

# Mastery-Approach Goals in Secondary Education Students

## Las Metas de Aproximación al Dominio en estudiantes secundaria

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### Abstract

Mastery-approach goals positively affect students' academic and emotional development. However, these themes have not been studied from the perspective of their relationship with self-efficacy and meaning in life. Accordingly, we aimed at assessing the effects of self-efficacy and meaning in life on mastery-approach goals in secondary education students. For this purpose, we conducted a cross-sectional quantitative study using a sample of 331,431 students. Of those, 170,739 (51.5%) were females, and 160,692 (48.5%) were males. We used data obtained from the Programme for International Student Assessment (PISA) 2018 results for 58 countries. We also used the meaning in life (EUDMO), self-efficacy (RESILIENCE), learning goals (MASTGOAL), and motivation to master tasks (WORKMAST) scales to evaluate the measurement and structural models. Using structural equation modeling, we analyzed the proposed theoretical model and the research data. We found the following: standardized root mean square residual = 0.022, root mean square error of approximation = 0.048 (90% confidence interval: 0.047, 0.048), comparative fit index = 0.971, and Tucker-Lewis index = 0.963. Using multigroup structural equation modeling, we searched for evidence of configural, metric, and scalar invariance of the structural model within the

sample groups by gender and continent of residence. This study found that self-efficacy and meaning in life positively affected students' mastery-approach goals regardless of gender and continent of residence. The findings of this study will equip teachers, educational psychologists, administrators, and policymakers to include work on self-efficacy and meaning in life in secondary school curricula in order to influence secondary education students' development of achievement goals and thus improve their academic performance and well-being and support the United Nations Educational, Scientific and Cultural Organization's related proposals.

*Keywords:* learning, motivation, goal orientation, adolescence, self-efficacy, learning goals.

### **Resumen**

Las Metas de Aproximación del Dominio tienen efectos positivos en el desarrollo académico y emocional de los estudiantes. Este tipo de temas no han sido estudiados desde su vinculación conjunta con Sentido de Vida y Autoeficacia, por lo que analizamos el efecto que tienen la Autoeficacia y el Sentido de Vida sobre las Metas de Aproximación al Dominio en estudiantes de secundaria. Fue un estudio cuantitativo transversal. Utilizamos una muestra de 331,431 estudiantes, recuperada de los resultados del Programa de Evaluación Internacional de los Alumnos (PISA) 2018, aplicado en 58 países; 170,739 (51.5%) fueron mujeres y 160,692 (48.5%) fueron hombres. Asimismo, utilizamos las escalas de EUDMO (Sentido de Vida) y RESILENCE (Autoeficacia), MASTGOAL (Metas de Aprendizaje) y WORKMAST (Motivación para Dominar las Tareas) para evaluar los modelos de medida y el modelo estructural. Con el modelado de ecuaciones estructurales analizamos el modelo teórico propuesto y los datos de la investigación; encontramos los siguientes resultados: SRMR = .022, RMSEA = .048 (90% IC: .047, .048), CFI = .971 y TLI = .963. A partir del Modelado de Ecuaciones Estructurales Multigrupo buscamos las evidencias de invarianza configuracional, métrica y escalar del modelo estructural dentro de los grupos de la muestra por sexo y continente de residencia. La Autoeficacia y el Sentido de Vida tienen un efecto positivo en las Metas de Aproximación al Dominio en estudiantes, y este efecto es invariante por el sexo y continente de residencia de los participantes. Se obtiene conocimiento para que los docentes, psicólogos educativos, directivos y formuladores de políticas públicas educativas incluyan el trabajo de la Autoeficacia y el Sentido de la Vida en los estudiantes de secundaria para incidir en el desarrollo de las metas de logro y así mejorar el rendimiento académico y bienestar de estudiantes de secundaria y apoyar las propuestas de UNESCO.

*Palabras clave:* aprendizaje, motivación, orientación a la meta, adolescencia, autoeficacia, metas de aprendizaje

## Introduction

During adolescence, the stage of life when students attend secondary school, several problems can lead to poor academic achievement, desertion, and school dropout, such as identity crises (Erickson, 2004) and limited development of socioemotional competences including discipline, motivation, and time management, among others (Rodríguez, 2021). Motivation is an impulse that drives adolescents to take action to achieve goals and depends on their biopsychosocial factors, environment, and interests (Castro Castiblanco, Puentes, & Guerrero Cruz, 2019). Although other factors beyond motivation affect school success, motivation considerably influences academic performance. Thus, analyzing achievement goal setting may provide relevant information for designing educational strategies that strengthen mastery-approach goals, especially when associated with self-efficacy and meaning in life given that these elements significantly affect the development of such goals. Therefore, the aim of this study was to assess the effects of self-efficacy and meaning in life on mastery-approach goals in secondary education students. Hence, our study is in line with the United Nations Educational, Scientific and Cultural Organization's (UNESCO) call to "face [the] dual challenge of making good on the unfulfilled promise to ensure the right to quality education for every child, youth and adult and fully realizing the transformational potential of education as a route for sustainable collective futures" (2022, p. 3).

## Mastery-Approach Goals

Achievement goal theory proposes to study the goal-setting motivational processes that drive a subject's adaptive or maladaptive behavior in cognitive tasks (Dweck, 1986). In this regard, Elliot (1999) purported that achievement goals allow the subject to generate intrinsic motivations for energizing and guiding cognitive and affective processes based on targeted skills. Achievement goal theory establishes mastery-approach and performance goals according to Dweck (1986); specifically, regarding mastery-approach goals, also known as learning goals, subjects focus on developing competences or understanding something new until they master them, whereas with performance goals, subjects aim at outperforming

others at certain tasks in order to achieve recognition through favorable judgments about their competence and avoid negative judgments; their motive is to demonstrate their ability in front of an audience. Thus, the dichotomous achievement goal model emerged in this context.

The mastery goals Dweck (1986) proposed were adopted in the trichotomous model (Elliot & Harackiewicz, 1996) and bifurcated into performance goals, yielding mastery-approach goals, performance-approach goals, and performance-avoidance goals. Based on this trichotomous model, the 2 x 2 achievement goal framework (Elliot, 1999) was proposed, comprising mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals. In the 2 x 2 achievement goal framework, Elliot (1999) defined mastery-approach goals as those regarding which subjects strive to develop their abilities until they master the targeted tasks and mastery avoidance goals as those in which subjects strive to avoid losing their abilities (e.g., “striving to avoid leaving a crossword puzzle incomplete”; Elliot & McGregor, 2001, p. 502).

Based on the 2 x 2 achievement goal framework, the 3 x 2 achievement goal model was proposed comprising six goals, namely task-approach goals, self-approach goals, other-approach goals, task-avoidance goals, self-avoidance goals, and other-avoidance goals (Elliot et al., 2011). According to Elliot et al. (2011), task-approach goals aim at developing competences in meeting the absolute demands of tasks, whereas self-approach goals aim at developing competences to strengthen personal development, persistence, motivation, and enthusiasm. He also stated that mastery-approach goals encompass task- and self-approach goals and that they are often mixed in daily life. Therefore, the first hypothesis this study proposed was that mastery goals and motivation to master tasks can be explained by a higher, second-order factor termed mastery-approach goals (see Fig. 1).

As shown in the literature, mastery-approach goals have a positive effect on students' academic performance (Alhadabi & Karpinski, 2020; Tuominen et al., 2020), as well as on deep (Aydiner-Uygun, 2020), reflective, and integrative (Miller, Fassett, & Palmer, 2021) learning, metacognition (Jaitner et al., 2019), and the ability to transfer knowledge in order to solve new problems (Belenky & Nokes-Malach, 2013).

Mastery-approach goals increase students' positive emotions (Datu, Valdez, & Yang, 2022), decrease their psychological stress, depression, and anxiety levels (Danthony, Mascret, & Cury, 2021), and are correlated with achievement emotions such as interest, enjoyment, hope, and pride (Huang, 2011).

On the one hand, some researchers have reported that females are more likely to develop mastery-approach goals (Camacho, et al., 2022; Nie & Liem, 2013), whereas others have reported that males display higher levels of such goals (Arens & Watermann, Méndez-Giménez, García-Romero, & Cecchini-Estrada, 2018). Other researchers have reported no gendered differences in mastery-approach goal levels (Lochbaum, Zanatta, & Kazak, 2019; Urdan & Kaplan, 2020).

On the other hand, Lochbaum et al. (2019) found that more individualistic countries have higher levels of mastery-approach goals than less individualistic countries. Similarly, Urdan and Kaplan (2020) observed that the culture of the participants had diverse effects on mastery-approach goals, albeit with nonsignificant differences.

## Self-Efficacy

Self-efficacy refers to subjects' beliefs regarding their own ability to complete a specific task; these beliefs enable them to organize and execute actions in order to perform the task (Bandura, 1986). Self-efficacy is developed through mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1977). Self-efficacy has many positive effects on academic performance (Drago et al., 2018), language proficiency (Wang & Sun, 2020), mathematics learning (Huang, 2016), and creativity (Haase et al., 2018), among others. According to Huang (2013), males have higher self-efficacy than females; however, that scholar reported a rather small difference, and other researchers found no gendered differences in self-efficacy (Assouline et al., 2021). Furthermore, Huang (2013) found no evidence that culture moderated self-efficacy and speculated that perhaps such results were due to low statistical power and to the low diversity of the countries included in the meta-analysis.

## Meaning in Life

Meaning in life refers to the degree to which subjects understand their life and give meaning to their self-perception based on a general purpose in life, thereby generating the sense that their life matters (Steger, 2009). Thus, meaning in life has three components: (a) comprehension/coherence, which enables subjects to build coherent meaning frameworks that provide them with expla-

nations for and ascribe meaning to their existence including past, present, and imagined future events (George & Park, 2016); (b) purpose, which enables subjects to identify the desired objects of life and generate directed and motivated behavior to achieve those objects (King & Hicks, 2021); and (c) significance, which generates subjects' belief that their life has a significant impact on reality and will have lasting importance after their death (Martela & Steger, 2016). Positive affects, social connections, self-connections, religion and worldview, the ability to visualize the past and the future, and awareness of mortality all comprise meaning in life (King & Hicks, 2021).

Meaning in life has a positive effect on adaptability, professional self-efficacy (Yuen & Chan, 2022), life satisfaction (Heng et al., 2020), and academic and personal self-efficacy (Yuen & Datu, 2021). In students, meaning in life has been positively correlated with motivation, positive affects, subjective well-being, and high grades (Bailey & Phillips, 2016).

Geng et al. (2022) and Yuen and Chan (2022) found no significant differences in meaning in life levels between males and females. However, Hamama and Hamama-Raz (2021) reported that females have higher levels of meaning in life than males. Lastly, regarding cultural differences, Heng et al. (2020) reported that Israeli students have higher levels of meaning in life than Singaporean students.

## Research Model

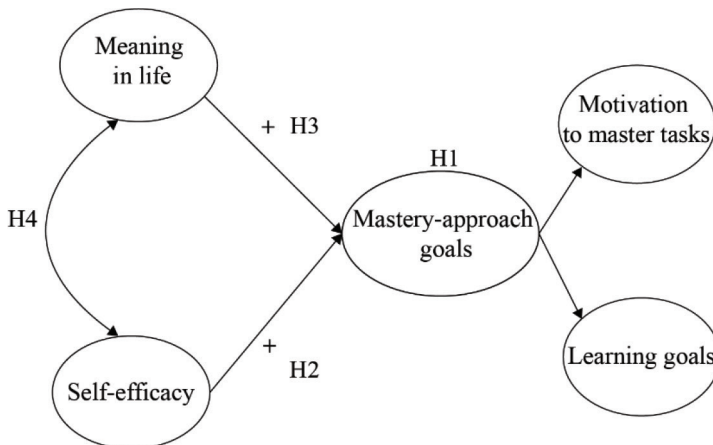
Predictors of mastery-approach goals have been reported in the literature, albeit overlooking their combined interaction with self-efficacy and meaning in life. Consequently, we propose a structural model for studying the relationship of mastery-approach goals with self-efficacy and meaning in life, involving two causal relationships and one correlational relationship (see Fig. 1).

The first causal relationship refers to the effect of self-efficacy on mastery-approach goals and is based on previous findings showing that self-efficacy has positive effects on (Alhadabi & Karpinski, 2020; Ariani, 2022) and is correlated with (Huang, 2016) students' mastery-approach goals. Additionally, gender is a moderator of the relationship between self-efficacy and mastery-approach goals (Huang, 2016). Based on the above, our second hypothesis was that self-efficacy would have a positive effect on mastery-approach goals among secondary education students.

As the second causal relationship, we proposed that meaning in life would affect mastery-approach goals (see Fig. I). We did not find studies on the relationship between meaning in life and mastery-approach goals. However, this relationship is worthy of analysis because meaning in life is a component of subjective well-being (Steger, 2017), and increasing meaning in life increases subjective well-being (Li et al., 2021). Accordingly, a positive correlation of subjective well-being with mastery-approach goals has been found in students (Ariani, 2022; Li & Zhao et al., 2021). Based on the above, our third hypothesis was that meaning in life would have a positive effect on mastery-approach goals in secondary education students.

In the model developed in this study, we proposed a correlation of meaning in life with self-efficacy because the latter is a positive predictor of the former (Cheng, Chen, & Zhang, 2021), and vice-versa (Rush et al., 2021). However, we did not find literature on the effects of gender and place of residence on the relationship between the aforementioned variables (see Fig. I). Consequently, our fourth hypothesis was that self-efficacy would show a positive correlation with meaning in life among secondary education students.

FIGURE I. Visualization of the proposed model



Source: The authors.

Lastly, we analyzed the proposed model's invariance within groups by gender (males and females) and continent of residence (America, Asia, and Europe). As shown above, the results regarding gendered and cultural differences with respect to mastery-approach goals, self-efficacy, and meaning in life were heterogeneous. Thus, our fifth hypothesis was that the effect of self-efficacy and meaning in life on mastery-approach goals would not vary according to subjects' gender or continent of residence.

## Method

### Sample and Procedure

The Organisation for Economic Co-operation and Development's (OECD, 2018a) Programme for International Student Assessment (PISA) evaluates students from 79 countries at the end of compulsory education. We retrieved the data from PISA 2018 and selected a student body with complete scores for the scales used to measure meaning in life (EUDMO), self-efficacy (RESILIENCE), learning goals (MASTGOAL), and motivation to master tasks (WORKMAST; OECD, 2018b). This study's final sample comprised 331,431 students, of whom 170,739 (51.5%) were females and 160,692 (48.5%) were males. Participant age ranged from 15 years to 16 years (mean [M] = 15.79, standard deviation [SD] = 0.29). Table I outlines the distribution of participants by continent and country of residence.

TABLE I. Participants' continent and country of residence

Continent/Country	<i>n</i>	%	Continent/Country	<i>n</i>	%
America	46,838	14.1	Europe	166,333	50.2
Argentina	8,302	2.5	Albania	5,171	1.6
Brazil	6,618	2.0	Baku (Azerbaijan)	3,279	1.0
Chile	5,570	1.7	Austria	5,498	1.7
Colombia	5,564	1.7	Bosnia and Herzegovina	4,729	1.4
Costa Rica	5,715	1.7	Bulgaria	3,358	1.0
Dominican Republic	1,870	0.6	Belarus	5,018	1.5

(Continued)



TABLE I. Participants' continent and country of residence (*Continued*)

Continent/Country	<i>n</i>	%	Continent/Country	<i>n</i>	%
Mexico	4,621	1.4	Croatia	5,498	1.7
Panama	2,243	0.7	Estonia	4,664	1.4
Peru	3,322	1.0	France	4,773	1.4
Uruguay	3,013	0.9	Germany	3,200	1.0
			Greece	5,250	1.6
Asia	118,260	35.7	Hungary	4,395	1.3
Brunei Darussalam	5,334	1.6	Iceland	2,604	0.8
Chinese Taipei	6,803	2.1	Ireland	4,797	1.4
Hong Kong	5,461	1.6	Italy	8,960	2.7
Indonesia	10,708	3.2	Kosovo	3,616	1.1
Kazakhstan	15,386	4.6	Latvia	4,490	1.4
Jordan	7,054	2.1	Lithuania	5,642	1.7
Korea	6,336	1.9	Malta	2,715	0.8
Macao	3,643	1.1	Moldovia	4,635	1.4
Malaysia	5,709	1.7	Montenegro	4,841	1.5
Philippines	5,851	1.8	Poland	5,096	1.5
Russia	6,019	1.8	Portugal	4,978	1.5
Saudi Arabia	4,651	1.4	Romania	4,366	1.3
Thailand	7,859	2.4	Serbia	4,477	1.4
United Arab Emirates	15,112	4.6	Slovakia	4,676	1.4
Turkey	6,055	1.8	Slovenia	5,296	1.6
Moscow Oblast (RUS)	1,630	0.5	Spain	28,358	8.6
Tatarstan (RUS)	4,649	1.4	Switzerland	4,211	1.3
			Ukraine	5,347	1.6
			United Kingdom	2,395	0.7

Source. Compiled by authors

## Instruments

EUDMO, RESILIENCE, WORKMAST and MASTGOAL (OECD, 2018c, 2019b) are scored on a Likert-type scale. EUDMO, RESILIENCE, and WORKMAST are 4-point scales, consisting of items with four response options (ranging from 1 = *strongly disagree* to 4 = *strongly agree*), and MASTGOAL is a 5-point scale (ranging from 1 = *Not at all true of me* to 5 = *Extremely true of me*). For the scales measuring meaning in life (EUDMO) and self-efficacy (RESILIENCE), scores range from 3 points to 12 points; for the scale measuring learning goals (MASTGOAL), scores are between 5 points and 20 points, and for motivation to master tasks (WORKMAST), scores range from 4 points to 12 points. In the obtained data, the reported individual total scores were probability-weighted estimates transformed to have a mean of 0.0 and a standard deviation of 1.0 across OECD countries (2019b, s.f.).

EUDMO (OECD, 2018c), which measures meaning in life, consists of three items on students' sense of life, meaning of life, and purpose of life, respectively (e.g., "My life has a clear meaning or purpose."), and positive values indicate greater meaning in life than the average student in OECD countries (2019b). Reliability analysis of the study participants' scores on the EUDMO scale yielded a Cronbach's alpha of 0.85. To assess self-efficacy, we used RESILIENCE (OECD, 2019b), which consists of five items (e.g., "I usually manage one way or another."). Positive values indicate greater self-efficacy than the average student in OECD countries (2019b). Reliability analysis of the study participants' scores on the RESILIENCE scale yielded a Cronbach's alpha of 0.78.

MASTGOAL (OECD, 2018c) measures learning goals and consists of three items concerning students' mastery-approach orientation toward learning goals (e.g., "My goal is to completely master the material presented in my classes."). Positive values indicate more ambitious learning goals than the average student across OECD countries (2019b). Reliability analysis of the study participants' scores on the MASTGOAL scale yielded a Cronbach's alpha of 0.87. Lastly, WORKMAST (OECD, 2019b) was used to assess motivation to master tasks. This scale consists of three items covering students' motivation to work as well as their achievement (e.g., "Once I start a task, I persist until it is finished."). Positive values indicate greater motivation to master tasks than the average student across OECD countries (2019b). Reliability analysis of the study participants' scores on the WORKMAST scale yielded a Cronbach's alpha of 0.78.

## Data Analysis

We calculated the mean, standard deviation, and percentage of the data to determine the descriptive statistics. We also performed Student's *t*-test to compare participants' scores on each scale by gender, and we calculated Cohen's *d* (Cohen, 1988) to assess effect size differences between the study groups. Additionally, we performed a one-way analysis of variance (ANOVA) (Christensen, 2016) to compare samples grouped by continent of residence and a two-way ANOVA to examine the interaction between gender and continent of residence with respect to participants' scores in order to determine those factors' relationship to the study variables. We also analyzed Cohen's *f* (Cohen, 1988) to determine the effect size between groups compared with the ANOVA. We calculated the statistical power ( $1-\beta$ ) to confirm that the null hypothesis was correctly rejected, based on between-group score comparison (Cohen, 1988). Following Cohen (1992), we assessed and interpreted the effect size of the proposed inter-group comparisons with Cohen's *d* values of 0.20 (small), 0.50 (medium), and 0.80 (large) and with Cohen's *f* values of 0.10 (small), 0.25 (medium), and 0.40 (large). We also set a cut-off point of  $1-\beta \geq 0.80$  (Cohen, 1992) for statistical power.

We analyzed the study hypotheses via structural equation modeling (Hancock & Mueller, 2013). We evaluated and interpreted the goodness-of-fit between the data and the proposed model using the following statistical indices and cut-off points: chi-square ( $\chi^2$ ), its degrees of freedom (*df*), and its level of significance; standardized root mean squared residual (SRMR = 0.08); root mean square error of approximation (RMSEA  $\leq$  0.06); comparative fit index (CFI  $\geq$  0.95), and Tucker-Lewis indices (TLI  $\geq$  0.95; Hu & Bentler, 1999).

To gather evidence of invariance, we performed multigroup analysis of the proposed model and analyzed the configural, metric, and scalar invariance (Vandenberg & Lance, 2000). To interpret the model invariance evidence for different sample groups, we analyzed changes in the chi square and CFI increment. We established that a significant chi-square value ( $p = 0.05$ ) or a CFI increment equal to or less than -0.01 indicated model invariance (Cheung & Rensvold, 2002).

Through confirmatory factor analysis (CFA), we estimated measurement models to assess the evidence of construct validity. Using analysis of variance extracted (AVE), we examined the evidence of convergent validity in the models and calculated the composite reliability (CR). In line

with Fornell and Larcker (1981), we assessed the evidence of convergent validity in the models by setting the following values: CR  $\geq$  0.60 and AVE  $\geq$  0.50. We used SPSS 27, AMOS 27, and GPower 3.1 to perform the tests.

## Results

### Descriptive Statistics and Between-Group Comparisons

The results of analysis of the mean and standard deviation and inter-group comparison of the study participants' scores by scale and gender are outlined in Table II, showing that females scored significantly ( $p < 0.001$ ) higher than males on learning goals ( $M = 0.217$ ,  $SD = 1.022$ ) and motivation to master tasks ( $M = 0.262$ ,  $SD = 0.979$ ), but the effect size was small ( $d = 0.18-0.19$ ). Conversely, males scored significantly ( $p < 0.001$ ) higher than females on meaning in life ( $M = 0.218$ ,  $SD = 0.988$ ) and self-efficacy ( $M = 0.110$ ,  $SD = 1.039$ ), but the effect size was nonsignificant ( $d = 0.01-0.07$ ).

As shown in Table III, American participants scored higher on meaning in life ( $M = 0.291$ ,  $SD = 0.994$ ), self-efficacy ( $M = 0.239$ ,  $SD = 1.041$ ), learning goals ( $M = 0.347$ ,  $SD = 1.057$ ), and motivation to master tasks ( $M = 0.361$ ,  $SD = 1.029$ ). Table 3 also highlights significant differences ( $p < 0.001$ ) in the study variables according to the participants' continent of residence but nonsignificant effect sizes ( $f < 0.10$ ) for scores in

TABLE II. Means and standard deviations and gendered comparison of study participants' scores on each scale

Variables	Females		Males		t	gl	95% CI	d	$\beta$
	M	SD	M	SD					
Meaning in Life	0.142	0.959	0.218	0.988	-22.62***	331,429	[-0.08, -0.07]	0.07	1
Self-efficacy	0.091	0.973	0.110	1.039	-5.46***	326,293	[-0.03, -0.01]	0.01	1
Learning Goals	0.217	1.022	0.030	1.061	51.54***	328,232	[0.18, 0.19]	0.18	1
Motivation to Master Tasks	0.262	0.979	0.076	1.022	53.55***	331,439	[0.18, 0.19]	0.19	1

Note. CI: confidence interval; \*\*\* $p < 0.001$

Source: Compiled by authors

TABLE III. Means, standard deviations, and comparison of the participants' response rates for each scale by continent of residence

Variables	America		Asia		Europe		F (2)	$\beta$	
	M	SD	M	SD	M	SD			
Meaning in Life	0.291	0.994	0.240	0.946	0.103	0.981	1048***	0.08	1
Self-efficacy	0.239	1.041	0.024	0.999	0.115	0.995	808***	0.07	1
Learning Goals	0.347	1.057	0.232	0.104	-0.009	1.022	3125***	0.14	1
Motivation to Master Tasks	0.361	1.029	0.188	1.011	0.107	0.986	1200***	0.08	1

Note. \*\*\* $p < 0.001$

Source: Compiled by authors

meaning in life, self-efficacy, and motivation to master tasks, as well as a small effect size ( $f = 0.14$ ) for scores on learning goals. In all groups, the statistical power was 1.

The results of the two-way ANOVA showed significant differences in the participants' scores by gender and continent of residence, with a nonsignificant effect size with respect to the scales as follows: Meaning in Life:  $F(2) = 193$ ,  $p < 0.001$ ,  $f = 0.03$ ,  $\beta = 1$ ; Self-efficacy:  $F(2) = 78$ ,  $p < 0.001$ ,  $f < 0.001$ ,  $\beta = 1$ ; Learning Goals:  $F(2) = 17$ ,  $p < 0.001$ ,  $f < 0.001$ ,  $\beta = 1$ ; and Motivation to Master Tasks:  $F(2) = 19$ ,  $p < 0.001$ ,  $f < 0.001$ ,  $\beta = 1$ .

## Measurement Model

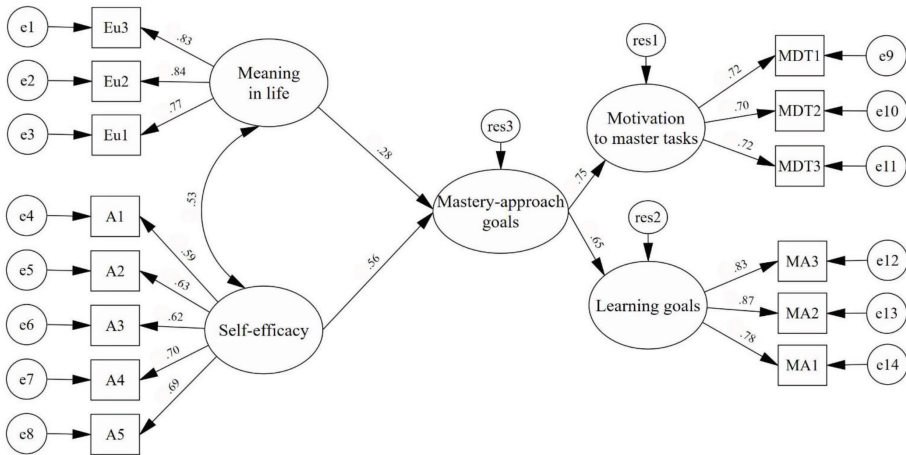
The measurement models were estimated using CFA, CR, and AVE; the results showed evidence of construct and convergent validity regarding the study variables. Analysis of the self-efficacy measurement model yielded the following values: SRMR = 0.031, RMSEA = 0.095 (90% CI: 0.094, 0.096), CFI = 0.927, TLI = 0.963, CR = 0.782, and AVE = 0.419, with the indicators' standardized factor loadings ranging from 0.60 to 0.70. Analysis of the meaning in life measurement model yielded the following values: SRMR = 0.011, RMSEA = 0.084 (90% CI: 0.056, 0.058), CFI = 0.995, TLI = 0.984, CR = 0.840, and AVE = 0.637, with the indicators' standardized factor loadings ranging from 0.78 to 0.83.

Additionally, analysis of the second-order measurement model for mastery-approach goals yielded the following values: SRMR = 0.025, RMSEA = 0.057 (90% CI: 0.081, 0.087), CFI = 0.989, and TLI = 0.979. For motivation to master tasks, the analysis showed that CR = 0.757 and AVE = 0.509, with the indicators' standardized factor loadings ranging from 0.69 to 0.73. For learning goals, the values were CR = 0.867 and AVE = 0.685, with the indicators' standardized factor loadings ranging from 0.77 to 0.88. Consequently, we accepted Hypothesis 1.

### Structural Model

The model explaining mastery-approach goals based on self-efficacy and meaning in life among secondary education students (see Fig. II) fit the data very well: SRMR = 0.022, RMSEA = 0.048 (90% CI: 0.047, 0.048), CFI = 0.971, and TLI = 0.963. Fig. II shows that the latent variables meaning in life ( $\beta = 0.28$ ,  $p < 0.001$ ) and self-efficacy ( $\beta = 0.56$ ,  $p < 0.001$ )

FIGURE II. Structural equation model explaining mastery-approach goals in secondary education students



Note. This model explains mastery-approach goals in secondary education students based on self-efficacy and meaning in life. The statistics are standardized regression coefficients. All path coefficients and correlations in the model are significant ( $p < .001$ ).

Source: Compiled by authors

had significant and positive effects on mastery-approach goals, thus confirming Hypotheses 2 and 3. Furthermore, Fig. II shows significant and positive correlations between meaning in life and self-efficacy ( $\beta = 0.53$ ,  $p < 0.001$ ). Therefore, we accepted Hypothesis 4. Lastly, the explained variance of mastery-approach goals based on the latent variables self-efficacy and meaning in life was 56.3% ( $R^2 = 0.563$ ).

## Invariance

Table IV presents the results of analysis of invariance in the proposed model for explaining mastery-approach goals based on self-efficacy and meaning in life in secondary education students by gender and continent of residence. The chi-squared difference test results showed the structural model's lack of invariance in the compared groups ( $p < 0.05$ ). However, the chi-square difference test is sensitive to sample size. Accordingly, Cheung and Rensvold (2002) have suggested evaluating model invariance according to the CFI increment. Such analysis yielded evidence of configural (CFI > 0.95), metric, and scalar invariance ( $\Delta CFI \leq -0.01$ ) with respect to the model under analysis for different groups of secondary education students (see Table IV). Therefore, we accepted Hypothesis 5.

TABLE IV. Structural equation model's goodness-of-fit indices by group

Models	$\chi^2$	gl	$\Delta \chi^2$	CFI	$\Delta CFI$	RSMEA [90% CI]
Sex						
M0. Configural invariance	52,119	144		0.972		0.033[0.033, 0.033]
M1. Metric invariance	54,853	154	2,737***	0.970	-0.002	0.033[0.033, 0.033]
M2. Scalar invariance	55,100	157	247***	0.970	0.000	0.032[0.032, 0.033]
Continent						
M0. Configural invariance	55,216	216		0.970		0.028[0.028, 0.028]
M1. Metric invariance	57,163	236	1,947***	0.969	-0.001	0.027[0.027, 0.027]
M2. Scalar invariance	58,185	242	1,022***	0.969	0.000	0.027[0.027, 0.027]

Note. To determine the invariance measures, the models were compared as follows: M1-M0 and M2-M1; \*\*\*  $p < 0.001$

Source: Compiled by authors

## Discussion and Conclusion

In this study, we aimed at explaining mastery-approach goals based on self-efficacy and meaning in life among secondary education students from 58 countries evaluated in the 2018 PISA. For this purpose, we performed an analysis by gender and culture to assess whether these factors affected the relationships between those variables. All hypotheses were accepted. Self-efficacy and meaning in life were found to be positively correlated with and showed a positive effect on mastery-approach goals in secondary education students, and these were consistent between groups of students divided by gender and continent of residence. We also found significant differences in the levels of mastery-approach goals, self-efficacy, and meaning in life between males and females and between participants living in America, Asia, and Europe, albeit with negligible to small effect sizes.

Self-efficacy had a positive effect on mastery-approach goals in secondary education students (Jiang et al., 2014), and the effect did not vary with gender (Huang, 2016). Moreover, self-efficacy was a consistent predictor of mastery-approach goals. We found insignificant differences in self-efficacy between males and females and between students living in America, Asia, and Europe (Assouline et al., 2021; Huang, 2013). Gendered differences in the levels of mastery-approach goals were small (Nie & Liem, 2013), as were differences by continent of residence (Urdan & Kaplan, 2020). Considering the above, self-efficacy may be a component of mastery-approach goals.

Meaning in life had a positive effect on mastery-approach goals in secondary education students. Although we did not find empirical studies on the relationship between meaning in life and mastery-approach goals, we are able to explain our results theoretically because meaning in life and mastery-approach goals share a fundamental component: the ability to set objectives in life. Therefore, we consider meaning in life to be theoretically related to mastery-approach goals.

On the one hand, meaning in life enables individuals to establish a general purpose in life, whereas mastery-approach goals enable them to establish a specific purpose that directs their behavior in a particular direction. On the other hand, meaning in life is considered to be a dimension of subjective well-being (Steger, 2017), and our results have demonstrated that subjective well-being can be used as a predictor of



mastery-approach goals (Kaplan & Maehr, 1999; Zhou, Huebner, & Tian, 2020). However, we did not find significant gendered differences in meaning in life levels (Hamama & Hamama-Raz, 2021). Therefore, our results corroborate the findings of Geng et al. (2022), Yuen and Chan (2022), and Hamama and Hamama-Raz (2021), who also did not find significant gendered differences.

Our results support empirical evidence of a correlation between self-efficacy and meaning in life (Cheng et al., 2020; Cheng et al., 2021; Rush et al., 2021). This result confirms the importance of self-efficacy, not only for setting mastery-approach goals but also for strengthening meaning in life among secondary education students. Therefore, fostering meaning in life among students will strengthen self-efficacy, and vice versa, which will enable them to develop mastery-approach goals and improve learning.

This study's main strength is that it used the largest sample that has been reported thus far in research related to achievement goal theory. The sample included students from 58 countries and three continents, which makes it possible to generalize the results across all the participating nations. Additionally, different invariance analyses of the proposed structural model were performed according to participants' gender and continent of residence.

Nevertheless, this study had some limitations. The research addresses achievement goal theory as a whole but focused on mastery-approach goals, disregarding mastery-avoidance goals, performance-approach goals, and performance-avoidance goals. By including these three latter types of goals in future research, we expect to understand the practical implications associated with students' academic performance in order to propose teaching and learning strategies that will highlight the emotional implications of achievement goal theory.

Another limitation was the use of a self-report instrument, which can generate social desirability bias in the participants' responses and hinder the replicability of the study in specific populations. To overcome this limitation, we propose taking up the topic of mastery-approach goals in research with an experimental design that will allow us to control for variables and bias; further, a qualitative perspective will enable us to analyze in depth the psychological factors that affect subjects' establishment of the abovementioned goals.

Another limitation was that this study only included students aged between 15 years and 16 years; this was so because of the nature of the

data source. The participants' small age range prevented the inclusion of all secondary school students and means that the study generated knowledge pertaining to a very specific age group instead of contributing more to research on the development of mastery-approach goals throughout the subjects' lifetime. To overcome this limitation, we must understand the dynamics of master-approach goals at different stages of human development in order to inform intervention strategies tailored to suit various subjects' current stage of development. In light of the limitation, the results of this study must be judiciously applied to populations of other ages since age is a modifying factor of self-efficacy levels (Huang, 2013; Mozahem, Boulad, & Ghanem, 2021) and mastery-approach goals (Méndez-Giménez et al., 2018). Lastly, because we did not find previous studies on the effect of meaning in life on mastery-approach goals, we suggest further exploring the relationship between these variables and expanding the inquiry with reference to subjective well-being theories; such an undertaking would replicate our results in specific populations and contribute to the development of achievement goal theory.

The results of the present study have contributed to the development of achievement goal theory by providing evidence of predictors of mastery-approach goals in the combined dimensions of self-efficacy and meaning in life among secondary education students. Regarding practical implications, this study's results can serve as a reference for secondary school teachers to design and implement activities and teaching and learning environments aimed at strengthening students' self-efficacy and meaning in life. Thus, students will be guided toward establishing and achieving mastery-approach goals to improve their academic performance and school well-being. Moreover, educational psychologists will be able to draw upon scientific evidence to support the inclusion of themes related to self-efficacy and meaning in life in individual and group intervention programs aimed at improving students' academic performance and subjective well-being. Additionally, this study equips school directors and education policymakers with relevant scientific knowledge to promote educational quality by designing and implementing policies and programs geared toward students' psychological development based on self-efficacy and meaning in life.

In conclusion, we have provided evidence of the importance of self-efficacy and meaning in life in secondary education students' development of mastery-approach goals. All our hypotheses were supported

since students' self-efficacy and meaning in life showed a positive effect on mastery-approach goals, and the effect did not vary with gender or continent of residence. Thus, teachers, educational psychologists, school directors, and education policymakers are advised to include self-efficacy and meaning in life in secondary education curricula in order to promote the development of mastery-approach goals and improve students' academic performance and well-being, thereby helping to tackle the educational challenges UNESCO (2022) has flagged.

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