Assessing Primary and Secondary Students' Achievement Goals for Italian and Mathematics Domains: The Italian Version of the Achievement Goal Questionnaire-Revised (AGQ-R)

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♟ *ABSTRACT*. Oltre a rispondere al bisogno di proporre una versione dell'Achievement Goal Questionnaire-Revised (AGQ-R, Elliot & Murayama, 2008) nella lingua italiana supportandone la validità di costrutto e di criterio, questo lavoro ha avuto lo scopo di testarne l'invarianza di misura considerando diversi fattori e di fornire nuovi dati su differenze di età con studenti di scuola primaria e secondaria, di genere e di dominio, nello specifico per estendere la comprensione degli obiettivi di evitamento di prestazione.

♟ *SUMMARY. Besides responding to the need to develop a version of the Achievement Goal Questionnaire-Revised (AGQ-R, Elliot & Murayama, 2008) in the Italian language supporting its construct and criterion validity, this work aimed at testing its measurement invariance across a variety of factors and providing new data on cross-sectional age, gender, and domain differences, particularly to extend the understanding of mastery-avoidance goals. The participants were 365 fourth, seventh, and eleventh-graders, who completed two versions of the AGQ-R referred to Italian and mathematics. We also examined responses of the American participants involved in the development of the original instrument. Confirmatory factor analyses supported the goodness of the hypothesized model, characterized by scalar invariance across country, metric invariance across class level, and uniqueness invariance across gender. Structural equation models showed that first-term performance positively predicted the four goal types, while mastery-approach goals positively predicted second-term performance and pleasantness. Achievement goals, higher for Italian for eleventh-graders and females, decreased at increasing ages. Notwithstanding limitations, our data support the validity of this version of the AGQ-R with primary and secondary school students.*

Keywords: *Achievement goals, Primary and secondary school students, Native language and mathematics domain*

INTRODUCTION

Understanding motivational processes is one of the core issues of contemporary educational psychology: Such focus mirrors their relevance within learning and teaching contexts, in which mutual interrelations between motivation, cognition, and affect assume a key role for explaining achievement outcomes (Graham & Weiner, 2012). Among different motivational constructs, great attention has recently being paid to achievement goals as "cognitive–dynamic aims that focus on competence" comprising two dimensions: definition in terms of mastery and performance strivings, and valence in terms of positive possibilities to approach success and negative possibilities to avoid failure (Elliot & Murayama, 2008; Hulleman, Schrager, Bodmann & Harackiewicz, 2010).

Referring to definition, back in the eighties the dichotomous achievement goal model distinguished two goal types according to the criteria used for judging competence: reaching competence for mastery goals and focusing on comparisons with others for performance goals (Dweck, 2000). Early empirical findings supported associations between the two goal types and adaptive and maladaptive consequences for learning, respectively, but contradictory results also emerged. More recently, researchers have refined their goal conceptualization paying attention to valence, a second competence-based dimension referring to the ways individuals focus on competence: in terms of associations with positive and desired outcomes for approach goals, or with negative and undesired outcomes for avoidance goals. This distinction was applied first only to performance goals in the trichotomous model and then also to mastery goals in the 2 x 2 achievement goal model, allowing to explain previous inconsistent results concerning mainly performance goals (Elliot & McGregor, 2001). In brief, the 2 x 2 model encompasses four goal types, namely mastery-approach goals and mastery-avoidance goals, "focused on attaining task-based or intrapersonal competence" or "incompetence", respectively, and performance-approach goals and performance-avoidance goals, "focused on attaining normative competence" or "incompetence" (Elliot & Murayama, 2008, p. 613).

As pointed out by a recent meta-analysis including 243 correlational studies for a total of 91,087 participants (Hulleman et al., 2010), predictive validity of valence bifurcation is generally supported, with positive and negative associations with performance and motivational-affective constructs for approach and avoidance goals, respectively. However, caution must be used in interpreting these findings, especially for performance-approach goals for which results are often inconsistent, and for mastery-avoidance goals, only rarely investigated, and for which theoretical and operational issues remain partially undefined (Graham & Weiner, 2012; Hulleman et al., 2010; Payne, Youngcourt & Beaubien, 2007). Moreover, while relationships with performance have been widely investigated, relationships with emotions have only recently being paid attention to, for example documenting that undergraduates' mastery-approach goals positively predicted enjoyment, according to the control-value model of achievement emotions (e.g., Pekrun, Elliot & Maier, 2009). However, relationships between achievement goals and performance are complicated by the moderating role of factors such as nationality, but not class level or gender (Hulleman et al., 2010). For example, comparing American or Canadian versus European samples, correlations with performance are less positive considering mastery-approach goals and more negative considering mastery-avoidance goals for the former compared to the latter, and more negative for Asian versus American or Canadian samples considering performance-avoidance goals. Coherently, in a previous study measuring Italian primary and secondary students' goals with the Patterns of Adaptive Learning Survey (PALS, Midgley et al., 2000), we found that mastery goals positively predicted performance in both native language and mathematics, but no effects of the two performance goals (Authors, 2013).

At present, one of the most used instruments to measure achievement goals (Muis, Winne & Edwards, 2009) is the Achievement Goal Questionnaire (AGQ, Elliot & McGregor, 2001), developed according to the 2 x 2 model. This model represents a viable theoretical framework helping to understand the contributions of goals in educational contexts, as a prerequisite to work on their malleability to improve instructional practice (Graham & Weiner, 2012; Hulleman et al., 2010). Focusing on it as more parsimonious than the more recent 3 x 2 model–in which, besides relying on the approach-avoidance dimension, a further distinction between goals focused on self, task, and other individuals is proposed (Elliot, Murayama & Pekrun, 2011), and therefore involving advantages for young students' comprehensibility, allows to increase our knowledge of mastery-avoidance goals, which so far have received only limited empirical support. The AGQ has been recently revised to solve some conceptual and methodological problems concerning item formulation,

such as reference to constructs like values, concerns, or affect rather than goals; lack of separation between goals and underlying motivations; or absence of content consistency in items focused on different goals. The resulting Achievement Goal Questionnaire-Revised (AGQ-R, Elliot & Murayama, 2008), more rigorous in its correspondence between concepts and their operationalization, revealed good structural validity after being tested with American college undergraduates referring to exam settings. Its predictive validity was also supported, by examining antecedents like need for achievement and fear of failure, and outcomes like intrinsic motivation and performance.

Since its publication, the AGQ-R has been translated into other languages such as Arabic, Greek, or Italian, rarely involving participants younger than university students, and limiting to high school students (e.g., Abd-El-Fattah & Al-Nabhani, 2012; Alkharusi & Aldgafri, 2010; Apostolou, 2013; Authors, 2014). While these studies have documented the goodness of AGQ-R factorial structure, suggesting its generalizability across different nationalities, to our knowledge there is a lack of attention to measurement invariance (except Alkharusi & Aldgafri, 2010, who supported gender invariance with undergraduate Oman students in Arabic, without checking for nationality invariance). Within the translation process of an existing instrument, examining invariance across a variety of factors, and primarily across languages, is essential to demonstrate cultural validity and to make new findings more interpretable, in order to check whether results can be ascribed to group differences or measurement issues (Chen, 2007; Ziegler & Bensch, 2013; Zusho & Clayton, 2011).

Therefore, our aim was to explore some psychometric properties, specifically in terms of construct and criterion validity, of an Italian version of the AGQ-R, whose factorial structure was preliminarily studied with a small sample of university students (Authors, 2014), with primary and secondary school students. To our knowledge, the AGQ-R has rarely been used with these age groups (e.g., Bernacki, Aleven & Nokes-Malach, 2014, involved adolescents), and supporting the validity of its adaptation could help to deepen our understanding of how achievement goals, and particularly the neglected mastery-avoidance goals, are shaped according to factors such as class level, gender, or domain, for which contrasting results exist.

Regarding changes in achievement goals at students' increasing age, many research studies have documented a general decline in the endorsement of mastery-approach goals,

performance-approach goals, and performance-avoidance goals, also in the Italian context; however, some authors have reported decreases of mastery goals and increases of performance goals, coherently with the differentiation of student's ability concepts, and others have documented the stability of achievement goal profiles over time (Authors, 2013; Bong, 2009; Dweck, 2000; Paulick, Watermann & Nückles, 2013; Tuominen-Soini, Salmela-Aro & Niemivirta, 2011). Also concerning gender, research has usually neglected mastery-avoidance goals, while a consistent pattern seems to emerge for the other goal types, with females endorsing more frequently mastery-approach goals and males performance-avoidance goals (Gherasim, Butnaru & Mairean, 2013).

Basing on findings documenting both achievement goals' context-specificity when referred to different levels of generality within learning environments (Apostolou, 2013) and the early development of the ability to differentiate motivational beliefs by domain, which gradually refines from school age to adolescence (Bong, 2001), we examined goals separately for two core subjects, native language and mathematics. The two domains differ also for associated stereotypical beliefs, mirroring female superiority for language and male superiority for mathematics (Muzzatti & Agnoli, 2007), thus complicating the influence of gender on the endorsement of achievement goals.

Concerning the construct validity of the AGQ-R, we expected good fit indexes for the model in which the four achievement goals loaded on four separate factors (mastery-approach goals, mastery-avoidance goals, performance-approach goals, performance-avoidance goals), i.e., we expected the items that were designed originally to measure the four achievement goal orientations to load on the four separate factors in the Italian sample (Elliot & McGregor, 2001; Elliot & Murayama, 2008), for both domains. We also tested the structural invariance of the AGQ-R across country (Italy, United States), class level (fourth, seventh, eleventh-graders), and gender (male, female), as a key step in the validation of the instrument for the Italian context and as a way to exclude measurement artefact from subsequent analyses (Ziegler & Bensch, 2013). Moreover, we investigated differences in achievement goals as a function of class level, gender, and domain (Italian, mathematics). We expected scores to be lower at increasing ages (Authors, 2013; Paulick et al., 2013) and higher for Italian compared to mathematics for females, and vice versa for males, mirroring stereotypical beliefs (Muzzatti & Agnoli, 2007); we also explored whether

achievement goal types were endorsed differently, further confirming their differentiation. Concerning criterion validity, for both domains we explored relationships of achievement goals with later school performance and pleasantness, hypothesizing them to be positively predicted by mastery-approach goals, but not by the other goals (Authors, 2013; Hulleman et al., 2010; Pekrun et al., 2009). Finally, we explored whether achievement goals played a partial or total mediating role between first and second-term performance.

METHOD

Participants

The Italian participants were 365 students, including 125 fourth-graders (mean age = 9.85 years, *SD* =.32, range: 9-11 years; 59 female, 66 male), 135 seventh-graders (mean age = 12.98 years, *SD* = .47, range: 12-15 years; 56 female, 79 male), and 105 eleventh-graders (mean age = 16.95 years, *SD* = .41, range: 16-18 years; 64 female, 41 male), nested in 19 classes and 11 schools. They participated on a voluntary basis, following parents' written authorization proposed within the consent form. All the students were guaranteed anonymity, and their teachers were not present while they were answering.

Reference data for testing invariance across country were kindly made available by the authors of the AGQ-R (Elliot & Murayama, 2008). They included the 229 American undergraduates who participated in the original study (mean age = 19.41 years, *SD* = 1.68, range: 17-36 years; 150 female, 76 male, 3 unspecified).

Materials and procedure

We administered a written questionnaire in the classrooms during normal school time, in the second term of the school year in May. We read aloud all the items to avoid missing responses. Each session lasted about 30 minutes. The American Psychological Association ethical standards were followed in the conduct of the study.

– *Achievement Goal Questionnaire-Revised (AGQ-R)*. We proposed two versions of the AGQ-R preliminarily used with Italian university students (Authors, 2014), counterbalanced across classes within each school and class

level, referred to two domains, Italian and mathematics (see Appendix; the original items were published in Elliot & Murayama, 2008, p. 617). Each version included 12 items to be evaluated on a 5-point Likert-type scale (1 = *not at all true of me and 5 = very true of me*), presented in the same order as in the original instrument. Three items regarded mastery-approach goals (e.g., "My aim is to completely master the material presented in Italian"), three items mastery-avoidance goals (e.g., "My goal is to avoid learning less than it is possible to learn in mathematics"), three items performance-approach goals (e.g., "I am striving to do well compared to other students in Italian"), and three items performance-avoidance goals (e.g., "My aim is to avoid doing worse than other students in mathematics"). Particular caution was paid to obtain simple linguistic versions for each item, both at the lexical and syntactic level, given that the original version of the questionnaire had been developed to be used with university students (Elliot & Murayama, 2008), and to our knowledge it has been used with adolescents but not with younger students (e.g. Bernacki et al., 2014).

– *School performance*. For each domain, students self-reported their first-term performance (then checked with teachers for reliability) and all of them authorized the school to communicate to us their second-term performance, assigned in June, according to the grades used in the Italian education system (1 = *very low* and 10 = *very high*).

– *Pleasantness*. For each domain, students indicated the level of associated pleasantness on a 10-point Likert type scale (1 = *very low* and 10 = *very high*). Notwithstanding the possible limitations of single-item measures (for example, low variance and reduced validity measuring a complex construct), the literature indicates their reliability and usefulness (Authors, 2013).

RESULTS

We used Mplus version 5.2 (Muthén & Muthén, 1998–2007) to run multilevel confirmatory factor analyses (MCFA), measurement invariance analyses (MI), multilevel structural equation models (MSEM), and path analyses, controlling for a clustering effect of classes in the data. The nested nature of the data (i.e., the fact that the participants belonged to different classes) was taken into account using the Mplus "Complex" syntax, which uses the maximum likelihood estimation with

robust standard errors (MLR) in order to estimate model parameters. We used SPSS version 21.0 for Windows to run all the other analyses.

To check for multivariate normality, we verified that skewness (range:.09-.14) and kurtosis (range:.01-1.45) values for each item did not exceed 2.0 and 7.0, respectively, supporting normality assumptions (Curran, West & Finch, 1996). There were no missing data.

Factorial structure of achievement goals

Two multilevel confirmatory factor analyses (MCFAs) separated by domain, clustered by class, allowed to test the goodness of fit of the two hypothesized models, in which the items referred to the four goals load on four distinct latent factors. We considered the Comparative Fit Index (CFI)≥.90, the root-mean-square error of approximation (RMSEA)≤.08, and the Standardized Root Mean Square Residuals (SRMR)≤.11 as threshold values (Beauducel & Wittmann, 2005).

The analyses supported the goodness of the hypothesized models, and verified that the hypothesized factors were measured by single latent variables. In Figure 1, we report the factor models with the parameter estimates. We allowed the four factors to covariate simultaneously. The standardized loadings ranged from .57 to .89 for Italian and from .63 to .87 for mathematics, and they were all statistically significant at the .001 level. The fit indexes for both models were very good (Italian: $\chi^2(48, 365) = 76.46$, $p = .006$; CFI = .98; RMSEA = .04; SRMR = .04; mathematics: $\chi^2(48, 365) = 107.50$, $p<.001$; CFI = .96; RMSEA = .06; SRMR = .05). Therefore, our findings

Figure 1 – Four-factor model for both domains. Read from left to right the digits represent error variances, factor loadings, and latent factor covariances for Italian/mathematics
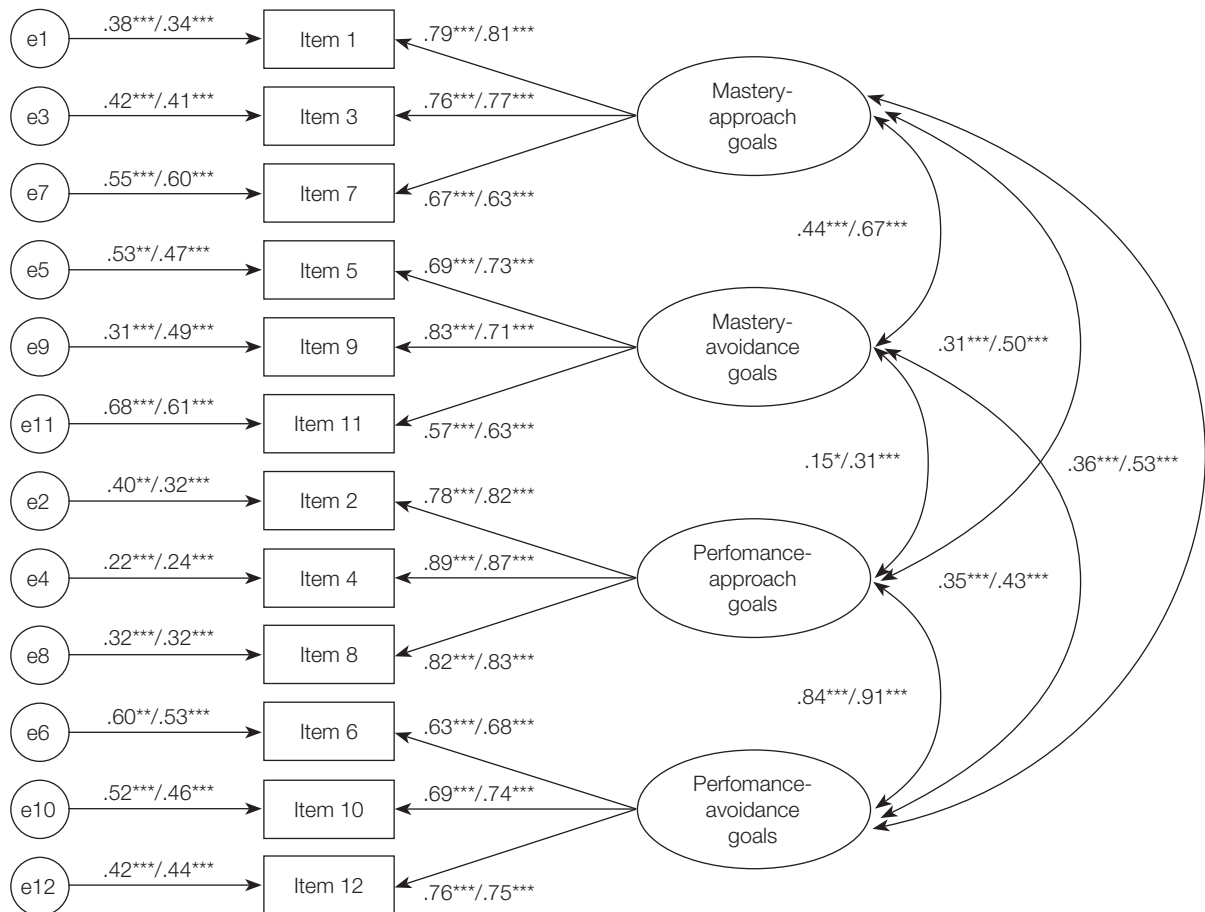
*Note. *p<.05; **p<.01; ***p<.001.*

confirmed that the Italian version of the 12 adapted items referred to four distinct latent factors, i.e. mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals.

For each domain, responses to items on the same goals were averaged together; all goals intercorrelations were positive (Table 1). We checked for reliability calculating the α-values for each goal; all the α-values were higher than .72, indicating the homogeneity for each construct.

Measurement Invariance (MI)

Measurement invariance (MI) usually relates to how contents of each item are interpreted in the same way across samples (Byrne & Watkins, 2003). If measures of achievement goals operate differently across country, age level, and gender, and these variations are not considered in the measurement, it is inadequate to compare achievement goals or their consequences across groups. For each domain, MI analyses examined hypotheses on the similarity of the covariance structure across groups differing for country, class level, or gender, by considering: (1) configural invariance, allowing all the parameters to be freely estimated; (2) metric invariance, requiring invariant factor loadings; (3) scalar invariance, requiring also invariant intercepts; and (4) uniqueness invariance, requiring invariant item uniqueness. Due to the small and unequal size of our samples, support for noninvariance required Δ CFI≤−.005, supplemented by Δ RMSEA≥.010, for testing metric invariance, and .010 or .005, respectively, for testing scalar and uniqueness invariance (Chen, 2007).

Similarly for the two domains, the base models showed excellent fit indexes for country and gender, but not for class level, presenting poor fit indexes for fourth and seventh-graders. After checking the modification indexes, we directly linked the two mastery-avoidance items focused on the same issue (5, 9) for the three class levels, due to item overlap, and the models improved substantially (Table 2). When we tested simultaneously the different groups not imposing equality

Table 1 -– Intercorrelations, Means (Standard Deviations), and Alpha-values for Scores on Achievement Goals, Performance, and Pleasantness for Italian/Mathematics, respectively

Variable	1	2	3	4	5	6	7	M (SD)
1. Mastery-approach goals	.78/.78	.510***	.409***	.412***	.283***	.401***	.541**	4.08 (.79)
2. Mastery-avoidance goals	.362***	.73/.72	.245***	.331***	.256***	.297***	.344**	3.56 (1.07)
3. Performance-approach goals	.273***	.141***	.86/.88	.750***	.242***	.276***	.373**	3.10 (1.11)
4. Performance-avoidance goals	.267***	.274***	.678***	.73/.76	.202***	.285***	.315**	3.30 (1.08)
5. First-term performance	.321***	.138***	.213***	.148***	–	.815**	.530**	7.14 (1.15)
6. Second-term performance	.285***	.151***	.232***	.190***	.618**	–	.532**	7.25 (1.20)
7. Pleasantness	.490**	.177**	.238**	.153**	.331**	.334***	–	7.62 (1.84)
M (SD)	3.99 (.84)	3.52 (1.04)	3.07 (1.16)	3.27 (1.12)	7.07(1.38)	7.26 (1.36)	6.96 (2.53)	–

Note. Respectively for Italian/mathematics, correlations are presented below/above the diagonal; means (standard deviations) in column/row; alpha-values along the diagonal.
**p<.01; ***p<.001.

Table 2 – Results of Invariance Analyses for the Model of Achievement Goals across Country (Italy, United States), Class Level (Fourth, Seventh, Eleventh-Graders), and Gender (Male, Female), for Italian/Mathematics, respectively

Groups	Model	χ^2	df	p	CFI	RMSEA	SRMR	Δ CFI	Δ RMSEA
Country	Italy (n = 365)	76.46/107.51	48	.005/.001	.971/.964	.040/.058	.039/.045	–	–
	United States (n = 229)	78.67	48	.003	.986	.053	.027	–	–
	Configural invariance	217.90/247.55	96	.001/.001	.970/.965	.061/.068	.039/.042	–	–
	Metric invariance	201.43/238.14	104	.001/.001	.975/.967	.056/.066	.052/.062	.005/.002	.005/.002
	Scalar invariance	226.46/281.86	112	.001/.001	.970/.959	.059/.071	.056/.070	.005/.008	.003/.005
	Uniqueness invariance	834.90/866.51	124	.001/.001	.815/.819	.139/.142	.123/.127	.149/.140	.075/.071
Class level	Fourth-graders (n = 125)	54.37/71.25	47	.214/.016	.973/.928	.035/.062	.055/.061	–	–
	Seventh-graders (n = 135)	83.38/87.06	47	.001/.001	.905/.910	.076/.079	.056/.057	–	–
	Eleventh-graders (n = 105)	79.52/77.33	47	.002/.003	.957/.954	.081/.078	.052/.059	–	–
	Configural invariance	272.25/302.28	141	.001/.001	.924/.910	.078/.087	.060/.066	–	–
	Metric invariance	272.24/276.58	157	.001/.001	.924/.926	.078/.079	.072/.068	.000/.016	.000/.008
	Scalar invariance	298.46/317.74	174	.001/.001	.918/.911	.077/.083	.075/.079	.006/.015	.001/.004
	Uniqueness invariance	433.86/590.66	200	.001/.001	.846/.759	.098/.127	.116/.137	.072/.152	.021/.044
Gender	Males (n = 186)	82.06/83.13	48	.002/.001	.950/.958	.062/.063	.057/.054	–	–
	Females (n = 179)	37.13/71.56	48	.872/.015	1.00/.968	.000/.052	.035/.050	–	–
	Configural invariance	125.68/160.15	96	.073/.001	.983/.964	.034/.054	.049/.053	–	–
	Metric invariance	123.83/158.78	104	.090/.001	.984/.965	.032/.054	.052/.057	.001/.001	.002/.000
	Scalar invariance	131.82/165.66	112	.100/.001	.984/.965	.031/.052	.052/.059	.000/.000	.001/.002
	Uniqueness invariance	145.30/180.63	124	.092/.001	.983/.964	.031/.050	.079/.063	.001/.001	.000/.002

Note. CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; Δ CFI = change in Comparative Fit Index; Δ RMSEA = change in Root Mean Square Error of Approximation.

constraints between them (configural invariance), the goodness-of-fit of the models was confirmed across country, class level, and gender. When all factor loadings were constrained to be equal across the three variables (metric invariance), the models resulted invariant for all the three variables; however, for class level (only for mathematics) the Δ RMSEA was below the threshold values, while the Δ CFI was not. When also the intercepts of the observed variables were constrained to be equal across groups (scalar invariance), the models were invariant for country and gender; for class level, the model was invariant for Italian, while for mathematics the Δ RMSEA was below the threshold values but the Δ CFI was not. Finally, when factor loadings, intercepts, and residuals were constrained to be equal (uniqueness invariance), the models were invariant only for gender.

To sum up, the results of the sequence of gradually more restrictive tests of MI supported metric invariance for all the three variables; scalar invariance across country, class level for Italian (and only partially for mathematics), and gender; and uniqueness invariance across gender. In other words, the factorial structure of the models for the two domains was confirmed as substantially invariant, enabling to compare achievement goal levels across the three variables, i.e. country, class level, and gender.

Effects of class level, gender, and domain

A 3 x 2 x 2 x 4 [Class Level (fourth-graders, seventh-graders, eleventh-graders) x (male, female) x Domain (Italian, mathematics) x Achievement Goal Type (mastery-approach goals, mastery-avoidance goals, performance-approach goals, performance-avoidance goals)] repeated-measure ANOVA was carried out on goal scores. Class Level and Gender were treated as between-subjects factors, while Domain and Achievement Goal Type as within-subjects factors. We applied Bonferroni correction to control for Type I error.

This ANOVA revealed main effects of Class Level, $F(2, 359) = 84.71$, $p<.001$, $\eta_p^2 = .32$, and Achievement Goal Type, $F(3, 1077) = 131.81$, $p<.001$, $\eta_p^2 = .27$ (Table 3). Post-hoc t-tests indicated that fourth-graders' scores were higher than seventh-graders', in turn higher than eleventh-graders' scores. Concerning goal types, the scores were higher for mastery-approach goals compared to mastery-avoidance goals, higher than performance-avoidance goals, in turn

higher than performance-approach goals. Such effects were moderated by a significant Class Level x Achievement Goal Type interaction, $F(6, 1077) = 18.92$, $p<.001$, $\eta_p^2 = .10$, suggesting that the afore mentioned class level differences were less marked for mastery-avoidance goals, for which only fourth and eleventh-graders differed.

In addition, Domain, $F(1, 359) = 6.31$, $p = .012$, $\eta_p^2 = .02$, Domain x Class Level, $F(2, 359) = 7.19$, $p = .001$, $\eta_p^2 = .04$, and Domain x Gender, $F(1, 359) = 8.35$, $p = .004$, $\eta_p^2 = .02$, resulted significant. Scores were higher for Italian ($M = 3.51$, $SD = .72$) compared to mathematics ($M = 3.46$, $SD = .80$). Interpretation of the interactions, confirmed by paired t-tests separated by class level and gender, suggested that it happened only for eleventh-graders [$t(104) = 4.00$, $p<.001$; Italian: $M = 3.01$, $SD = .63$, mathematics: $M = 2.79$, $SD = .61$] and females [$t(178) = 3.97$, $p<.001$; $M = 3.53$, $SD = .72$; $M = 3.38$, $SD = .79$, respectively], with an opposite but not significant trend for males [$t(185) = -1.21$, $p = .228$; $M = 3.49$, $SD = .72$; $M = 3.54$, $SD = .80$].

Relationships of achievement goals with performance and pleasantness

To explore the relationships between achievement goals and performance and pleasantness, we ran multilevel structural equation models (MSEM) for each domain, taking into account the nested nature of the data.

For the first two MSEMs, we considered first-term performance as predictor of achievement goals, and achievement goals as predictors of second-term performance. We also included a direct path between first and second-term performance to verify goals' partial or total mediating role. The models had good fits for both domains [Italian: $\chi^2(64, 365) = 97.19$, $p = .005$; CFI = .98; RMSEA = .04; SRMR = .04; mathematics: $\chi^2(64, 365) = 126.15$, $p<.001$; CFI = .97; RMSEA = .05; SRMR = .04], with significant factor loadings (all $p<.001$) (Figure 2a). All the relationships between first-term performance and goals were statistically significant (except for mastery-avoidance goals for Italian) and positive; only mastery-approach goals positively predicted second-term performance.

It is interesting to note that the effect of first-term performance on achievement goals was stronger for mathematics compared to Italian, as indicated also by the values of explained variances, ranging from .03 to .07 for

Table 3 - Means (Standard Deviations) of Achievement Goals, separately by Class Level, pooled for Domain

Variable	Fourth-graders	Seventh-graders	Eleventh-graders	Total
Mastery-approach goals	4.33 (.56)	4.06 (.73)	3.65 (.66)	4.04 (.71)
Mastery-avoidance goals	3.71 (1.07)	3.54 (.97)	3.35 (.77)	3.54 (.96)
Performance-approach goals	3.68 (.93)	3.22 (.91)	2.19 (.81)	3.08 (1.07)
Performance-avoidance goals	3.85 (.81)	3.45 (.84)	2.41 (.87)	3.29 (1.02)
Total	3.89 (.59)	3.56 (.61)	2.90 (.55)	3.49 (.71)

Figure 2a – Multilevel structural equation models for relationships of achievement goals with performance for Italian/mathematics. Explained variances are reported next to each dependent variable
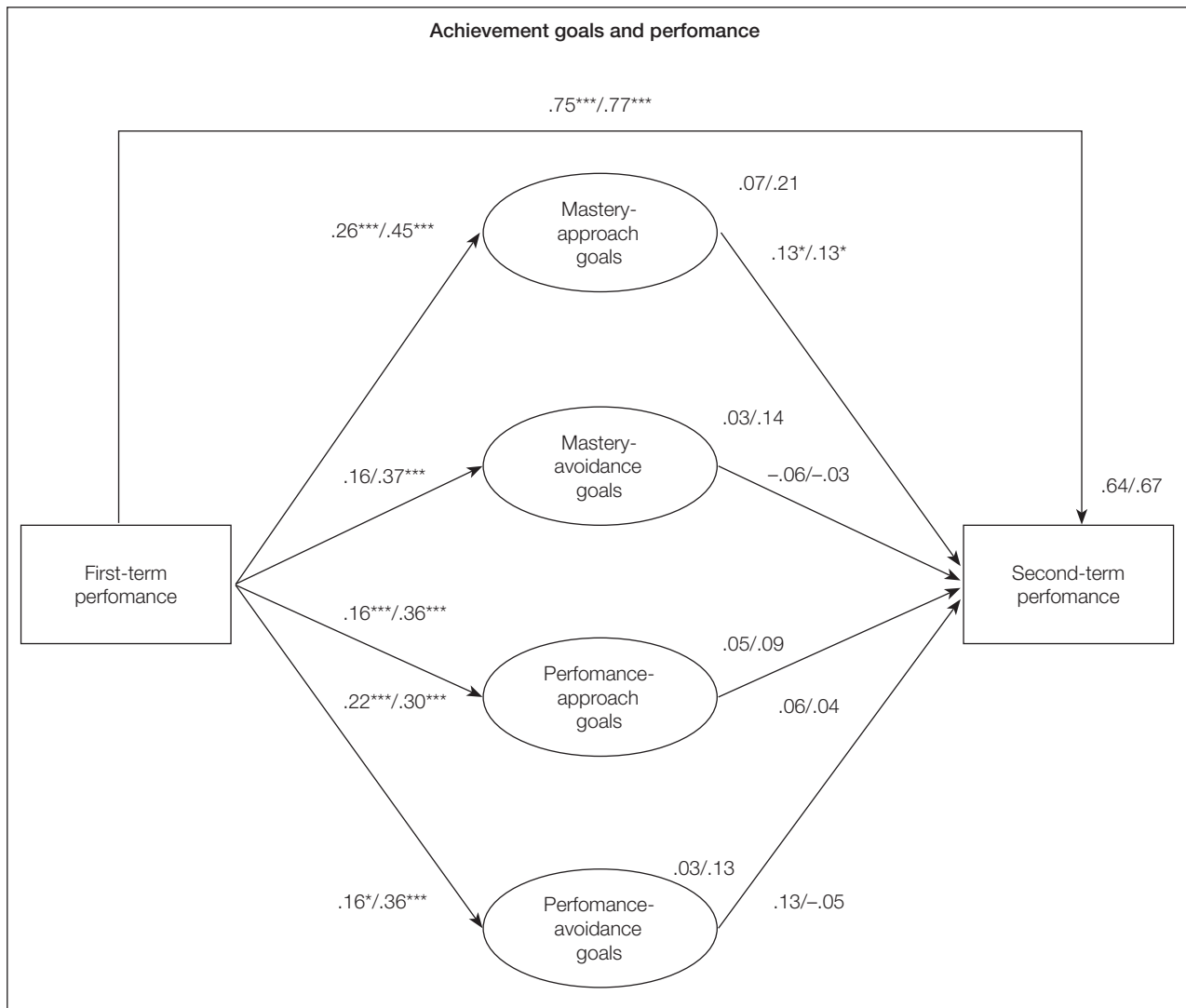

Note. *p<.05; ***p<.001.

Italian and from .09 to .21 for mathematics. Furthermore, the direct path between first and second-term performance was statistically significant, highlighting a partial mediating role of mastery-approach goals between first and second-term performance (Italian: indirect effect = .04, p = .017; mathematics: indirect effect = .06, p = .036). In other terms, first-term performance had a strong effect on second-term performance, but this effect was partially due to the influence of students' mastery approach goals on second-term performance. The indirect effect was, again, slightly stronger for mathematics compared to Italian.

For the other two MSEMs, we tested whether achievement goals predicted pleasantness (Figure 2b). The models had good fits for both domains [Italian: $\chi^2(56, 365)$ = 91.18, p = .002; CFI = .97; RMSEA = .04, SRMR = .04; mathematics: $\chi^2(56, 365)$ = 110.97, $p<.001$; CFI = .97; RMSEA = .05, SRMR = .04], with significant factor loadings (all $p<.001$): as expected, mastery-approach goals positively predicted pleasantness. The relationship was slightly stronger for the Italian domain. In general, mastery goals seemed to have a stronger effect for Italian, while performance goals seemed to be more important predictors in mathematics. The explained variance of pleasantness was quite high for both domains (.35 for Italian and .41 for mathematics).

Figure 2b – Multilevel structural equation models for relationships of achievement goals with pleasantness for Italian/mathematics. Explained variances are reported next to each dependent variable
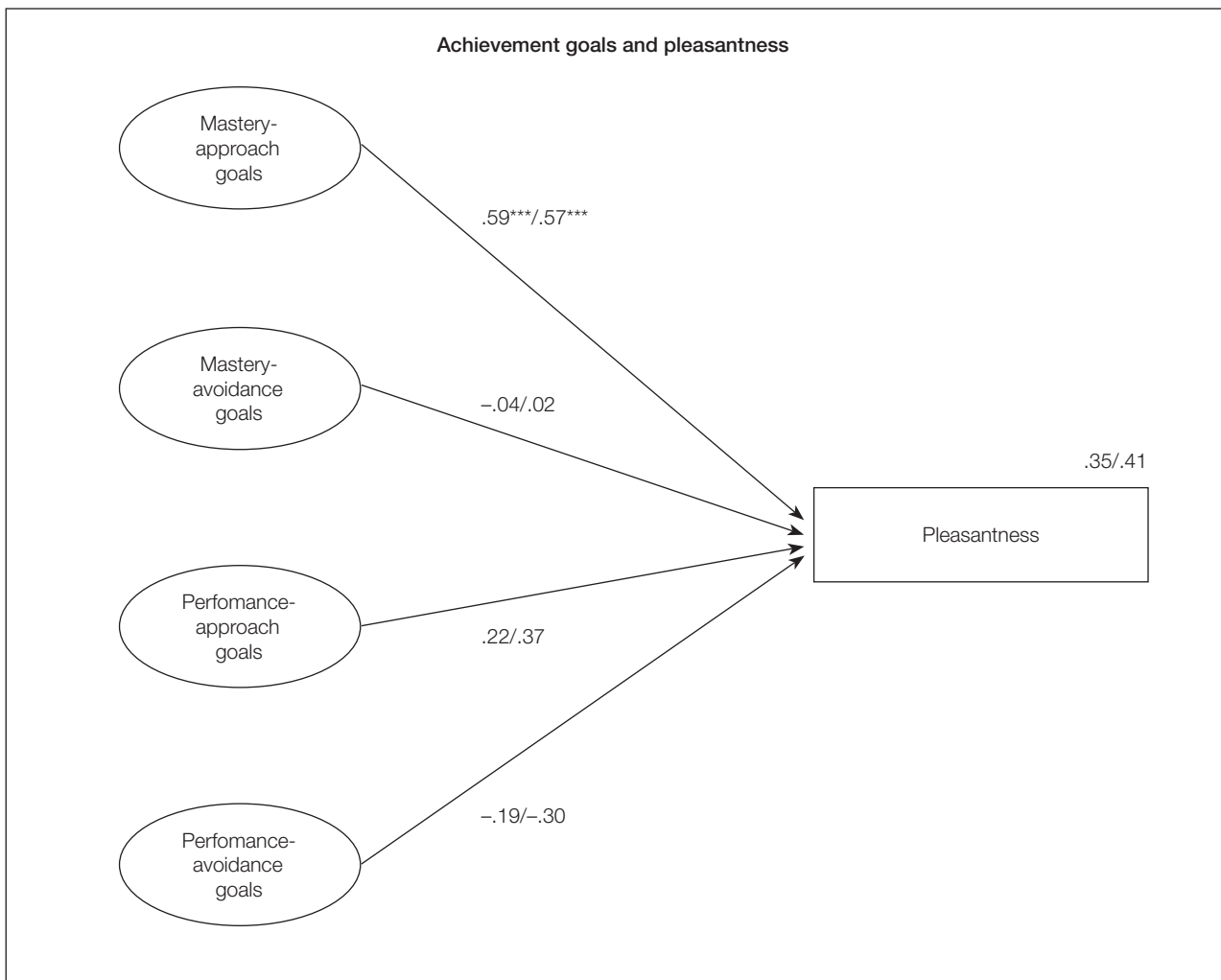
Note. ***p<.001.

DISCUSSION

Besides responding to the need to develop a version of the AGQ-R in the Italian language supporting its construct and criterion validity, this work aimed at testing its measurement invariance across a variety of factors and providing new data on cross-sectional age, gender, and domain differences, particularly to extend the understanding of mastery-avoidance goals (Ziegler & Bensch, 2013).

Concerning construct validity issues, we found support of the 2 x 2 hypothesized goal model (Elliot & Murayama, 2008) for Italian and mathematics domains. This suggests the salience of both valence and definition dimensions, at least for the Italian students involved, in the representation of the reasons underlying the endeavours towards learning in specific subjects. Mean differences in the levels with which the students endorsed the four goal types–with the highest scores for mastery-approach goals and the lowest scores for performance-approach goals –further indicated that they are already differentiated in fourth-graders. Even if the higher scores for mastery versus performance goals could be linked to social desirability, the ability to distinguish between the four goal types supports the authenticity of students' responses.

The goodness of the factorial structure of the 2 x 2 model was additionally indicated by the measurement invariance analysis (Chen, 2007; Ziegler & Bensch, 2013). Differently from previous studies in which AGQ-R invariance issues were marginally considered (except Alkharusi & Aldgafri, 2010), we documented the increasing invariance of the model across class level (partially scalar for mathematics and scalar for Italian), country (scalar for both domains), and gender (uniqueness for both domains). Different levels of invariance could depend on limitations of our study such as small sample sizes across class level and American and Italian sample different age. Besides being a prerequisite for the use of the translated questionnaire, these findings allow to exclude the risk of attributing the group differences described to measurement artefacts (Ziegler & Bensch, 2013).

We also reported mean differences in the endorsement of achievement goals according to class level, gender, and domain, as a way to further document how achievement goals are differential in different groups. In support of a detrimental trend for motivation in the transition from primary to secondary school, scores decreased at increasing ages (Authors, 2013; Paulick et al., 2013). This could be linked to a variety of dimensions, such as changes in academic

tasks and classroom organization, concurrent psychological development, and changes in peer relationships (Eccles & Roeser, 2011). Concerning domain, we found higher scores for Italian compared to mathematics only for eleventh-graders and females. For older students, this effect could be linked to the increased differentiation between motivational beliefs characterizing them compared to younger students (Bong, 2001). For females, such difference (an opposite though not significant trend characterized males) could mirror stereotypical beliefs on gender superiority in terms of performance in different school domains (Muzzatti & Agnoli, 2007). However, data on superiority derive from tests on cognitive abilities or national surveys and do not correspond to the female advantage in school marks characterizing most subjects from primary to secondary school (Voyer & Voyer, 2014). Making the source of such information salient could be a fruitfully way to diminish the negative consequences associated with gender differences on motivational beliefs (Muzzatti & Agnoli, 2007). Acknowledging differences related to factors such as class level, gender, and domain is relevant not only at a theoretical level, but also from an applied perspective. Knowledge on how students' goals vary according to specific dimensions could be an invaluable instrument for professionals whom daily deals with students, such as teachers, psychologists, or educators. The awareness of these processes is a first step for possible prevention programs aiming at fostering those psychological processes associated with positive performance and wellbeing.

Finally, we examined the causal relationships between goals and performance and pleasantness as a way to provide data on the criterion validity of the AGQ-R. The four goals – besides being strongly correlated with one another, although not sharing neither the valence nor the definition dimension, similarly to data on first to nine-graders (Bong, 2009) – were positively predicted by first-term performance (except for mastery-avoidance goals for Italian, coherently with their focus on avoidance), but only mastery-approach goals positively predicted second-term performance. It seems that past successes or failures in a specific subject influenced the level with which students endorse all types of goals, or, more generally, become motivationally engaged towards a subject. However, only mastery-approach goals play an adaptive role fostering later performance, and their partial mediating role, together with the different signs of coefficients linked to second-term performance, supports goals' construct validity. From a theoretical perspective, these data confirmed

and extended findings characterizing European samples (Hulleman et al., 2010; Pekrun et al., 2009). From an applied perspective, such as clinical or educational, they further stress the need to develop learning environments that can favour students' endorsement of mastery-approach goals (Bong, 2009). Different contextual levels could be taken into account to promote such endorsement, working for example at the individual level on students' awareness of their own goals, at the class level, related for example to the structure of the class goals, or at more comprehensive level, including also contextual goals such as teachers' and parents' goals.

This research study suffers from limitations related for example to the prevailing focus on the 2 x 2 model with respect to other achievement goals frameworks; to the relatively small sample size; and to the use of self-report methods, like desirability effects, or cross-sectional designs, like the absence of control on individual differences. They could be partially

addressed in future studies, including for example larger samples to investigate further how class level can moderate associations between goals and outcomes, basing on our preliminary results supporting this effect. However, on the whole our data support the validity of the Italian version of the AGQ-R with primary and secondary school students, making its use worthwhile in learning contexts, as a means to provide new data about the Italian population but having the potentiality to be compared cross-culturally and give innovative contributions to our knowledge on the motivational nuances assuming salience in specific school environments.

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APPENDIX

Italian Achievement Goal Questionnaire-Revised (AGQ-R) Items (adapted from Elliot & Murayama, 2008)

Item	Item content
	Mastery-approach goals
1	Il mio scopo è padroneggiare pienamente gli argomenti spiegati in italiano/matematica.
3	Il mio obiettivo è imparare il più possibile in italiano/matematica.
7	Mi sforzo di capire i contenuti dell'italiano/della matematica nel modo più completo possibile.
	Mastery-avoidance goals
5	Il mio scopo è evitare di imparare meno di quanto potrei in italiano/matematica.
9	Il mio obiettivo è evitare di imparare meno di quanto sia possibile imparare in italiano/matematica.
11	Mi sforzo di evitare una comprensione incompleta degli argomenti dell'italiano/della matematica.
	Performance-approach goals
2	Mi sforzo di andare bene in confronto agli altri studenti in italiano/matematica.
4	Il mio scopo è ottenere buoni risultati rispetto agli altri studenti in italiano/matematica.
8	Il mio obiettivo è riuscire meglio degli altri studenti in italiano/matematica.
	Performance-avoidance goals
6	Il mio obiettivo è evitare di ottenere risultati scarsi in confronto agli altri in italiano/matematica.
10	Mi sforzo di evitare di riuscire peggio degli altri in italiano/matematica.
12	Il mio scopo è evitare di andare peggio degli altri studenti in italiano/matematica.