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The Reliability of Self-Reported GPA in Educational Research: A Comparison of Self-Reported and Officially Recorded Data

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Abstract: *Researchers use often self-reported grades as indicators of students' educational achievement because of difficulties in obtaining the official records. However, the results of such studies are questionable due to doubts regarding the reliability of self-reported grade data and factors that may lead to distortion. In this study, we help to resolve this issue by comparing self-reported grade point averages (GPAs) of 926 eighth grade Romanian students from the previous academic year with their official GPAs. At the descriptive and practical levels, we conclude that the distortions are positive—overreporting is more frequent than underreporting—and that their limited magnitude allows for the use of self-reported grades for the usually description i.e. of achievements in a population of students but not for individual students' diagnostics. At the explanatory level, the distortions are non-random, and there are two main causal mechanisms. First, overreporting is a cognitive and commitment-based error. Second, overreporting is an effect of social desirability, according to which students are expected to perform well based on their social characteristics. However, this second causal channel is not visible in bivariate tests because it is statistically suppressed by the main mechanism and the correlation of actual GPA with gender and socioeconomic status (SES – parents' education and class) variables.*

Keywords: *Education achievement; GPA; self-reported data; reliability; suppression effect.*

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1. Introduction

In Romanian schools, from lower secondary education up to the master's level, students' academic performance is assessed by teachers using an ordinal scale ranging from 1 to 10. For each subject, except for a few for which the evaluation result is either pass or fail (e.g., physical education), teachers compute an average at the end of the term, and the non-weighted average of these subject averages constitutes the term and yearly grade point averages (GPAs). This individual measure of educational performance is used to rank students for several purposes, for example, for admissions.

GPA is the single, officially employed, and mostly used and available measure of student academic performance, in Romania as well as in many countries worldwide. However, there have been many critiques regarding its validity in characterizing the knowledge, skills, and efforts of the assessed students. In our previous research articles, we have warned about the reliability of self-reported GPA as an indicator of school performance (Hatos, 2008). GPA is not only the single official measure of pupils' performance in Romania; it is also the most frequently used measure in educational research, in Romania and worldwide. Other measures, especially various cognitive or competency tests, are not as relevant because they are less available, rarely comparable, and do not have the same impact on students' academic careers as the official GPA itself.

However, due to the limited availability of official GPA records, most current and past research has used self-reported measures of GPA, a practice that raises questions regarding the reliability of students' self-reporting. Since studies involving GPAs are most often based on inferential statistics, random errors would not be a concern if their severity could be assessed. It is non-random errors that concern researchers, as they can introduce systematic biases in the results. Considering these issues, the current paper has the following objectives: 1) to assess the reliability of self-reported GPAs through an investigation of the consistency of self-reported grades of a random sample of eighth grade lower secondary students in Romania (Bihor County); 2) to test hypotheses driven by the literature on the correlates of distorted self-reports of GPA; and 3) to produce a model of self-report bias.

The novelty of our research, in addition to advancing previous similar studies, is that it is the first empirical investigation of its kind in the Romanian scientific literature and, as it will become clear from the literature analysis, one of the few in the international literature.

Our research will unfold as follows. First, we will examine the current literature on bias in reporting academic achievement and present hypotheses concerning correlates of the size and sign of these errors. In the second part of the paper, the hypotheses will be quantitatively tested using data collected from a survey of eighth grade Romanian students, including a self-report of their GPA from the previous year. The corresponding GPAs were obtained separately from the school's official records for comparison.

2. Literature review

To date, the most extensive meta-analytical review of research on the accuracy of self-reported GPA was carried out by Kuncel et al., (2005), which synthesized more than 80 North American studies on the topic published until 2005, including an assessment of high-school and college students' self-reported GPA's accuracy. According to the most recent studies, this meta-analysis remains the most authoritative source of hypotheses concerning the validity and reliability of self-reported GPAs in educational research (Christian et al., 2020).

The following are the most important conclusions of Kuncel et al. (2005) that pertain to the type of data used in our research (i.e., high school students' GPA), adjusted to the most recent literature:

1. The correlation between reported and official GPAs is usually large. Across 17 studies involving 44,176 students, the sample size weighted mean observed correlation was 0.82. A similar correlation was obtained by Maxey and Ormsby (1971). Since that time, the reliability of self-reported GPA—at least at the sample or population level— has been confirmed by a large number of studies (ACT, 2013; Christian et al., 2020; Cole & Gonyea, 2010; Dickhäuser & Plenter, 2005; Feng & Rost, 2015; Mayer et al., 2007; Möller et al., 2006; Noftle & Robins, 2007; Schwartz & Beaver, 2014; Shaw & Mattern, 2009; Sparfeldt et al., 2008; Talento-Miller & Peyton, 2006). However, Kuncel et al. (2005) warn that self-reported GPAs should be used with caution.
2. Overreporting of GPA is more frequent than underreporting, with the average error usually being positive. This result has been reproduced and confirmed by many newer studies (ACT, 2013; Cole & Gonyea, 2010; Dickhäuser & Plenter, 2005; Feng & Rost, 2015; Mayer et al., 2007; Möller et al., 2006; Schwartz & Beaver, 2014; Sparfeldt et al., 2008; Sticca et al., 2017; Talento-Miller & Peyton, 2006), with only a single contradictory result reported from a US high school survey (Shaw & Mattern, 2009).

3. Overreporting is negatively correlated with real GPA: actual underperformers tend to overreport to a greater degree than students with better abilities and performance. Maxey and Ormsby (1971) obtained the same result much earlier, followed by other research showing that lower academic performance is associated with lower reliability of self-reported GPA (ACT, 2013; Cassady, 2001; Cole & Gonyea, 2010; Frucot & Cook, 1994; Shaw & Mattern, 2009; Trice, 1990). Specifically, individuals with lower grades inflated their GPAs more than those with higher grades (Frucot & Cook, 1994). Researchers have argued that this is a result of social desirability (Dobbins et al., 1993) and the attempt to maintain social approval and a positive image (Shepperd, 1993).
4. Boys tend to overreport more than girls. This was also observed by Beyer (1999). Conversely, Caskie, Sutton, and Eckhardt (2014) found a different relationship in a small sample of US college students, with girls tending to overreport. Feng and Rost reported a similar finding (2015). Caskie et al. (2014) took things one step further by examining individual characteristics related to academic achievement and identified a relationship between grades, academic self-efficacy, and the accuracy of self-reported GPA by gender: of students with lower GPAs and lower academic self-efficacy, girls tended to overreport and boys to underreport. For those with higher GPAs and academic self-efficacy, no differences were found. In the study of Shaw and Mattern (2009), the result was not as categorical, showing that boys made more errors in reporting but had an identical likelihood to girls of over- and underreporting. Most research that has studied the relationship between gender and the accuracy of self-reported GPA has found no significant differences between the two variables (Dickhäuser & Plenter, 2005; Mayer et al., 2009; Talento-Miller & Peyton, 2006).

More recent research offers some hints about other moderators of distorted reporting of GPA by high school students. Newer research on monozygotic twins shows that around half of the variance in the inflated reporting of GPAs is explained by genetic influences, while all underreporting is explained by non-shared environmental influences (Schwartz & Beaver, 2015). Many other investigations have had a psychological focus, seeking to reveal the psychological correlates of faulty GPA reporting (e.g., Zimmerman, Caldwell, & Bernat, 2002). Some of the psychological factors that might influence the accuracy of students' self-

reported GPA are academic self-efficacy (Caskie et al., 2014) and parenting style (Rivers et al., 2012). A few studies have tested the correlation of SES with the tendency to overreport GPA.

However, little to no research has examined the likelihood of distorted GPA self-reports as a function of general response bias in self-completed student surveys. The issue of response bias in self-completed surveys with students is a pervasive one in educational research. Watkins and Cheung (1995) proposed that erroneous answers to some questions may be explained by a lack of cognitive ability to understand and properly answer the questions. It is reasonable to presume that memorizing and recalling one's GPA is dependent on one's general cognitive abilities as well as one's commitment to school, as remembering this information implies both the capacity and motivation for information processing and retrieval. We expect, therefore, that the size of the error in reporting one's own GPA is related to the tendency to give erroneous answers to any kind of questions.

Important sociological mediators that are rarely considered in the literature are those related to the socioeconomic backgrounds of students, which are known to be among the most important predictors of educational achievement (Bourdieu & Passeron, 1970; Coleman, 1966; Lucas, 2001; Raftery & Hout, 1993; Rivkin et al. ,2005; Sun & Li, 2009). Shaw and Mattern (2009) found no significant differences in self-reported GPAs across levels of parents' education and income. This is surprising, as both cognitive ability and school commitment, which have been highlighted as the main factors behind the accuracy of GPA self-reports, have been found to be correlated with the socioeconomic characteristics of students (Hackman et al., 2010; Hair et al., 2015; Li et al., 2018; Noble et al., 2007; Noble et al., 2015; Thomson, 2018; Ursache & Noble, 2016).

In summary, the current literature provides a foundation for the following research hypotheses:

H1: Boys tend to overreport GPA (Beyer, 1999; Kuncel et al., 2005).

H2: Higher actual GPA reduces the tendency to overreport GPA (low-performing students tend to overreport their GPA) (ACT, 2013; Cassady, 2001; Cole & Gonyea, 2010; Frucot & Cook, 1994; Shaw & Mattern, 2009; Trice, 1990).

H3: SES variables are not correlated with overreporting or underreporting of GPA.

3. Methodology

We will test the hypotheses through bivariate correlations and multiple linear regression of errors in the GPA reporting of lower secondary education students in Romania assessing the effect of exogenous variables in the hypotheses and controls.

The data used in this research were collected through a survey administered to eighth graders in Bihor County (Romania). The survey was organized by the Doctoral School of Sociology, University of Oradea. Specifically, a two-stage stratified random sample of 999 eighth graders from the entire eighth grade student population (mostly 14- and 15-year-old students) from Bihor County was surveyed using a paper-and-pencil self-assessment questionnaire during November–December 2018. Among the numerous questions included in the questionnaire, several required self-reports of GPA and subject point averages from the previous academic year (seventh grade). We present the variables included in the study in Table 3.1. The official GPAs taken from the school records were later attached to the database. Out of the 999 cases in the original database, 923 had valid values for both variables, and this subsample was the basis for the current research. The randomness of the subsample of cases with missing values was not assessed in this study, but we expect that, given its small size, the effect on the estimates is rather negligible.

Table 3.1. Variables in the analysis

Variable	Description	Measurement	Descriptive statistics
GPA overreporting	Reported GPA in previous academic year - Officially recorded GPA of previous year	Scale (min=-3, max=4.25)	Mean=0.115 St. deviation=0.744
Official GPA	Official GPA at the end of the previous academic year (taken from official records)	Scale (min=3, max=10)	Mean=8.21 St. deviation=1.35
Sex	Sex (1=M)	Dummy	Male=41.2% Female=51.8%
Mother's education low (1 = up to lower secondary)	Mother finished no more than 8 grades		Finished=23.6%
Mother's education high school (1=up to high school)	Mother finished at least some high school (9–12 grades)	Dummy	Finished=41.2%
Affluence – family material endowment	Number of yes answers for ten household items	Discrete scale (min=0, max =10)	Mean=5.87 St. deviation=2.19

4. Results

Overall, in line with the expectations based on previous research, there was an overreporting of GPAs, whose actual value was 0.155 points smaller, on average, than the reported value. The standard deviation of this error was 0.744 GPA points (Table 4.1). The one-sample K-S test used to compare the distributions of the two variables was significant at the $p<0.001$ threshold. This means that the two measures of GPA had significantly different distributions.

Table 4.1. Self-reported and officially recorded GPAs

	Mean	**Std. Dev.**
Self-reported GPA	8.41	1.216
Officially recorded GPA	8.26	1.318

Of the cases, 56% had correct self-reported GPAs, while 17% had self-reported GPAs that were lower than the officially recorded data. Student reports of inflated GPAs were more frequent (27%) (Table 4.2).

Table 4.2. Types of errors in reporting GPA

Error type	**Mean**	**N**	**Std. Deviation**
Underreporting	-0.529	157	0.590
Correct report	0.000	517	0.000
Overreporting	0.908	249	0.961
Total reporting error	0.155	923	0.744

The most important measure of reliability of self-reports, the correlation of self-reported GPA with the official records, resulted in a value similar to that of Kuncel et al. (2005) for high school students (0.83, $p<0.001$ in our case, compared to the 0.82 weighted mean correlation from 17 studies reported in their meta-analysis). This suggests that, while random errors explain part of the variance in reporting errors that are not accounted for by other variables, self-reported GPA is still a good proxy of actual GPA for inferential statistics necessities. However, given the large proportion of variance from official GPAs that was not covered by the self-reports (32%), self-reported GPA should not be used as an individual-level diagnostic or selection tool.

4.1. Bivariate analyses

By gender

Although some previous studies indicated that overreporting is more frequent in the case of male students, our data show only a slight, statistically non-significant increase in the case of girls ($p(t)>0.05$) (table 4.1.1). The literature on this topic is contradictory. As we obtained a non-significant difference, we assume that examinations of this relationship require a more careful statistical approach.

Table 4.1.1. Average GPA reporting error by gender

	Overreporting – mean
Female	0.16
Male	0.15

$p(t)>0.05$

By real GPA

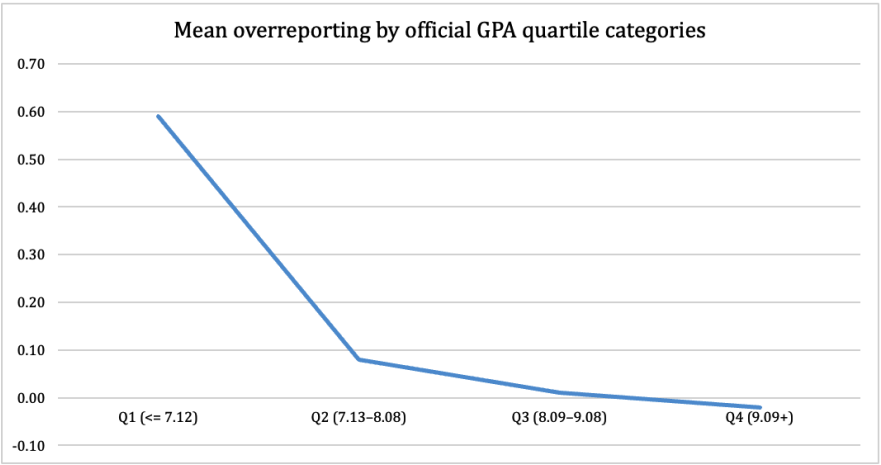
The overreporting error (computed as the difference between the self-reported GPA and the actual official record) decreased strongly as the actual GPA increased ($r=-0.41$, $p<0.001$) (Table 4.1.2). This can be better illustrated by computing the average error by quartiles of official GPA. It is apparent that large overreporting occurred in the quartile of the lowest performing students (Figure 1).

Table 4.1.2. Mean reporting error by real GPA quartile

Actual GPA quartiles	**Overreporting - Mean**
<= 7.12	0.59
7.13–8.08	0.08
8.09–9.08	0.01
9.09+	-0.02

$p(ANOVA)<0.01$

Figure 1. Mean overreporting by official GPA quartile categories



By parents' education

The average reporting error appeared to vary largely based on the education of parents. However, a one-way ANOVA test including mother's and father's education did not produce any significant results ($p>0.1$) (Table 4.1.3).

Table 4.1.3. Mean reporting error by parents' education

	Mean overreporting, by level of father's education	**Mean overreporting, by level of mother's education**
Up to lower secondary (up to 8 grades completed)	0.04	0.11
Upper secondary/high school (grades 9–12), including baccalaureate and vocational school	0.17	0.19
Technical school, post-secondary education, college	0.21	0.14
Higher/tertiary education	0.13	0.13

By affluence

The correlation between the error measure and affluence assessed based on expensive home appliances and amenities, including cultural goods, was also not significant ($p(r)>0.05$). The bivariate tests confirmed the

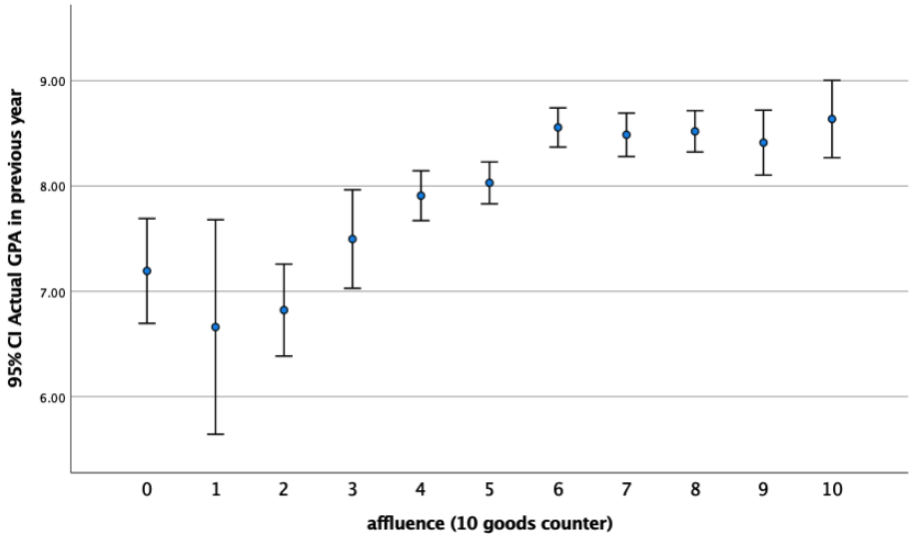
research hypotheses. As expected, neither gender nor SES were associated with distorted reports of academic achievements by students. However, despite the support from previous studies, such results are counterintuitive given the large correlation of overreporting with actual GPA (confirmed H1) and of actual GPA with gender and SES indicators (see Table 4.1.4. and Figure 2). If there is no direct relationship between gender and SES, on the one hand, and distortion in GPA reports on the other, given the large correlation of actual GPA and the dependent variable, the bivariate analyses should have demonstrated significantly larger overreporting for boys than girls as well as for students from lower socioeconomic backgrounds.

Table 4.1.4. Average real GPA by sex and parents' education

	Category	**Actual GPA average**	**N**
Sex***	female	8.42	464
	male	8.00	495
Mother's education up to 8th grade***	no	8.44	741
	yes	7.39	218
Mother's education up to 12th grade	no	8.19	560
	yes	8.22	399

***p(t)<0.01

Figure 2. Average of actual GPA by affluence score



As expected, the linear correlation of the affluence variable (10 expensive amenities or cultural goods) with the actual recorded GPA was also significant (0.303, $p<0,01$).

Since these relations were not apparent in the bivariate tests, contrary to our expectations as well as most of the literature, it would appear that some more complex causal mechanism is at play. Our working hypothesis is that the actual recorded GPA suppresses the direct effect that gender and SES, based on parents' education and family's affluence, have on a student's tendency to give distorted accounts of his or her academic records in surveys. The impact of suppressor variables on the effect of other predictors in multiple regressions has been extensively examined in the methodological literature (e.g., Akinwande et al., 2015; Conger, 1974; Darlington, 1968; Pandey & Elliott, 2010).

4.2. Multiple regressions

To test this working hypothesis, and the impact of each of the hypothesized variables in a controlled setting, we conducted three multiple regressions, including a group of variables in each step to explain the variation in GPA overreporting, our dependent variable (Table 4.2.1):

- Model 1 – Sex
- Model 2 – Model 1 + mother's education and family affluence
- Model 3 – Model 2 + official GPA

Table 4.2.1. Regression models fit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.002[a]	0.000	-0.001	0.74454
2	0.055[b]	0.003	-0.001	0.74461
3	0.475[c]	0.226	0.222	0.65654

All multicollinearity tests were satisfactory, and VIF and tolerance measures were largely below the thresholds.

As seen in the model fit, the first and second models yielded almost no improvement in explaining the variance of the dependent variable. However, after introducing the actual GPA in the third model, the R^2 jumped from explaining almost none to explaining close to a quarter of the variance in the reporting error.

Moreover, the third model was a definite improvement over the model including only the actual GPA, which had an R^2 of 0.171.

However, as shown by the parameters in Table 4.2.2, this dramatic improvement in explanatory power was not only due to the effect—still the largest—of the actual GPA but also to the fact that including the parameter of actual GPA in the multiple regression revealed the direct effects of three other variables, which, in the previous models, as in the bivariate analyses, had insignificant effects: sex, mother's education up to lower secondary school, and affluence.

Table 4.2.2. Parameters of regression models of GPA overreporting

		B	**Std. Error**	**Beta**	**t**	**sig**
Model 1	(Constant)	0.157	0.035		4.476	0.000
	Dummy_sex (1=male)	-0.004	0.049	-0.002	-0.075	0.940
Model 2	(Constant)	0.061	0.092		0.670	0.503
	Dummy_sex (1=male)	-0.004	0.049	-0.003	-0.088	0.930
	Dummy_mother's education low (1= up to lower secondary)	-0.016	0.069	-0.009	-0.237	0.812
	Dummy_mother's education high school (1=up to high school)	0.050	0.056	0.033	0.893	0.372
	Affluence	0.013	0.012	0.038	1.096	0.273
Model 3	(Constant)	2.454	0.168		14.607	0.000
	Dummy_sex (1=male)	-0.117	0.044	-0.079	-2.671	0.008
	Dummy_mother's education low (1= up to lower secondary)	-0.323	0.064	-0.180	-5.051	0.000
	Dummy_mother's education high school (1=up to high school)	-0.076	0.050	-0.051	-1.518	0.129
	Affluence	0.049	0.011	0.142	4.583	0.000
	Official GPA	-0.294	0.018	-0.521	-16.242	0.000

The direct effects of these variables on the overreporting of GPA when the influence of actual GPA was controlled are as follows:

- Boys tended to overreport GPA to a significantly lower degree than girls.

- Children of parents with poor educational backgrounds (mother with maximum lower secondary education, i.e., 7 or 8 grades completed) tended to overreport GPA to a significantly lower

extent than the rest of the students (the vast majority of whom had better educated parents)

- Affluence had a direct positive effect on overreporting (students from more affluent families tended to overestimate their educational achievement).

In addition, the most salient effect was that of the actual GPA itself, which was largely negative, meaning that students with poor grades tended to overstate their achievements in self-reports, and this was true regardless of whether other variables were controlled.

5. Discussion and limitations

Most of the descriptive data concerning the distortions in students' self-reported GPAs confirmed the previous knowledge regarding the accuracy of these accounts. The correlation between self-reported GPA and actual GPA was 0.83. Further, overreporting was more frequent than underreporting, and the average errors were positive when the actual GPA was subtracted from the reported GPA.

Off the three hypotheses concerning the predictors of reporting error, only one was confirmed in the multiple regression analysis: the strongest direct effect on the error in reporting was the actual GPA itself, which had a negative impact on overreporting, meaning that the better a student performs in terms of GPA, the lower (or maybe even negative) his or her error will be in reporting his or her GPA.

Contrary to the hypotheses derived from previous studies, girls were found to be more likely to overreport their grades (H1), while students of lower SES (i.e., with parents with lower educational attainment and those from less affluent families) were significantly less inclined to exaggerate their grades in self-reports (H3).

These effects were not revealed in a straightforward way, for example, through bivariate tests, as the two-way relationships with the predictors and the dependent variable were masked (or suppressed) by the predictors' strong relationship with the actual GPA. Introducing the actual GPA in multiple regression along with the rest of predictors made the significant effect of these predictors directly visible as significant regression parameters.

These results suggests that, concerning the reason for distortion in reporting GPA, there are at least two mechanisms at play related to distorting one's academic achievements:

1. The cognitive abilities/school commitment mechanism, which has been suggested in previous studies and which explains why the errors have an inverse elationship with the actual GPA. Giving a correct answer to the question of one's own GPA in the previous academic year is determined by the same factors as providing the correct answer to any question, which involve memorization and commitment.
2. The social desirability mechanism, which was revealed by the significant effects that became apparent in the multiple regression once the actual GPA was introduced in the model: girls and students with a higher SES background tended to overreport their GPA. Some of the students belonging to categories expected to perform academically well were likely to overreport their academic performances, whereas some of those from categories with lower expectations—boys or those with worse socioeconomic backgrounds—tended to underreport their grades. This mechanism is consistent with the logic of social desirability and social approval seeking (Dobbins et al., 1993; Shepperd, 1993).

Moreover, based on the comparisons of R^2 values of the regression models of the entire final regression model (Model 3), 75.66% (0.171/0.226) of the explanatory power is attributable to the first mechanism and the rest (24.33%) to the second mechanism. However, as highlighted earlier, the second mechanism was suppressed in the bivariate analysis by the first due to the strong relationships of actual GPA with gender and indicators of SES.

On the practical level, it is obvious from these results that errors in self-reported GPA are not random, but they are limited in magnitude. Therefore, while it is possible to describe the grades of populations of students based on self-reports with some accuracy, self-reports cannot be employed for individual assessment.

6. Conclusions

Our article addressed a persistent issue in educational research: the consistency of self-reported grades as indicators of academic achievement. It aimed at assessing the reliability of these reports by comparing them against the real grades as they appear in the official records and advancing the understanding of the tendency to over- or underreport one's grades. The analysis of the literature on this issue supported several hypotheses that guided our investigation of factors explaining the variation in the difference between reported and real GPA. Actual GPA is negatively correlated with distortion, while gender and SES are not correlated with the magnitude of

the distortion, making the tendency to over- or under-report GPA mainly a question of cognitive ability. We extended the current knowledge by testing hypotheses based on our doubts regarding these simple explanations. The flaws in current simple explanations are evident, if they ignore to possibility of correlations of reporting distortions with SES indicators, for example, given the strong effect that real GPA has on reporting distortion and the well-known impact of socioeconomic indicators on real GPA.

To achieve these objectives, we analysed survey data from 926 eight grade students from Oradea, which were collected through a pen-and-pencil self-administered questionnaire, to which we added the official GPA of each student.

The descriptive results confirm those reported in previous studies. The correlation between actual GPA and self-reported GPA was rather large (r=0.83), making self-reported grades an acceptable replacement for actual grades, at least at the sample and population levels. The mean tendency of distortion was to overreport, while more than half of the students gave correct answers.

Tests of our hypotheses provided a more nuanced picture. The bivariate tests confirmed the expectations based on previous research, as neither gender, mother's education, nor material endowment of the family had a statistically significant relationship with the dependent variable (reported GPA/real GPA). However, the multiple regressions showed that both gender and SES indicators were significantly correlated with the measure of reporting distortion. This was not apparent in the simpler analyses because the main effect, that of GPA, had a suppressor effect on the impact of gender and SES. In other words, there are two mechanisms at work in producing erroneous self-reports: 1) cognitive mechanisms, which lead students with lower academic abilities (boys and those with worse socioeconomic backgrounds) to make errors, especially by overreporting their grades; and 2) the social desirability mechanism, which also causes students who are expected to perform well in school (especially girls and students with advantaged social backgrounds) to overestimate their achievements.

Our research thus clarifies the counterintuitive non-correlation of self-report bias with gender and SES, revealing the second causal mechanism that determines over-reporting: social desirability. It also contributes to the methodological research by providing researchers with a simple but dramatic example of a suppression effect in educational measurement.

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