study investigated the initial exploratory psychometric properties of the GOCS–EAF, a brief self-report measure of perceived goal-oriented regulatory behaviour in early adolescence. The 18-item pilot form yielded a single broad factor, whereas the shorter 10-item version exhibited two related dimensions in an independent main sample. These differences should be interpreted in light of the distinct purposes of the pilot item-reduction stage and the main exploratory analysis; they do not constitute a confirmed developmental or structural change in the construct.

Goal-Focused Task Persistence reflects task organization, sustained attention, persistence despite difficulty, and motivation to finish initiated activities. Error Monitoring and Corrective Regulation reflects renewed effort after mistakes, attempts to avoid repeated errors, learning from mistakes, and consideration of their causes. The observed factor relationship is consistent with the interpretation of these behaviours as connected aspects of perceived goal-oriented

control, rather than entirely independent capacities. Nevertheless, the scale is not equivalent to a comprehensive executive-function inventory or a performance-based cognitive task (Toplak et al., 2013).

Internal consistency was stronger for the total score than for either subscale. In particular, Cronbach's alpha for the four-item Error Monitoring and Corrective Regulation subscale was below .70, even though ordinal alpha and omega were slightly above this threshold. Since reliability indices are influenced by item number and measurement assumptions, these estimates should be interpreted jointly and not treated as proof of established psychometric adequacy (Cortina, 1993; Tavakol & Dennick, 2011; Taber, 2018). The wide confidence interval for total-score omega hierarchical further suggests reporting both subscale and total scores cautiously.

The findings have possible applications in school counselling and educational research because brief self-reports can provide information about how students view their own task persistence and responses to errors. Such information may complement interviews, teacher observations, and other assessment sources. It should not be used in isolation to diagnose executive-function disorders, make clinical classifications, or infer objective cognitive-control capacity.

4.1. Limitations

The samples came from two public schools in one district of Bursa, limiting geographical, educational, and cultural generalizability. The cross-sectional design did not establish temporal stability. The pilot sample (n = 54) was small and was used only for exploratory item refinement. The two-factor structure has not been replicated or tested through confirmatory factor analysis. External convergent, discriminant, and criterion-related validity evidence was not collected; relationships with teacher and parent reports, performance-based tasks, and academic outcomes remain unknown. Measurement invariance across gender, age, and grade level was not evaluated. As a self-report instrument, the scale is subject to response styles, self-awareness, and social desirability. These limitations mean that the results constitute preliminary evidence concerning internal structure and consistency, not comprehensive validation.

5. Conclusions

The GOCS–EAF offers a concise 10-item exploratory measure of early adolescents' perceived goal-oriented regulatory behaviour. In the independent main sample, the items formed two related dimensions—Goal-Focused Task Persistence and Error Monitoring and Corrective Regulation—with acceptable total-score internal consistency and more modest subscale estimates. The instrument may have provisional value as a supplementary tool in school-based research and student-support discussions, but the current evidence does not justify standalone diagnostic or high-stakes interpretation.

Future work should conduct confirmatory factor analysis with independent and more diverse samples, examine test–retest reliability and measurement invariance, and assess associations with teacher and parent ratings, performance-based executive-function measures, academic engagement, and educational outcomes. These steps are necessary before making stronger claims about the scale's validity or applied uses.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available because they were collected from minors and are subject to ethical and confidentiality requirements.

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