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Performance-approach goals: the operationalization makes the difference

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Abstract

The operationalization of performance-approach goals (PAGs) was found to be an important moderator of the associations between different PAGs and several educational outcomes. To explore this aspect in more detail, we conducted two studies with school students ($N_1 = 425$, mean age = 16.6 years, $SD = 0.61$; $N_2 = 310$, mean age = 14.91, $SD = 1.72$). In study 1, we mainly focused on the associations between achievement goals and school grades. In study 2, we additionally assessed several motivational variables (academic self-concept, school values), as well as test anxiety and school well-being. All variables were assessed for school in general, mathematics, and German (mother tongue). The results of confirmatory factor analyses replicated and extended the finding on the different facets of PAGs. Besides a normative-based PAG component (the aim is to perform better than others) and an appearance-based PAG component (the aim is to demonstrate one's ability), an additional proving PAG component (the aim is to demonstrate one's ability toward significant others) was found. Contrary to earlier findings, both normative and appearance-based PAGs were positively correlated with school grades, whereas the proving component showed smaller associations. Moreover, differential associations with self-concept, school values, and school well-being emerged regarding the different facets of PAGs. The results are discussed with regard to the operationalization of PAGs.

Keywords Achievement goals · Motivation · School achievement · Assessment · Well-being

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Introduction

The relevance of different motivational constructs to academic achievement outcomes has been demonstrated during the last several decades of research. Among others, achievement goals in particular have gained considerable attention (Elliot 1999, 2005). One relevant moderator regarding the association between achievement goals and important educational outcomes is the operationalization of the achievement goal (Huang 2012; Hulleman et al. 2010; Wirthwein et al. 2013). Especially performance-approach goals (PAGs) have been operationalized heterogeneously (Hulleman et al. 2010).

At least two different elements of PAGs have been discussed: goals with an appearance focus ("appearance performance-approach goals": demonstrating competence or appearing intelligent to others) and goals with a normative focus ("normative performance-approach goals": trying to be better than others or to outperform others). In their meta-analyses, Hulleman et al. (2010) and Wirthwein et al. (2013) concluded that normative PAGs yielded higher associations with academic achievement outcomes than scales with appearance PAGs. Recently, Senko and Dawson (2017) dedicated a whole meta-analysis to this research topic. The authors summarized that normative PAGs are more adaptive than appearance PAGs, not only regarding achievement outcomes but also regarding competence perceptions and self-regulation.

However, research validating different PAG components by applying an adequate methodological approach such as structural equation modeling is scarce. Only if a two-factor solution (PAGs subdivided into normative and appearance components) outperforms a single or an even more differentiated PAG solution does the assumption made by Hulleman et al. (2010), Wirthwein et al. (2013), and Senko and Dawson (2017) hold. Hence, the current publication had three goals: to analyze the dimensional structure of PAGs by applying confirmatory structural equation models in different samples of school students, to investigate the relevance of multidimensional PAGs for the other achievement goals, and for other several educational outcomes (i.e., grades, academic self-concept, school values, test anxiety, school well-being).

Achievement goals

The theory of achievement goals aims to explain and predict the direction and intensity of individuals' behavior in achievement situations (cf. Dweck 1986; Nicholls 1984). During the past three decades, different achievement goal models have been developed (see Kaplan and Maehr 2007; Wirthwein et al. 2013). Earlier conceptualizations referred to dichotomous achievement goals by focusing on mastery goals for which the aim is to increase one's competence or abilities, thereby focusing on intrapersonal standards, and performance goals for which the aim is to demonstrate one's competence, thereby focusing on interpersonal standards. The trichotomous achievement goal model (e.g., Elliot and Church 1997) takes the approach-and-avoidance distinction of achievement motivation into account and differentiates performance goals into PAGs (appearing competent to others or trying to outperform others) and performance-avoidance goals (hiding one's incompetence). These three achievement goals show substantial intercorrelations (e.g., Hulleman et al. 2010): mastery and PAGs as well as PAGs and performance-avoidance goals show positive associations, whereas performance-avoidance goals are negatively correlated with mastery goals.

Elliot and McGregor (2001) extended the approach-avoidance distinction to mastery goals and developed a 2 × 2 achievement goal model. They additionally distinguished between

mastery-approach goals (enhancing task-based competence) and mastery-avoidance goals (avoiding the inability to master a task or task-based incompetence). Whereas there is a lot of empirical support for the trichotomous goal framework in different settings, the mastery-avoidance goals are less frequently investigated in school contexts (Hulleman et al. 2010; Wirthwein et al. 2013). Moreover, additional goals such as work-avoidance, which involves the main aim of working as little as possible and reducing one's effort, have been examined (e.g., Elliot et al. 2011; Kaplan and Maehr 2007; Ryan and Shim 2008).

Defining and operationalizing performance-approach goals

Whereas mastery goals have been defined more homogeneously, the conceptualizations of PAGs vary and have undergone considerable changes. In early definitions, PAGs focused on the demonstration of competence and were "directed toward the attainment of favourable judgements of competence" (Elliot and Church 1997, p. 218; see also Dweck 1986). The demonstration of high ability or competence was also seen as the core aspect of PAGs by Midgley et al. 2001; see also Kaplan and Maehr 2007; Midgley et al. 1998). Hence, in the corresponding instrument ("Patterns of Adaptive Learning Survey"; PALS; Midgley et al. 1998), most PAG items refer to the demonstration of abilities. Nicholls (1984) added a social comparison component (i.e., the aim is to perform better than others) and included corresponding items in the "Motivation Orientation Scales" (MOS; e.g., Duda and Nicholls 1992), another widely used PAG scale. Harackiewicz et al. (2002) distinguished between self-presentation goals (e.g., trying to appear a certain way to others) and norm-referenced goals (e.g., trying to do well compared with others) and argued that self-presentation goals are not focused primarily on competence—the most important element of achievement goals. Hence, in their opinion, PAGs should rather refer to the normative comparison component. In this context, Elliot and Trash 2001; see also Elliot 2005; Elliot and Murayama 2008; Senko et al. 2011) stated that on the one hand, absolute or intrapersonal criteria (mastery goals), and on the other hand, interpersonal or normative criteria (performance goals) are the essential elements of achievement goals. In their opinion, the demonstration of competence is a self-presentational goal rather than an achievement goal because it focuses on the social consequences of being competent. In the corresponding questionnaire ("Achievement Goal Questionnaire-Revised"; AGQ-R; see Elliot and Murayama 2008), the PAG scale contains only items with a normative comparison.

Hulleman et al. (2010, p. 425) listed several PAG components mentioned throughout the literature and subsumed them under three superior components based on theoretical considerations and similarities between the different scales. In their conceptualization, the *appearance component* of PAGs focusses on demonstrating competence (e.g., "I like school work that lets me show how smart I am."; labels frequently used in the literature: appearance-approach or ego-orientation), on gaining favorable judgements about one's competence or ability (e.g., "It's important that others know that I am a good student."; label frequently used in the literature: proving goal orientation), and on seeking to validate one's ability (e.g., "It is important to me to validate that I am smart."; label frequently used in the literature: ability validation).

Different definitions and operationalizations of the *normative component* of PAGs are more homogeneous compared to the appearance components and refer to being better than others and to outperform others (e.g., "My goal in this class is to do better than others."; labels frequently used in the literature: competition-approach, performance-approach, or ego-orientation). Besides appearance PAGs and normative PAGs, Hulleman et al. (2010) additionally mentioned a third component ("proving PAGs"): a combination of the appearance and

normative components that refers to appearing competent relative to others (e.g., "I like to show my teacher that I'm smarter than other kids."). Because there were just a few measures focusing on these proving PAGs, the authors decided to combine all appearance and proving PAG components in one category. They argued that the normative standard of these PAGs serves the overarching goal to appear talented and impress others. Another fourth component was mentioned, titled "general PAGs" with an outcome focus (e.g., "My aim is to get a good grade."). Hulleman et al. (2010) reasoned that outcome goals could also be related to mastery goals, are neutral regarding the definition of competence, and hence, are no PAGs. In their meta-analysis, appearance PAGs, proving PAGs, and general PAGs were analyzed together and were compared to normative PAGs. Although comprehensible and necessary for meta-analytical reasons, the combination of appearance, proving, and general PAGs in one component has not been tested empirically so far.

To our knowledge, there are just a few studies that have explicitly addressed the differentiation between the different components of PAGs empirically. Grant and Dweck (2003) found support for a model with ability-linked, normative, and outcome goals in different samples of university students. The PAG components showed moderate correlations varying between $r = .34$ (outcome and normative goals) and $r = .53$ (outcome and ability goals). Moreover, the authors provided evidence for the divergent validity of the different PAG scales and concluded that different PAG scales should be considered simultaneously because of their differential associations with several outcome variables. However, other studies (e.g., Bong et al. 2013) did not support a model with different PAGs.

Two additional studies explicitly differentiated between normative and appearance components and found empirical evidence via confirmatory factor analyses for separate normative and appearance PAGs (Edwards 2014; Wartburton and Spray 2014). There are some shortcomings to mention regarding the aforementioned studies. The authors used the revised PALS (Midgley et al. 2000) to investigate appearance PAGs. But besides appearance PAGs, other PAG items are included as well in this scale (e.g., "It's important to me that other students in my class think I am good at my class work."). It was not examined whether the used PAG items are comprised of more than two factors. Hence, it is not clear if a model with more than two PAG components reaches a better model fit than a model with two factors.

In addition, there are some studies comparing the convergent and divergent validity of different achievement goal instruments (Day et al. 2003; Donnellan 2008; Jagacinski and Duda 2001; Smith et al. 2002). It can be concluded that although there were some convergences between the different scales, the results on the convergent and divergent validities of the used questionnaires were conflicting, especially regarding PAGs (Hackel et al. 2016).

In sum, at least two different operationalizations of PAGs are widely used by different researchers: an appearance component with the aim of showing and demonstrating one's competence or abilities and/or a normative component with the aim of outperforming others or being better than others. Others argue that beside appearance and normative PAGs, even more PAG components should be considered (e.g., Grant and Dweck 2003; Hulleman et al. 2010; Lee and Bong 2016).

Validating different operationalizations of performance-approach goals

Research regarding the effects of PAGs on educational outcomes is mixed (e.g., Elliot and Moller 2003; Midgley et al. 2001; Senko et al. 2011). In this context, Senko and Tropiano (2016) argue that there are two separate achievement goal theories that define achievement

goals differently. Due to the different conceptualizations, different effects might result. The goal orientation theory (drawing on the work of Ames and Archer 1988; Dweck 1986; or Nicholls 1984) defines achievement goals as underlying reasons for task engagement: to develop competence (mastery goals) or to demonstrate competence (performance goals). Here, mastery goals are seen as the more adaptive goals, resulting in favorable educational outcomes. The goal standard model (drawing on the work of Elliot 1999) conceptualizes goals based on the standards for determining competence. Here, competence is defined differently. Regarding mastery goals, personal criteria are relevant for achieving success (e.g., perceiving that one has learned). Regarding performance goals, interpersonal criteria are relevant for achieving success (e.g., outperforming others). These two goals can each have beneficial outcomes, implying a multiple-goal perspective.

Meta-analyses revealed associations of $r = .06$ (Hulleman et al. 2010), $r = .08$ (Wirthwein et al. 2013), and $r = .13$ (Huang 2012) between PAGs and different achievement indicators. Hulleman et al. (2010) as well as Wirthwein et al. (2013) found several important moderators of this relation: The respective questionnaire and operationalization of PAGs were especially relevant. For example, the associations between achievement indicators and the PAG scale from the Achievement Goal Questionnaire (AGQ; Elliot and McGregor 2001) were higher (Hulleman et al. 2010: $r = .13$; Wirthwein et al. 2013: $r = .15$) than for the PALS by Midgley et al. (1998); Hulleman et al. 2010: $r = -.01$; Wirthwein et al. 2013: $r = .02$).

In their meta-analysis, Hulleman et al. (2010) additionally analyzed the content of the scales. They found that normatively coded PAG scales had higher effect sizes ($r = .14$) than scales coded as both appearance and proving goals ($r = -.14$). Hence, the authors concluded that the AGQ shows higher correlations because this instrument contains only normatively referenced items and that the PALS shows smaller correlations because it mostly contains appearance/provingly referenced items (see also Wirthwein et al. 2013). Taken together, it seems to be necessary to differentiate between different PAG components with regard to their associations with academic achievement.

Hulleman et al. (2010) provided a theoretical rationale for the smaller associations between achievement and appearance-based PAGs: They assumed that the appearance component is comparable to the construct of self-worth contingency (i.e., Covington 1984) that refers to how contingent one's self-worth is regarding external circumstances. If an individual's self-worth is linked with task outcomes (as is also the case for appearance-based PAGs), this might lead to maladaptive responses such as unfavorable performance outcomes but also to anxiety and shame (Hulleman et al. 2010). Grant and Dweck (2003) additionally found hints that appearance-based PAGs are associated with lower achievement after experiencing failure. This is consistent with the aforementioned argument: When one's self-worth is negatively affected (because an individual is not able to appear highly competent to others), a maladaptive response pattern results (Dweck 1986). However, according to Grant and Dweck (2003), negative effects of appearance goals on achievement are not expected when the person is doing well.

Explanations for why normative PAGs show higher associations with achievement indicators than appearance PAGs are scarce. An explanation might be that achievement outcomes such as grades are mainly norm-referenced, and hence, higher associations might emerge for explicitly norm-referenced PAGs because, in this case, one's personal goals match the demands of the environment. In line with this argument, Wirthwein et al. (2013) found hints that the specific achievement indicator is another moderator of the associations between achievement and PAGs. Norm-referenced achievement indicators such as grades had slightly higher effect sizes than objective indicators such as achievement tests.

The distinction between different PAG scales seems to matter for outcomes other than just different academic achievement indicators (Senko et al. 2011; Senko and Dawson 2017; see also Elliot and Moller 2003; Putwain et al. 2010).

Hulleman et al. (2010) did not find the operationalization of PAGs to be a moderator of the associations with interest in their meta-analysis. However, intrinsic values and interest are only two aspects of subjective scholastic values (cf. Eccles and Wigfield 2002). Whether different associations would emerge if subjective scholastic values were assessed on a broader level has not yet been investigated.

Whereas the correlations between normative PAGs and the two components of test anxiety (worry, emotionality) seem to be negligible (Putwain et al. 2010; Pekrun et al. 2006), the correlations between test anxiety and appearance PAGs are mostly significant and positive albeit small (see Senko et al. 2011). Senko and Dawson (2017), not differentiating between different components of anxiety, summed up that normative PAGs and appearance PAGs did not differ regarding emotions such as anxiety, negative and positive affect, and enjoyment. However, other studies have shown heterogeneous results for positive and negative affect and PAGs. In a study by Pekrun et al. (2006), normative PAGs yielded small positive associations with negative affect ($r = .16$), whereas the association with positive affect was negligible ($r = -.06$). For appearance PAGs, Kaplan and Maehr (1999) found small negative correlations ($r = -.17$) with positive affect in school. Hence, independent from the respective operationalization of PAGs, PAGs seem to have negligible or small negative associations with well-being measures. However, these studies have focused solely on the affective components of subjective well-being. Previous research has shown that subjective well-being consists of both affective and cognitive components (i.e., life satisfaction; see Diener et al. 1999). As the cognitive component is often measured by items such as "In the past I have accomplished most things I intended to do," and such items are related to goal accomplishment in general, it might be the case that achievement goals that all broach the issue of goals in a more specific and detailed manner are related to these general life goals that are reflected by the cognitive component of subjective well-being. We are not aware of any studies that have focused on both components of subjective well-being with regard to their associations with achievement goals in general and different aspects of PAGs in particular in the context of school.

The present research

The main aim of the present research was to shed light on the different operationalizations of PAGs, especially regarding appearance and normative PAGs, and their associations with important educational variables. If the different contents of PAGs could be confirmed via confirmatory factor analyses, we were mainly interested in the differential associations between the different aspects of PAGs and the remaining achievement goals as well as motivational variables (academic self-concept, school values) and well-being indicators. Moreover, as school grades show the most substantial associations with PAGs among various indicators of academic achievement (Wirthwein et al. 2013), we decided to investigate this achievement indicator as well.

On the basis of Hulleman et al. (2010), Senko et al. (2011), or Wirthwein et al. (2013), we predicted that PAG items with a focus on normative superiority would show higher associations with school grades than appearance-based items. Moreover, we additionally expected that both components would be differentially related to the other achievement goals. According to Grant and Dweck (2003), mastery goals yield lower correlations with normative-based

than with appearance-based or outcome goals. However, Hulleman et al. (2010) found that normative PAGs showed higher correlations with mastery goals than with other achievement goal scales. In addition, performance-avoidance goals had lower associations with normative-based PAGs than with other operationalizations of PAGs (Hulleman et al. 2010). We are not aware of any studies that have focused on the relations between work-avoidance goals and different PAGs.

In study 1, we assessed the achievement goals (mastery, performance-approach, performance-avoidance, work-avoidance goals) as well as the school grades in school in general, mathematics, and German (mother tongue) of $N = 425$ students. In study 2, we extended the number of items on the PAG scales and analyzed achievement goals in mathematics and German. Furthermore, we tested for divergent validity and assessed—in addition to school grades and performance-avoidance goals—several motivational variables (e.g., academic self-concept, school values, test anxiety, school well-being). Here, we assumed that the associations might be more positive between normative PAGs and self-concept than for appearance-based PAGs (see Senko and Dawson 2017; Senko et al. 2011). However, there might be no different correlations for different PAG scales and interest or intrinsic values (Hulleman et al. 2010). For test anxiety, the associations with appearance and normative PAGs might be similar (Senko and Dawson 2017). Studies on measures of well-being in the context of school and their associations with PAGs have been scarce. We assumed that at least small associations with well-being measures might emerge independent of the respective operationalization of the PAGs (e.g., Pekrun et al. 2006; Putwain et al. 2010; Senko and Dawson 2017; Senko et al. 2011).

Study 1

Sample

We investigated $N = 425$ school students ($n = 214$ female) from five different schools from the German federal states of North Rhine-Westphalia and Baden-Württemberg. The students (mean age = 16.6 years, $SD = 0.61$) attended the 11th grade in a school that was preparing them for university (Gymnasium). Trained psychology students tested the participants during regular school lessons in the middle of the school year. Signed parental consent forms were requested and obtained from almost all students in all grades at all schools (only two parents refused to sign the consent form). A total of 11% of the students were ill or were participating in an extracurricular activity on the day of testing.

Measures

We used a well-established German questionnaire to assess achievement goals: the SELLMO (Skalen zur Erfassung der Lern- und Leistungsmotivation; Spinath et al. 2002). The SELLMO is a German adaptation of the MOS (e.g., Duda and Nicholls 1992). The PAG scale contains seven items that can also been found in Appendix Table 6. Moreover, the SELLMO assesses mastery goals as well as performance-avoidance and work-avoidance goals with eight items each. For an English translation of all SELLMO items, see Spinath and Steinmayr (2012). All items were answered on 5-point scales ranging from 1 (*totally disagree*) to 5 (*totally agree*). In addition to general achievement goals in school, we assessed subject-specific achievement

goals in mathematics and German by using a table: Each of the items formed a row, and each school subject formed a column. The students were instructed to mentally fill in the place-holder (...) with the corresponding school subject from the respective column (see Sparfeldt et al. 2006). The internal consistencies of the achievement goals were at least satisfactory (α = 0.81 for mastery goals for school in general to α = 0.90 for work-avoidance goals in German). The internal consistencies of the PAGs are given in the "Results" section.

At the end of the school semester, the school provided report card grades (grade point average; grades in mathematics and German) as an indicator of academic achievement. In Germany, grades range from 1 (*excellent*) to 6 (*insufficient*). For the sake of clarity, grades were recoded so that higher grades indicated better performance.

Statistical analyses

Missing values (< 2%) were estimated by applying the full information maximum likelihood estimator (e.g., Enders 2010). To analyze the structure of the PAG items, we used confirmatory factor analyses (CFAs; computed with MPLUS, Muthén and Muthén 1998-2012) to compare the model fit of more- or less-differentiated PAGs. Because we were not aware of the students' class membership (e.g., whether the students attended the same mathematics class), we could not account for a nested data structure in study 1.

We used three different fit indices to estimate the fit of the model: the CFI, RMSEA, and SRMR. The CFI should be greater than 0.95, and the RMSEA should be less than 0.05 (Hu and Bentler 1999). According to Browne and Cudeck (1993), CFIs between 0.90 and 0.95 and RMSEAs between 0.05 and 0.08 are acceptable. Regarding the SRMR, Kline (2005) suggested a cutoff value of 0.10. To evaluate the fit of the different models (e.g., one, two, or three performance-approach factors), we compared the respective fit indices. In addition, we referred to the change in χ^2 between the different models to examine the relative fit.

To analyze whether the correlation coefficients representing the associations between the multiple PAGs and achievement goals as well as between the multiple PAGs and achievement differed significantly, we used the difference in Fisher's *z*-scores (Soper 2020).

Results

Model fit The different models were analyzed separately for the respective school subjects (i.e., school in general, mathematics, or German). Model 1 comprised all PAG items in one factor. Model 2 consisted of two correlated factors (first factor: appearance-oriented items; second factor: proving as well as normative-oriented items). Model 3 contained three correlated factors (the appearance, normative, and proving PAG components).

The best fit statistics were found for the three-factor model for school in general (χ^2 = 19.39, *df* = 11, RMSEA = 0.04, CFI = 0.99, SRMR = 0.02), mathematics (χ^2 = 48.10, *df* = 11, RMSEA = 0.09, CFI = 0.97, SRMR = 0.04), and German (χ^2 = 37.35, *df* = 11, RMSEA = 0.08, CFI = 0.98, SRMR = 0.04). The model fit of the other two models was poorer, as can be seen in Table 1. These results confirmed the existence of three different PAG components, namely, appearance (e.g., "In school I want to show that I am good at things"; three items), normative (e.g., "In school I want to do my work better than others"; two items), and proving PAGs (e.g., "In school I want others to notice when I did well on a test"; two items). The descriptive statistics and internal consistencies can be found in Table 2. Cronbach's alpha

Table 1 Goodness of fit indices for samples in study 1 ($N = 425$) and study 2 ($N = 310$)

Model	χ^2	df	RMSEA	CFI	SRMR	$\Delta\chi^2/\Delta df$
Study 1						
School						
One factor	136.52*	14	0.14	0.88	0.08	--
Two factors	41.02*	13	0.07	0.97	0.03	95.5/1*
Three factors	19.39*	11	0.04	0.99	0.02	21.63/2*
Mathematics						
One factor	216.40*	14	0.19	0.83	0.09	--
Two factors	77.11*	13	0.11	0.95	0.05	139.28/1*
Three factors	48.10*	11	0.09	0.97	0.04	29.02/2*
German						
One factor	205.62*	14	0.18	0.84	0.09	--
Two factors	79.18*	13	0.11	0.94	0.05	126.44/1*
Three factors	37.35*	11	0.08	0.98	0.04	41.83/2*
Study 2						
Mathematics						
One factor	138.02*	35	0.10	0.90	0.06	--
Two factors	104.36*	34	0.08	0.93	0.05	33.66/1*
Three factors	50.25*	32	0.04	0.98	0.03	54.11/2*
German						
One factor	214.75*	35	0.13	0.84	0.07	--
Two factors	113.10*	34	0.09	0.93	0.06	101.65/1*
Three factors	59.11*	32	0.05	0.98	0.04	53.99/2*

*$p < .01$

ranged from $\alpha = 0.71$ (appearance-based PAGs for school in general/proving PAGs in mathematics) to $\alpha = 0.84$ (normative PAGs in German).

Achievement goal intercorrelations The intercorrelations between the PAG scales ranged from $r = .24$ between proving PAGs and normative PAGs for school in general to $r = .64$ between proving PAGs and normative-based PAGs in mathematics and German (see Table 3). The intercorrelations between the three PAG scales and mastery- and performance-avoidance and work-avoidance goals can additionally be found in Table 3. The correlations between mastery goals and the appearance PAGs were significantly higher (school in general: $r = .52$; mathematics: $r = .70$; German: $r = .68$) than the correlations between mastery goals and the normative PAGs ($r = .15/.30/.27$), as well as between mastery goals and the proving PAGs ($r = .08/.15/.15$; see Table 3). The highest correlations with performance-avoidance goals emerged

Table 2 Descriptive statistics

	M (S/M/G)	SD (S/M/G)	Cronbach's alpha (S/M/G)
Study 1 ($N = 425$)			
Normative PAGs	3.07/2.94/2.97	1.05/1.12/1.10	0.78/0.83/0.84
Appearance PAGs	3.84/3.67/3.67	0.70/0.83/0.77	0.71/0.76/0.74
Proving PAGs	2.78/2.72/2.72	1.04/1.02/1.05	0.75/0.71/0.74
Study 2 ($N = 310$)			
Normative PAGs	--/3.00/2.99	--/1.15/1.10	--/0.91/0.89
Appearance PAGs	--/3.66/3.66	--/0.91/0.87	--/0.75/0.69
Proving PAGs	--/2.78/2.79	--/1.08/1.00	--/0.79/0.77

PAGs, performance-approach goals; *S*, school; *M*, mathematics; *G*, German

Table 3 Intercorrelations between multidimensional performance-approach goals and achievement goals

	School, study 1/2	Mathematics, study 1/2	German, study 1/2
PAG normative–PAG appearance	0.49/--	0.50/0.56	0.49/0.50
PAG normative–PAG proving	0.24/--	0.64/0.70	0.64/0.64
PAG proving–PAG appearance	0.26/--	0.44/0.52	0.43/0.47
Mastery–PAG normative	0.15[a]/--	0.30[a]/--	0.27[a]/--
Mastery–PAG appearance	0.52/--	0.70/--	0.68/--
Mastery–PAG proving	0.08[c]/--	0.15[c]/--	0.15[c]/--
Performance-avoidance–PAG normative	0.48[d]/--	0.47[d]/0.44[d]	0.44[d]/0.44[d]
Performance-avoidance–PAG appearance	0.22/--	0.24/0.29	0.20/0.26
Performance-avoidance–PAG proving	0.62[e/f]/--	0.64[e/f]/0.57[e]	0.59[e/f]/0.55[e]
Work-avoidance–PAG normative	0.18[d]/--	0.06[d]/--	0.07[d]/--
Work-avoidance–PAG appearance	− 0.12/--	− 0.21/--	− 0.29/--
Work-avoidance–PAG proving	0.31[e]/--	0.25[e/f]/--	0.21[e]/--

$r \geq .15$ (study 1), $r \geq .12$ (study 2), r significant at $p < .01$

[a] Normative PAGs < appearance PAGs, $p < .01$

[b] Proving PAGs < normative PAGs, $p < .01$

[c] Proving PAGs < appearance PAGs, $p < .01$

[d] Normative PAGs > appearance PAGs, $p < .01$

[e] Proving PAGs > appearance PAGs, $p < .01$

[f] Proving PAGs > normative PAGs, $p < .01$

for the proving PAGs (school in general: $r = .62$; mathematics: $r = .64$; German: $r = .59$). These correlations were significantly higher than the correlations between performance-avoidance goals and the normative PAGs ($r = .48/.47/.44$) and performance-avoidance goals and the appearance PAGs ($r = .22/.24/.20$). Moreover, the normative PAGs showed statistically significantly higher associations with performance-avoidance goals than did the appearance PAGs. Work-avoidance goals and the proving PAGs showed the highest correlations (school in general: $r = .31$; mathematics: $r = .25$; German: $r = .21$). These coefficients were significant higher than the associations with the normative PAGs ($r = .18/.06/.07$) and with the appearance PAGs ($r = − .12/− .21/− .29$). Finally, the associations between the proving PAGs and work-avoidance goals were higher than the associations between the normative PAGs and work-avoidance goals but just in mathematics (see Table 3).

Correlations with school grades Next, we were interested in the associations between the different PAG facets and school grades. The correlations (see Table 4) between the normative-based PAGs were statistically significant albeit small (school in general: $r = .22$; mathematics:

Table 4 Correlations between multidimensional performance-approach goals and school grades

	PAGs normative, study 1/study 2	PAGs appearance, study 1/study 2	PAGs proving, study 1/study 2
School (GPA)	0.22/--	0.21/--	0.11/--
Mathematics	0.28/0.16	0.41/0.27	0.14[b]/0.08[b]
German	0.17/0.16	0.29/0.22	0.08[b]/0.02[b]

$r \geq .15$ (study 1), $r \geq .15$ (study 2) significant at $p < .01$

[a] Proving PAGs < normative PAGs, $p < .01$

[b] Proving PAGs < appearance PAGs, $p < .01$

$r = .28$; German: $r = .17$). Comparable correlations emerged for the appearance PAGs ($r = .21/$ .41/.29). The correlations between the proving PAGs and grades ($r = .11/.14/.08$) were lower than for the normative or appearance PAGs: Significantly lower associations were found for the associations between the proving PAGs and grades in comparison with those found for the appearance PAGs and grades in mathematics and in German.

Study 2

In study 1, different associations between the three PAG scales and other achievement goals as well as school grades emerged. In study 2, we were interested in whether different associations with other motivational variables and subjective well-being in school would appear.

Sample

Before testing, we received parental consent forms from the students (2% were not allowed to participate or forgot to hand in the consent forms; 2% were ill). We tested $N = 310$ high school students ($n = 138$ males) from two schools, including 16 school classes from North Rhine-Westphalia (mean age: 14.91, $SD = 1.72$). The students again came from two Gymnasium schools, and the schools were located in urban areas. Most of the students had rather high socioeconomic status and were mainly Caucasian. The students were from the seventh ($n = 106$), ninth ($n = 128$), and 11th ($n = 76$) grades.

Measures

In study 2, we investigated only PAGs and performance-avoidance goals by using the SELLMO (Spinath et al. 2002). We decided to add items regarding the normative and proving PAGs to increase the reliability of the scales (see Appendix Table 6). We added one item from the PALS (Midgley et al. 1998) for the proving PAG component and two items from the AGQ-R (Elliot and Murayama 2008) for the normative PAG component. The items were assessed with respect to mathematics and German. The internal consistencies of the performance-avoidance goals were $\alpha = 0.88$ (mathematics) and $\alpha = 0.86$ (German).

Academic self-concept We used an instrument developed by Rost, Sparfeldt, and Schilling (2007; Differentielles Selbstkonzept-Gitter/Differential self-concept grid). This scale consists of eight items answered on 5-point scales ranging from 1 (*totally disagree*) to 5 (*totally agree*). An item example is "In mathematics I know the answer to a question faster than others." The internal consistencies for the current sample were $\alpha = 0.93$ for mathematics and $\alpha = 0.89$ for German.

School values We used two subscales from the Skalen zur Erfassung subjektiver schulischer Werte (SESSW; Scales for assessing subjective academic values; Steinmayr and Spinath 2010) to assess intrinsic values (e.g., "I like doing mathematics"; three items) and utility values (e.g., "Mathematics is useful for my future"; three items). The items were answered on a 5-point scale ranging from 1 (*this does not apply to me at all*) to 5 (*this applies to me exactly*). For mathematics, Cronbach's alpha was $\alpha = 0.94$ for intrinsic values and $\alpha = 0.89$ for utility

values. For German, Cronbach's alpha was $\alpha = 0.90$ for intrinsic values and $\alpha = 0.86$ for utility values.

Test anxiety Test anxiety was measured with the German Test Anxiety Inventory (TAI-G; Hodapp 1991), a German adaptation of the well-established Test Anxiety Inventory by Spielberger (1980). We used the scales *worry* to investigate the cognitive aspect of test anxiety (five items; e.g., "When I think about my next math exam, I am worried about the fact that something could go wrong") and *emotionality* to investigate physical reactions to a test and excitement (five items; e.g., "When I think about my next math exam, I get nervous"). The items ranged from 1 (*almost never*) to 4 (*almost always*). For emotionality, the Cronbach's alpha coefficients were $\alpha = 0.88$ for mathematics and $\alpha = 0.84$ for German. Regarding worry, the Cronbach's alphas were $\alpha = 0.90$ for mathematics and $\alpha = 0.89$ for German.

School well-being Well-being in school was measured by using the Habitual Subjective Well-being Scale (HSWBS) developed by Dalbert (2003). Originally, the HSWBS refers to general subjective well-being. We reformulated the items to assess well-being in mathematics and German. This scale assesses an affective (e.g., "In mathematics I usually feel happy"; five items) as well as a cognitive component (e.g., "I am satisfied with my situation in mathematics"; five items) of subjective well-being. Internal consistencies were satisfactory (mathematics: affective well-being $\alpha = 0.82$; cognitive well-being $\alpha = 0.88$; German: affective well-being $\alpha = 0.83$; cognitive well-being $\alpha = 0.83$).

Achievement Information about grades from the last school report card in mathematics and German (ranging from 1 = *excellent* to 6 = *insufficient*) was investigated via self-report. As already described in study 1, grades were recoded so that higher grades indicated a better performance.

Statistical analyses

We used the same statistical analyses already described in study 1. Because of the clustering of the data (students taught in fixed school classes), the standard errors were corrected by using the "type = complex" procedure implemented in Mplus (Muthén and Muthén 1998-2012).

Results

Model fit The results of the CFAs regarding the dimensionality of the PAGs are displayed in Table 1. Comparable to the results of study 1, the best model fit was found for a three-factor model in mathematics ($\chi^2 = 50.25$, $df = 32$, RMSEA = 0.04, CFI = 0.98, SRMR = 0.03) and in German ($\chi^2 = 59.11$, $df = 32$, RMSEA = 0.05, CFI = 0.98, SRMR = 0.04). As can be seen in Table 2, higher mean values were reported for the appearance-based PAGs than for the normative-based or proving PAGs. Cronbach's alpha ranged from $\alpha = 0.69$ (appearance PAGs, German) to $\alpha = 0.91$ (normative PAGs, mathematics).

Achievement goal intercorrelations The lowest intercorrelation was found between proving and appearance PAGs in German ($r = .47$); the highest intercorrelation was $r = .70$ for normative and proving PAGs in mathematics (see Table 3).

Correlations with school grades The results for school grades are displayed in Table 4: Whereas the correlations with the normative and appearance-based PAGs were similar ($.16 \leq r \leq .27$), the correlations were significantly smaller for the proving PAGs (mathematics: $r = .08$; German: $r = .02$) than for the appearance-based PAGs. Differential correlations were also found for performance-avoidance goals: The proving and normative PAGs showed higher correlations than the appearance-based PAGs in mathematics and in German (see Table 4).

Correlations with self-concept, school values, test anxiety, and school well-being The results can be found in Table 5.

The proving PAGs had the smallest associations with academic self-concept in both mathematics ($r = .30$) and German ($r = .17$) than the appearance-based PAGs (mathematics: $r = .49$; German: $r = .43$). Furthermore, the normative PAGs in mathematics showed significantly lower associations with the corresponding self-concept ($r = .25$) than with the appearance-based PAGs ($r = .43$).

A similar correlational pattern was found for intrinsic values: The proving PAGs showed smaller associations in mathematics ($r = .29$) and German ($r = .20$) than the appearance-based PAGs (mathematics: $r = .49$; German: $r = .41$). In addition, the normative PAGs in mathematics had significantly smaller associations with intrinsic values in mathematics ($r = .33$) than with the appearance-based PAGs ($r = .49$). For utility values, the correlations with all three PAG facets ranged from $r = .24$ to $r = .39$ in mathematics and from $r = .14$ to $r = .30$ in German. No significant differences in the correlations between the PAGs and utility values were detected.

For the two components of test anxiety (worry, emotionality), the correlations with the three different PAG scales were similar in magnitude. Whereas the correlations between emotionality, worry, and the PAGs were not statistically significant in mathematics ($r \leq .09$), the associations in German were somewhat higher ($.22 \leq r \leq .27$).

Finally, we observed differential associations between the appearance PAGs and satisfaction in school (mathematics: $r = .49$; German: $r = .39$) and the proving PAGs and satisfaction in school (mathematics: $r = .27$; German: $r = .15$). Another significant difference was found for

Table 5 Correlations between multidimensional performance-approach goals and academic self-concept, school values, test anxiety, and subjective well-being in school (study 2; $N = 310$)

	PAG normative (M/G)	PAG appearance (M/G)	PAG proving (M/G)
Academic self-concept	0.37/0.25[a]	0.49/0.43	0.30[b]/0.17[b]
School values			
Intrinsic values	0.33[a]/0.22[a]	0.49/0.41	0.29[b]/0.20[b]
Utility values	0.30/0.18	0.39/0.30	0.24/0.14
Test anxiety			
Worry	0.09/0.27	0.08/0.24	0.12/0.22
Emotionality	0.00/0.13	0.09/0.13	0.04/0.09
Well-being			
Satisfaction	0.35/0.15[a]	0.49/0.39	0.27[b]/0.15[b]
Affect	0.14/0.08	0.13/0.14	0.14/0.15

M, mathematics; *G*, German

$r \geq .15$ significant at $p < .01$

[a] Normative PAGs < appearance PAGs, $p < .01$

[b] Proving PAGs < appearance PAGs, $p < .01$

the correlation between the normative PAGs and satisfaction in German ($r = .15$), which was significant lower than the correlation found between the appearance PAGs and satisfaction in German ($r = .39$). All correlations between the PAG scales and the affective component were comparable and mostly nonsignificant.

General discussion

The definition and conceptualization of PAGs has always been heterogeneous throughout the literature (e.g., Hulleman et al. 2010). In particular, an appearance-based (with a focus on demonstrating competence) and a normative-based (with a focus of outperforming others) PAG facet has been used in different questionnaires. Moreover, additional PAG components such as proving PAGs, which emphasize appearing competent to others (e.g., Hulleman et al. 2010), or outcome goals such as the goal of obtaining good grades (Grant and Dweck 2003), have been mentioned. Although different researchers have argued that one has to be cautious on which facet a specific PAG scale focuses, different facets have been examined simultaneously and have frequently not been separated.

In the present study, we focused on normative- and appearance-based as well as proving PAGs, and we were interested in whether the PAG facets could be separated from each other. Moreover, because heterogeneous results with academic achievement (especially grades) have been found with different operationalizations of PAGs, we were especially interested in analyzing associations with grades. To obtain additional information about the validity of different PAG scales, achievement goals as well as other motivational variables and school well-being were also investigated. The results of the present studies provide support for the differentiation between at least the above mentioned three PAGs. In two studies with school students from grades nine to eleven, we demonstrated that a model with three PAG components had a better model fit than models with just one or two PAG components. Moreover, the associations with school grades, different motivational variables, and school satisfaction underpin the relevance of separating different PAGs. In other words, specific hypotheses due to the used PAG scale have to be formulated with regard to the above mentioned associations with other variables. Another important result of our studies refers to the fact that—contrary to previous research— appearance PAGs showed beneficial associations with important educational outcomes.

Multidimensional performance-approach goals and achievement goals

We found several different intercorrelations between the three PAGs and the other achievement goals (mastery, performance-avoidance, work-avoidance goals). Hulleman et al. (2010) also found evidence that the operationalization of PAGs was a significant moderator of the intercorrelations between PAGs and other achievement goals. In study 1, we found that mastery goals had higher associations with appearance-based than with normative or proving PAGs as already confirmed by Grant and Dweck (2003). For both PAGs, a certain amount of knowledge might be necessary, and enhancing and demonstrating competence might be reciprocally connected with each other. However, the opposite results were found by Hulleman et al. (2010): Here, the AGQ by Elliot (e.g., Elliot and McGregor 2001) focusing on normative PAGs showed higher associations with mastery goals than other scales. Perhaps this conflicting finding can be explained by the fact that the AGQ focuses solely on normative-based PAGs, but other scales usually contain several different PAGs (inter alia proving PAGs,

which show only negligible associations with mastery goals). Proving PAGs had the lowest and mostly nonsignificant associations with mastery goals. This implies that students with the aim of appearing competent to significant others probably do not have the goal of investing effort to obtain more knowledge or to increase their abilities but rather just want to show off in front of others.

However, performance-avoidance goals showed the smallest associations with appearance-based PAGs but the highest associations with proving PAGs. Of course, if a student aims to appear competent to teachers or peers, this must be associated with the aim of not looking incompetent. Hulleman et al. (2010) found hints that normative PAGs had lower associations with performance-avoidance goals compared with other operationalizations. Although normative-based goals showed smaller correlations than proving PAGs in our studies, the associations were still higher compared with the relations for appearance-based PAGs. Again, to explain this discrepant result, one could argue that achievement goal instruments focus (solely) on normative PAGs *or* on a combination of different PAGs.

Differential correlations were also revealed for the associations with work-avoidance goals. Whereas the relations between work-avoidance goals and appearance-based PAGs were negative, mostly positive associations emerged for proving PAGs, whereas the associations with normative PAGs were negligible. The small positive associations between work-avoidance goals and proving PAGs could support the assumption that it might not be necessary to have a certain amount of knowledge to appear competent to others. However, showing others that one is capable is an economical technique and perhaps the effort that is invested is rather low. In sum, we found that all PAGs were differentially related to other achievement goals. Hence, when one is interested in achievement goal intercorrelations, the operationalization of PAGs has to be considered.

Multidimensional performance-approach goals and grades

Because of the heterogeneous associations between PAGs and grades, the beneficial effects of PAGs have frequently been questioned. As the meta-analyses by Hulleman et al. (2010) and Wirthwein et al. (2013) have already demonstrated, the operationalization of PAGs seems to matter with regard to academic achievement outcomes. However, and in contrast to the reasoning found in the literature, the normative-based PAGs did not show higher associations with school grades than the appearance-based PAGs in our studies. Instead, the present studies found comparable associations between appearance-based PAGs and grades and normative-based PAGs and grades but smaller associations with proving PAGs. In this context, it has to be mentioned that in former studies, appearance-based PAGs have been defined as not only appearing competent but also providing evidence of one's competence to others (e.g., Bong et al. 2013; Grant and Dweck 2003; Senko et al. 2011). Additionally, differentiating between appearance-based and proving PAGs, as we did in the present studies, was usually not implemented, and this might explain the diverging results.

For both goals—demonstrating competence and outperforming others—a student might need a certain amount of knowledge, and hence, positive correlations with grades emerge. Hulleman et al. (2010) argued that appearance-based PAGs are comparable to the construct of self-worth contingency (Covington 1984) and that negative achievement outcomes might emerge when one's self-worth is threatened (e.g., after experiencing failure). This might be true for specific situations after failures or setbacks when appearance-based PAGs are assessed as states. In this context, earlier experimental studies conducted by Ames and Archer (1988) or Dweck and Leggett (1988) also

found hints for the detrimental effects of appearance-based PAGs on achievement. However, in the face of success, appearance-based PAGs might instead lead to an increase in performance outcomes. Thus, it might be the case that the performance level that influences whether one is able to meet one's appearance-based PAGs or not additionally influences the association between PAGs and academic achievement. In this context, additional experimental research is needed to compare the effects of different PAGs at different performance levels after the experience of failure.

Similar effects could also be possible for normative PAGs: When a student experiences failure on a specific task, the aim of outperforming others might be too difficult to obtain. Hence, besides the fact that poor achievement outcomes result from the failure, the student might also be less motivated to work on this task again. This lower motivation might lead to rather negative achievement outcomes as well. On the other hand, when one is better than others at a task and one's aim is to outperform others, this might also lead to a performance boost. Furthermore, it is not only the experience of failure or success that might be relevant in this context but also the difficulty of the task. In this context, Senko et al. (2013) conducted two studies with university students to investigate normative PAGs under different conditions: Only when tasks or activities were experienced as challenging or interesting did normative PAGs positively predict course grades. However, no associations between normative PAGs and course grades were found when the tasks were experienced as less challenging. The aforementioned results imply that the relation between normative- and appearance-based PAGs and achievement is more complex than expected. As already concluded by Wirthwein et al. (2013), several important moderator variables also have to be considered with regard to the relations between the different PAGs and academic achievement.

However, the associations between grades and proving PAGs (appearing competent to others) were nonsignificant and negligible in both studies. In this regard, it would be interesting to determine which strategies are used by the student to demonstrate competence. It might be the case that a student is applying less successful techniques and that significant others do not notice the student's aim to appear competent. Maybe proving PAGs lead only to the desire to make a good impression on others in the short term, thus having nothing to do with a person's underlying knowledge, and hence, this may account for why no associations with grades emerge.

Harackiewicz et al. (2002) and Elliot and Trash (2001) argued that the aim to demonstrate competence is actually a self-presentational goal and does not belong to the construct of achievement goals because it focuses on the consequences of showing competence (see also Senko et al. 2011). This argument may be true for proving PAGs: Here, the aim to show competence is connected to the social consequences of showing competence. In comparison with proving PAGs, appearance-based PAGs do not explicitly refer to the social consequences of showing competence. Here, the person him or herself probably decides whether he or she has successfully demonstrated competence. The reactions of significant others might not be relevant in this context. We additionally found that appearance-based PAGs were highly related to mastery goals: Hence, one can assume that the aim of demonstrating competence requires a certain amount of knowledge and the desire to enhance one's competence but not for the sake of appearing competent to others.

Multidimensional performance-approach goals, motivation, and well-being

Differential associations between PAGs and other motivational variables were found as well. Again, and contrary to our hypothesis, appearance-based and normative PAGs showed

comparable associations with academic self-concept in German. Regarding mathematics, normative-based PAGs showed even smaller associations with self-concept than appearance-based PAGs did. This result might be due to the operationalization of self-concept: If self-concept had been assessed in a more norm-referenced fashion, higher results with normative PAGs might have emerged. Because our operationalization of self-concept focused on an absolute rather than a norm-referenced comparison standard, similar results for the normative- and appearance-based PAGs were found. By contrast, proving PAGs had the smallest (but still significant) associations with academic self-concept. In this context, again, it has to be considered that previous research has usually not differentiated between appearance-based and proving PAGs (e.g., Senko et al. 2011). Hence, it makes sense that our results differed from previous studies. Having a good academic self-concept could be an important prerequisite for demonstrating competence. Moreover, proving PAGs also displayed lower associations with intrinsic values than appearance-based PAGs did. Furthermore, but only for mathematics, appearance-based PAGs also had higher correlations with intrinsic values than normative-based PAGs did. Consequently, proving PAGs showed not only very low correlations with school grades in all studies but also very low correlations with other favorable determinants of academic achievement (e.g., Steinmayr and Spinath 2009), namely, intrinsic motivation and ability self-concept. As proving PAGs explicitly refer to the desire to appear competent to significant others, it might be the case that the more someone values a task for oneself, the less important it is to demonstrate one's competence in this subject to others. Concerning school satisfaction and affect in school, the lowest correlations emerged for proving PAGs. Statistically significant differences were found for the difference between proving and appearance-based PAGs. It could be that students scoring high on proving PAGs feel a certain amount of pressure to demonstrate their competences. Maybe those students realize that their aim to appear competent sometimes fails, and this might lead to feelings of dissatisfaction. However, demonstrating competence to oneself (i.e., appearance-based PAGs) might be easier to attain, and hence, this may be why appearance-based PAGs show higher associations with school well-being. However, due to the correlational design of our studies, these explanations have to be considered with caution and have to be tested empirically.

Summing up, the results on the divergent validity of PAGs are not only of theoretical but also of practical importance as we especially found rather detrimental effects of proving PAGs in contrast to appearance- or normative-based PAGs. The most positive effects were found for appearance-based PAGs. Here, again, the relevance of separating proving PAGs from other PAGs is obvious.

Limitations and conclusion

Some limitations of the current studies should be mentioned. We investigated only school students of grades nine to eleven; hence, it could be that the differentiation of multiple PAG scales is somewhat different for university students. In the context of a university setting versus a high school setting, different goals might be relevant. For example, it might be less important to show others that one is competent (a proving PAG), but it may be more important to try to outperform others as the pressure to succeed may be higher for university students. Wirthwein et al. (2013) found the sample status (school or university) to be an important moderator of the relations between PAGs and academic achievement: For university students, the association was higher than for school students. University students are frequently tested with the AGQ (e.g., Elliot and McGregor 2001), which focuses solely on normative-based PAGs. Hence,

normative-based PAGs might show higher associations with achievement outcomes than appearance-based PAGs do for university students. Further research is needed to compare the influence of appearance- and normative-based PAGs on achievement or other educational outcomes for university students. However, the results in our studies were comparable for rather younger students (study 1) and older students (study 2). Further research could additionally focus on the relevance of different PAGs for elementary school students as some studies have shown that younger children display different achievement goals than older students (Bong 2009).

In the current studies, we used only school grades as an indicator of academic achievement. Wirthwein et al. (2013) found that associations between PAGs and objective achievement indicators such as objective test scores showed smaller associations than school grades. It might be relevant for further research to differentiate not only between different PAGs but also between different achievement outcomes. We used grades, which are known to measure competences in a norm-referenced way (cf. Steinmayr et al. 2014). But it might be possible that higher associations would be found between appearance-based PAGs and academic achievement if the latter were operationalized in an objective way (e.g., standardized achievement tests). Another limitation is that we investigated only selected PAGs with the SELLMO and additional items that focused on only three PAGs. Moreover, the additional items investigated in study 2 were not selected due to empirical analyses. Hulleman et al. (2010) listed several additional PAGs such as outcome PAGs (with a focus on obtaining good outcomes), which we did not consider. It would be important to investigate several different achievement goal instruments to explore further PAG components. In this context, it would also be relevant for further research to conduct qualitative studies by asking students which goals are relevant for them in achievement situations (e.g., Dowson and McInerney 2001; Levy et al. 2004; Lee and Bong 2016) to test whether students differentiate between different PAGs themselves. We examined only students from a relatively homogeneous socioeconomic background who were preparing to attend universities. It is possible that the variance of the motivational variables that we analyzed was restricted. Hence, other studies should also focus on students from different school types.

We argue that PAGs are not solely appearance-based *or* normative-based: Taking into account the history of PAGs, both types of PAGs are usually mentioned in the definition of PAGs (e.g., Grant and Dweck 2003; Kaplan and Maehr 2007). Our analyses showed that both appearance- and normative-based PAGs have positive associations with academic achievement and intrinsic value, self-concept, and satisfaction in school. This is less the case for proving PAGs. Furthermore, the separation of proving PAGs is crucial when examining the associations with other achievement goals but also with several different outcome variables.

In the context of motivational school interventions enhancing academic achievement outcomes, both appearance and normative PAGs could be adaptive. As several achievement goal trainings primarily focus on fostering mastery-approach goals (e.g., Maehr and Midgley 1991), future training studies should explicitly examine the effects of fostering appearance and normative PAGs on important educational outcomes. Moreover, it might be relevant to further determine in which contexts and for which outcomes appearance- or normative-based PAGs are more important (see Chung et al. 2020).

Another important point for further studies on PAGs is to take into account additional moderator variables such as the age of the sample (e.g., Wirthwein et al. 2013) or the difficulty of the task (e.g., Senko et al. 2013). In this context, experimental studies might be helpful for investigating these moderating effects especially with regard to different academic

achievement outcomes. In sum, as already concluded by other researchers with regard to the associations between different PAGs and achievement (e.g., Senko et al. 2011; Hulleman et al. 2010), the content of the PAG scale that is used has to be inspected in detail. Different measures of PAGs show different associations not only with measures of academic achievement but also with other achievement goals and important educational variables.

Appendix

Table 6 Performance-approach goal scales

Appearance	Normative	Proving
In school/math/German, I …	In school/math/German, I …	In school/math/German, I …
… want to show that I am good at things.[A]	… want to do my work better than others.[A]	… want others to think that I am smart.[A]
… want to show that I can do things.[A]	… want to get better grades than others.[A]	… want others to notice when I did well on a test.[A]
… want to show what I can do and what I know.[A]		
Additional items investigated in study 2		
	My aim is to perform well relative to other students.[B]	It's important to me that other students in my class think I am good at my class work.[C]
	My goal is to perform better than the other students.[B]	

[A] Spinath et al. (2002). *Die Skalen zur Erfassung von Lern-und Leistungsmotivation (SELLMO)* [Scales for the measurement of learning and achievement motivation]. Göttingen, Germany: Hogrefe

[B] Elliot and Murayama (2008). On the measurement of achievement goals: critique, illustration, and application. *Journal of Educational Psychology, 100,* 613–626

[C] Midgley et al. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23,* 113–131

References

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260–267.

Bong, M. (2009). Age-related differences in achievement goal differentiation. *Journal of Educational Psychology, 101*(4), 879–896.

Bong, M., Woo, Y., & Shin, J. (2013). Do students distinguish between different types of performance goals? *The Journal of Experimental Education, 81*(4), 464–489.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Beverly Hills: Sage.

Chung, Y., Bong, M., & Kim, S. (2020). Performing under challenge: the differing effects of ability and normative performance goals. *Journal of Educational Psychology, 112*(4), 823–840.

Covington, M. V. (1984). The self-worth theory of achievement motivation: findings and implications. *The Elementary School Journal, 85*, 4–20.

Dalbert, C. (2003). Habituelle Subjektive Wohlbefindensskala (HSWBS). In J. Schumacher, A. Klaiberg, & E. Brähler (Eds.), *Diagnostische Verfahren zu Lebensqualität und Wohlbefinden* (pp. 170–175). Göttingen: Hogrefe.

Day, E. A., Radosevich, D. J., & Chasteen, C. S. (2003). Construct- and criterion-related validity of four commonly used goal orientation instruments. *Contemporary Educational Psychology, 28*(4), 434–464.

Diener, E., Suh, E. M., Lucas, R. R., & Smith, H. L. (1999). Subjective well-being: three decades of research. *Psychological Bulletin, 125*(2), 276–302.

Donnellan, M. B. (2008). A psychometric evaluation of two achievement goal inventories. *Educational and Psychological Measurement, 68*(4), 643–658.

Dowson, M., & McInerney, M. (2001). Psychological parameters of students' social and work avoidance goals: a qualitative investigation. *Journal of Educational Psychology, 93*(1), 35–42.

Duda, J. L., & Nicholls, J. G. (1992). Dimensions of academic motivation in school work and sport. *Journal of Educational Psychology, 84*(3), 290–299.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040–1048.

Dweck, C. S., & Leggett, E. L. (1988). A social cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256–273.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*(1), 109–132.

Edwards, O. V. (2014). Differentiating performance-approach goals and their unique effects. *Universal Journal of Educational Research, 2*, 134–145.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*(3), 169–189.

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52–72). New York: Guilford.

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218–232.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501–519.

Elliot, A. J., & Moller, A. C. (2003). Performance-approach goals: good or bad forms of regulation? *International Journal of Educational Research, 39*(4-5), 339–356.

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: critique, illustration, and application. *Journal of Educational Psychology, 100*(3), 613–626.

Elliot, A. J., & Trash, T. M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review, 13*(2), 139–156.

Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 × 2 achievement goal model. *Journal of Educational Psychology, 103*(3), 632–648.

Enders, C. K. (2010). *Applied missing data analysis*. New York: Guilford.

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85*(3), 541–553.

Hackel, T. S., Jones, M. H., Carbonneau, K. J., & Mueller, C. E. (2016). Re-examining achievement goals instrumentation: convergent validity of AGQ and PALS. *Contemporary Educational Psychology, 46*, 73–80.

Harackiewicz, J. M., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: necessary and illuminating. *Journal of Educational Psychology, 94*(3), 638–645.

Hodapp, V. (1991). Das Prüfungsängstlichkeitsinventar TAI-G: Eine erweiterte und modifizierte Version mit vier Komponenten [The test anxiety questionnaire TAI-G: an extended and altered version with four components]. *Zeitschrift für Pädagogische Psychologie, 5*, 121–130.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55.

Huang, C. (2012). Discriminant and criterion-related validity of achievement goals in predicting academic achievement: a meta-analysis. *Journal of Educational Psychology, 104*(1), 48–73.

Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin, 136*(3), 422–449.

Jagacinski, C. M., & Duda, J. L. (2001). A comparative analysis of contemporary achievement goal orientation measures. *Educational and Psychological Measurement, 61*(6), 1013–1039.

Kaplan, A., & Maehr, M. L. (1999). Achievement goals and student well-being. *Contemporary Educational Psychology, 24*(4), 330–358.

Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review, 19*(2), 141–184.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: The Guilford Press.

Lee, M., & Bong, M. (2016). In their own words: reasons underlying the achievement striving of students in schools. *Journal of Educational Psychology, 108*(2), 274–294.

Levy, I., Kaplan, A., & Patrick, H. (2004). Early adolescents' achievement goals, social status, and attitudes towards cooperation with peers. *Social Psychology of Education, 7*(2), 127–159.

Maehr, M. L., & Midgley, C. (1991). Enhancing student motivation: a schoolwide approach. *Educational Psychologist, 26*(3), 399–427.

Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., Anderman, E., & Roeser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23*(2), 113–131.

Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. E., et al. (2000). *Manual for the patterns of adaptive learning scales.* Ann Arbor.

Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: good for what, for whom, under what circumstances, and at what costs? *Journal of Educational Psychology, 93*(1), 77–86.

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (6th. ed.). Los Angeles: Muthén & Muthén.

Nicholls, J. G. (1984). Achievement motivation: conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*(3), 328–346.

Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: a theoretical model and prospective test. *Journal of Educational Psychology, 98*(3), 583–597.

Putwain, D. W., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology, 80*(1), 137–160.

Rost, D. H., Sparfeldt, J. R., & Schilling, S. R. (2007). *Differentielles Schulisches Selbstkonzept-Gitter mit Skala zur Erfassung des Selbstkonzepts schulischer Leistungen und Fähigkeiten (Disk-Gitter) [Differential academic self-concept grid with a scale for the assessment of academic self-concept (Disk-Grid)].* Göttingen: Hogrefe.

Ryan, A. M., & Shim, S. S. (2008). An exploration of young adolescents' social achievement goals and social adjustment in middle school. *Journal of Educational Psychology, 100*(3), 672–687.

Senko, C., & Dawson, B. (2017). Performance-approach goal effects depend on how they are defined: meta-analytic evidence from multiple educational outcomes. *Journal of Educational Psychology, 109*(4), 574–598.

Senko, C., & Tropiano, K. L. (2016). Comparing three models of achievement goals: goal orientations, goal standards, and goal complexes. *Journal of Educational Psychology, 108*(8), 1178–1192.

Senko, C., Hulleman, C., & Harackiewicz, J. M. (2011). Achievement goal theory at the crossroads: old controversies, current challenges, and new directions. *Educational Psychologist, 46*(1), 26–47.

Senko, C., Durik, A. M., Patel, L., Lovejoy, C. M., & Valentiner, D. (2013). Performance-approach goal effects on achievement under low versus high challenge conditions. *Learning and Instruction, 23*, 60–68.

Smith, M., Duda, J., Allen, J., & Hall, H. (2002). Contemporary measures of approach and avoidance goal orientations: similarities and differences. *British Journal of Educational Psychology, 72*(2), 155–190.

Soper, D. S. (2020). Significance of the difference between two correlations calculator [software]. Retrieved December 4, 2020, from https://www.danielsoper.com/statcalc/calculator.aspx?id=104.

Sparfeldt, J. R., Schilling, S. R., Rost, D. H., & Thiel, A. (2006). Blocked versus randomized format of questionnaires: a confirmatory multiple group analysis. *Educational and Psychological Measurement, 66*(6), 961–974.

Spielberger, C. D. (1980). *Test anxiety inventory. Preliminary professional manual.* Palo Alto: Consulting Psychologists Press.

Spinath, B., & Steinmayr, R. (2012). The roles of competence beliefs and goal orientations for the change in intrinsic motivation. *Journal of Educational Psychology, 104*(4), 1135–1148.

Spinath, B., Stiensmeier-Pelster, J., Schöne, C., & Dickhäuser, O. (2002). *Die Skalen zur Erfassung von Lern- und Leistungsmotivation (SELLMO) [Scales for the measurement of learning and achievement motivation].* Göttingen: Hogrefe.

Steinmayr, R., & Spinath, B. (2009). The importance of motivation as a predictor of school achievement. *Learning and Individual Differences, 19*(1), 80–90.

Steinmayr, R., & Spinath, B. (2010). Konstruktion und erste Validierung einer Skala zur Erfassung subjektiver schulischer Werte (SESSW) [Construction and first validation of a scale assessing subjective scholastic task values]. *Diagnostica, 56*(4), 195–211.

Steinmayr, R., Meißner, A., Weidinger, A. F., & Wirthwein, L. (2014). Academic achievement. Oxford Bibliographies. https://doi.org/10.1093/OBO/9780199756810-0108

Wartburton, V., & Spray, C. (2014). Appearance- and competition-focused performance goals: examining their links with performance in physical education. *European Physical Education Review, 20*(3), 305–318.

Wirthwein, L., Sparfeldt, J. R., Pinquart, M., Wegerer, J., & Steinmayr, R. (2013). Achievement goals and academic achievement: a closer look at moderating factors. *Educational Research Review, 10*, 66–89.

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Current themes of research (06/24/2020):

Achievement goals and academic achievement. Operationalization of achievement goals. Subjective well-being and academic achievement. Subjective well-being in school. Identification of gifted and talented students. Myths and facts about intellectual giftedness.

Most relevant publications in the field of psychology of education (last 5 years):

Wirthwein, L., Sparfeldt, J. R., Heyder, A., Buch, S. R., Rost, D. H. & Steinmayr, R. (2020). Sex differences in achievement goals: do school subjects matter? *European Journal of Psychology of Education, 35,* 403-427.

Wirthwein, L., Bergold, S., Preckel, F. & Steinmayr, R. (2019). Personality and school functioning of intellectually gifted and nongifted adolescents: self-perceptions and parents' assessments. *Learning and Individual Differences, 73,* 16-29.

Bergold, S., Wirthwein, L., Rost, D. H., & Steinmayr, R. (2017). What happens if the same curriculum is taught in five instead of six years? A quasi-experimental investigation of the effect of schooling on intelligence. *Cognitive Development, 44,* 98-109.

Sparfeldt, J. R., Brunnemann, N., Wirthwein, L., Buch, S. R., Schult, J., & Rost, D. H. (2015). General versus specific achievement goals: a re-examination. *Learning and Individual Differences, 43,* 170-177.

Schwinger, M.*, Wirthwein, L.*, Lemmer, G., & Steinmayr, R. (2014). Academic self-handicapping and achievement: A meta-analysis. *Journal of Educational Psychology, 106,* 744-761. *Contributed equally