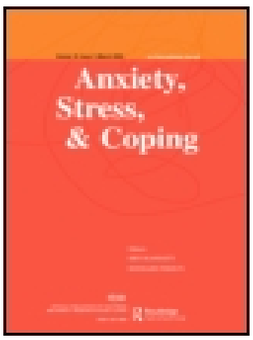

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Fear of failure: a polynomial regression analysis of the joint impact of the perceived learning environment and personal achievement goal orientation

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ABSTRACT

Background and Objectives: Alongside a strong emphasis on performance and achievement in the current higher educational system, researchers have described an increase in anxiety, stress, and fear of failure amongst students. The purpose of this study was to investigate how the (mis)match between a perceived institutional performance-oriented learning environment and students' personal achievement goal orientation (mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goal orientation) related to fear or failure.

Design: Cross-sectional, correlational study.

Methods: Students ($N = 329$) at a highly selective college filled out questionnaires about the perceived performance-orientation in the institutional learning environment, their achievement goal orientations, and fear of failure.

Results: Results of the polynomial regression analyses show that independent of each other, performance goal orientations (approach and avoidance) and the perceived institutional performance-oriented learning environment related positively to fear of failure. The results for mastery goal orientations showed that mastery-approach goal orientation attenuated, while mastery-avoidance goal orientation exacerbated the negative effects of the perceived institutional performance-oriented learning environment on fear of failure.

Conclusions: These results indicate the importance of examining perceived institutional learning environments alongside students' personal characteristics in order to understand fear of failure amongst students.

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Fear of failure; perceived institutional learning environment; achievement goal orientation; polynomial regression analysis; response surface analysis

The current higher educational system places a strong emphasis on performance and achievement that is particularly noticeable in prestigious, highly competitive and selective colleges. The ultimate aim of this is to produce high achieving students that are ready to enter the labor market and be successful in their career. However, recent reports show that college students experience high levels of anxiety, stress, and fear of failure (Beiter et al., 2015). An often-cited reason as to why students experience stress and fear of failure, is the pressure to perform well (e.g., Kumaraswamy, 2013). Learning environments that are perceived to stress performance and define failure as negative have indeed been shown to invoke fear of failure (e.g., Tsai & Chen, 2009). Similarly, the learning

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environment at the institutional level has the same potential to directly influence the fear of failure of students. Fear of failure (FF) is a tendency of trying to avoid failure because of the anticipated experience of shame or embarrassment when failing in an achievement task (Elliot & Thrash, 2004). The devastating impact of FF has been reflected in research on school engagement, academic performance, and drop out (e.g., Pekrun, Elliot, & Maier, 2009). FF is not merely a product of the perceived learning environment, it can also stem from an internal source such as the unhealthy motivations students have for pursuing academic goals (Beiter et al., 2015). Students' achievement motivation (e.g., achievement goal orientations) in particular strongly relate to FF (Conroy, 2003; Conroy & Elliot, 2004).

Considering that FF results from both personal characteristics and the perceived characteristics of the institutional learning environment, we set up this study to answer the following question: How does the (mis)match between a perceived performance-oriented institutional learning environment and students' achievement goal orientation relate to fear of failure? This study, therefore, addresses the problem of fear of failure amongst university students from a person x environment approach (Kristof, 1996). To do so, FF is examined as an outcome of the compatibility between personal characteristics and perceived characteristics of the learning environment. By utilizing innovative person x environment analyses techniques (i.e., polynomial regression analysis and response surface analysis), we are able to examine how the personal and environmental variables relate to FF, as well as if and how the degree and the direction of the (mis)match between the two relates to FF.

The impact of the perceived contextual achievement goal orientation

The learning environment refers to the conditions in which learning take place (Malik & Rizvi, 2018) and manifests itself on different levels such as the classroom level and the institutional level. According to Ames (1992) practices in a classroom learning environment, such as the way routines and rules are set up and students are evaluated, determine how students relate to each other, and what goals students should attain. Depending on the way these practices are set up, learning environments can emphasize a certain achievement orientation (i.e., Ames & Ames, 1984). The achievement orientation can be focused on personal improvement (i.e., a mastery-orientation) or interpersonal comparisons and competition (i.e., a performance-orientation).

In the same way as in a classroom, at the institutional level students' sense of academic competence is influenced by the academic goals that are emphasized in the institution (Roeser, Eccles, & Samerof, 1998). Institutional practices that create a mastery-oriented learning environment include emphasizing task mastery and recognizing effort and improvement. In contrast, a performance-oriented institutional learning environment[11] includes, amongst others, an emphasis on getting the highest grade, the encouragement of interpersonal competition, and public recognition of superior performance (Maehr & Midgley, 1996). Scott (2009) argued that the expectations placed by others (e.g., teachers and parents) on students to thrive and succeed at college, causes students to experience an extensive amount of stress.

Table 1. Descriptives, correlations, and reliability estimates of all the variables in the study.

		M	*SD*	1	2	3	4	5	6	7	8
1.	Age	18.70	1.05								
2.	Gender			−.11*							
3.	Mastery-approach GO	3.88	.52	.01	−.01	(.77)					
4.	Mastery-avoidance GO	2.49	.75	−.02	.05	−.24**	(.80)				
5.	Performance-approach GO	2.80	.85	−.03	−.11*	.06	.41**	(.79)			
6.	Performance-avoidance GO	2.88	.83	−.07	.16**	−.13*	.47**	.24**	(.71)		
7.	Perceived institutional performance-oriented learning environment	3.41	.83	.01	−.04	.03	.28**	.36**	.24**	(.79)	
8.	Fear of failure	2.79	.90	−.06	.17**	−.11	.53**	.37**	.43**	.23***	(.86)

Note *N* varies between 329 and 351, Gender is coded as 0 = male, 1 = female.
**$p < .01$, *$p < .05$.

Although researchers have shown that contextual influences can lead to negative student outcomes, the subjective perception of the learning environment has been shown to be more important than the objective learning environment in predicting learning outcomes (Murray, 1938). When students perceive a strong salience of competition and thus social comparison information in the learning environment, they focus on and make inferences about their own abilities that are based on the way success and failure are perceived to be defined in the learning environment (Ames & Ames, 1984). When success is defined as doing better than others and showing your abilities, failure becomes something that should be avoided. As a consequence, failure avoidance is emphasized and anxiety will increase (Ames & Ames, 1984). Indeed, Tsai and Chen (2009) showed that perceived performance-oriented learning environments are positively related to experiences of FF. However, one might assume that the relation between contextual factors and student outcomes might not be homogeneous across all personal characteristics. Student characteristics such as their achievement motivation might interact with the perceived institutional performance-oriented learning environment to produce a motive to avoid failure at all cost (i.e., FF).

The impact of personal achievement goal orientation

Personal achievement goal orientation (GO) refers to the relatively stable reasons that individuals have when pursuing achievement related tasks (Ames, 1992). Four types of achievement GO's can be distinguished based on the standards used to define success (i.e., mastery goals versus performance goals) and the way individuals view the achievement task (Elliot & McGregor, 2001; i.e., either as an opportunity to succeed; approach goals or an opportunity to avoid failure; avoidance goals). Individuals high on mastery-approach GO are motivated to develop their competence and fully understand the task at hand, whereas individuals high on mastery-avoidance GO are motivated to avoid the deterioration of one's competence relative to one's past performances and not failing to learn as much as possible. Individuals high on performance-approach GO are motivated to prove or show their competence and outperform others and finally, individuals high on performance-avoidance GO are motivated to avoid appearing incompetent and avoiding to perform worse relative to others.

Elliot and Church (1997) have proposed that achievement GO's relate differently to FF as they stem from different ways of defining competence and success. Theoretically, the avoidance-based nature of the FF construct makes it likely that it is positively associated with avoidance GO's. Avoiding failure will likely coincide with feelings of anxiety because one is afraid of experiencing shame and embarrassment when one is failing. Knowing that avoidance GO relates positively to anxiety (e.g., Pekrun et al., 2009), FF will likely coincide with being motivated to avoid doing worse than one has done before and not failing to learn as much as possible (i.e., mastery-avoidance GO) or to avoid doing worse than others and showing incompetence (i.e., performance-avoidance GO). Several studies (e.g., Chen, Wu, Kee, Lin, & Shui, 2009; Conroy, Elliot, & Hofer, 2003; Elliot & McGregor, 2001) have shown support for these theoretical propositions. On the other hand, FF is unrelated to mastery-approach GO as failure is seen as part of the achievement process for individuals subscribing to this achievement GO (Conroy et al., 2003; Elliot & Church, 1997; Elliot & McGregor, 1999). Finally, being motivated to show one's competence in comparison to others (i.e., performance-approach GO) can be accompanied by a fear of experiencing the shame and embarrassment that comes with failure to do so (Conroy et al., 2003; Edwards, 2014; Elliot & McGregor, 2001; Elliot & Church, 1997).

The impact of (in)compatibility between personal and perceived contextual achievement orientations

The fundamental principle that the compatibility between a person and his or her environment can affect individual outcomes is elaborated by research focusing on person-environment fit (e.g., Schneider, 2001). The idea of person-environment fit stipulates that the match or mismatch between individuals' personal characteristics and the characteristics of their environment affects individual

outcomes. Achievement GO researchers have applied the principles of match and mismatch to achievement motivation in an educational context and have researched the (mis)match between individuals achievement motivation and the achievement motivation that is emphasized in the context (e.g., Barron & Harackiewicz, 2001; Murayama & Elliot, 2009).

Murayama and Elliot (2009) have proposed that the effects of a match effect should be framed in terms of the accentuation of personal characteristics instead of a beneficial outcome pattern. As a personal performance-approach GO and the perceived performance-oriented learning environment have been shown to relate positively to FF (e.g., Elliot & McGregor, 2001; Tsai & Chen, 2009), a match between the two should accentuate the positive relation between personal performance-approach GO and FF.

In addition, Murayama and Elliot (2009) put forward three possible outcomes as the result of a mismatch in achievement orientation between the individual and the learning environment. Firstly, a mitigation effect can occur, which refers to a situation in which the detrimental effects of a personal achievement GO such as a performance-avoidance GO are dampened by the positive influence of an achievement orientation in the learning environment such as a mastery-orientation. Secondly, a vitiation effect refers to a situation in which the achievement orientation in the learning environment dampens the positive outcome pattern of the personal achievement GO (e.g., when a personal mastery-approach GO is less beneficial in a performance-oriented learning environment). Lastly, exacerbation occurs when the detrimental effects of a personal achievement GO such as a mastery-avoidance GO are aggravated by a detrimental achievement orientation in the learning environment such as a performance-orientation.

As the perceived institutional performance-oriented learning environment has been shown to be associated with higher levels of FF and personal mastery-approach GO has been shown to be unrelated to FF, mitigation and vitiation effects are unlikely to occur in this study. However, the perceived institutional performance-oriented learning environment could aggravate the positive association between FF and personal mastery-avoidance, performance-approach, and performance-avoidance GO (i.e., an exacerbation effect).

More specifically, our analytical approach allows us to examine 1) how the perceived institutional performance-oriented learning environment and the personal achievement GO relate to FF (i.e., absolute level effects) 2) how the degree of a match between personal performance-approach GO and the perceived institutional performance-oriented learning environment (i.e., a match effect) relates to FF, 3) how the direction of a mismatch between personal achievement GO and the perceived institutional performance-oriented learning environment two relates to FF (i.e., the direction of mismatch effect), and 4) how the degree of a mismatch between personal achievement GO and the perceived institutional performance-oriented learning environment relates to FF (i.e., the degree of mismatch effect), Based on previous research (Chen et al., 2009; Elliot & McGregor, 2001; Elliot & Church, 1997; Tsai & Chen, 2009), our hypotheses are as follows:

Hypothesis 1 (i.e., the absolute level of achievement motivation hypothesis): We expect that the perceived institutional performance-oriented learning environment, personal mastery-avoidance, personal performance-approach, and personal performance-avoidance GO will be positively related to FF.

In addition, we expect no relationship between personal mastery-approach GO and FF. As we expect that mastery-approach GO will be unrelated to FF, we do not expect that this personal achievement GO will interact with the perceived performance orientation in the institutional learning environment.

Hypothesis 2 (i.e., the degree of match hypothesis): We expect that a greater match between personal achievement GO (i.e., mastery-avoidance, performance-approach, and performance-avoidance GO) and the perceived institutional performance-oriented learning environment will be positively associated with FF. Thus, levels of FF will be relatively lower when both these personal achievement GO's levels are low and the institutional achievement orientation in the learning environment is perceived to be less oriented towards performance. Levels of FF will be higher when both levels of these personal achievement GO's and the level of perceived performance orientation in the institutional learning environment increase together.

Hypothesis 3 (i.e., direction of mismatch hypotheses): We expect that the perceived performance orientation in the institutional learning environment is stronger related to FF than personal achievement GO's. As such, we expect that FF levels will be higher when the mismatch is such that levels of personal achievement GO's (i.e., mastery-avoidance, performance-approach, and performance-avoidance GO) are low and the performance-orientation in the learning environment is perceived to be high (i.e., a negative mismatch) than when the mismatch is such that levels of the performance-orientation in the learning environment is perceived to be low and the levels of personal achievement GO's (i.e., mastery-avoidance, performance-approach, and performance-avoidance GO) are high (i.e., a positive mismatch).

Hypothesis 4 (i.e., the degree of mismatch hypothesis): We expect that a greater negative mismatch will be more positively associated with FF than a greater positive mismatch. Thus, we expect that FF levels will be higher when the mismatch is such that levels of personal achievement GO's (i.e., mastery-avoidance, performance-approach, and performance-avoidance GO) are low and the performance-orientation in the learning environment is perceived to be high than when the mismatch is such that levels of the performance-orientation in the learning environment is perceived to be low and the levels of personal achievement GO's (i.e., mastery-avoidance, performance-approach, and performance-avoidance GO) are high.

Method

Participants

Participants were 351 first year students pursuing a Bachelor's degree at a highly selective institution in the Netherlands. Six percent of these students ($N = 22$) did not complete any of the measures, as such they were not included in the regression analyses, resulting in a final sample size of 329. Participants had an average age of 18.70 years ($SD = 1.05$) with 32.3% being male, and 64.5% being Dutch.

Procedures and measures

All procedures performed in this study were in accordance with the ethical standards of the institution at which the study was conducted and with the 1964 Helsinki Declaration and its later amendments (World Medical Association, 2013). Informed consent was obtained from all individual participants involved in the study. During the first semester, data was collected by means of an online survey. Teachers asked their students at the end of their class to participate in the study. Participation took part on a voluntary basis and students did not receive any credits for participation.

Achievement GO

To measure students' personal achievement GO in the academic context, we used a version of the questionnaire by Baranik, Stanley, Bynum, and Lance (2010) that was focused on education. This 18-item questionnaire taps into the 2×2 model of achievement GO and contains five items that measure mastery-approach GO (e.g., "I prefer to work on activities in my study that require a high level of ability"), five items that measure mastery-avoidance GO (e.g., "I just try to avoid being incompetent at performing the skills and task necessary for my study"), four items that measure performance-approach GO (e.g., "I prefer to work on study projects where I can prove my ability to others"), and four items that measure performance-avoidance GO (e.g., "I prefer to avoid situations in my study where I might perform poorly"). The items were answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An Exploratory Factor Analysis (EFA) with an oblimin rotation yielded four factors (based on the scree plot and eigenvalues) that combinedly explained 62.33% of the variance. All items loaded on the corresponding factor (factor loadings >.46). Only one item had a cross-loading (−.32), however this item had a strong primary loading of .51. As such, the item was retained.

Perceived institutional performance-oriented learning environment

To assess the perceived performance orientation at the institution, we made use of the 3-item performance-approach goal structure sub-scale of the Patterns of Adaptive Learning Styles: Perception of Classroom Goal Structures (Midgley et al., 2000). Minor adjustments were made to fit the focus of the study, such that the word class was replaced by the name of the institution. An example item of this scale is: "At [*name of institution*], getting good grades is the main goal". Students answered the items by making use of a Likert scale anchored at 1(*not at all true)* and 5 (*very true)*. The scree plot and eigenvalue of an EFA supported the one-factor structure of the perceived institutional performance-oriented learning environment scale which explained about 70.00% of the variance (all items loaded on the factor with factor loadings >.77).

Fear of failure

To assess fear of failure we made use of the fear of experiencing shame and embarrassment sub-scale of the Performance Failure Appraisal Inventory (PFAI) by Conroy, Willow, and Metzler (2002). This questionnaire contains five items that measures fear of experiencing shame and embarrassment (e.g., "When I am failing, it is embarrassing if others are there to see it"). Students rated themselves on how often they believed each statement was true using a five-point Likert scale anchored at 1 (*do not believe at all)* and 5 (*believe 100% of the time)*. The scree plot and eigenvalue of an EFA supported the one-factor structure of the fear of experiencing shame and embarrassment scale which explained about 60.00% of the variance (all items loaded on the factor with factor loadings >.57).

Analytic approach

The analyses were conducted by making use of the R 3.3.2 software (R Development Core Team, 2014). The psychometric qualities of the used questionnaire were analyzed by making use of explanatory factor analyses and reliability analyses. The reliability coefficients for each questionnaire and, where applicable, the sub-scales, are reported in parentheses in Table 1. To investigate our hypotheses, we made use of a combination of polynomial regression analysis and Response Surface Analysis (Edwards & Parry, 1993).

Polynomial regression analyses

The full polynomial model is one with the following form: $Z = b0 + b1X + b2Y + b3\,X^2 + b4\,XY + b5Y^2 + \varepsilon$, in which the outcome variable (FF) is regressed on the personal variable (personal achievement GO = X), the environmental variable (perceived institutional performance-oriented learning environment = Y), the squared terms of the personal (*X*2) and the environmental variable (*Y*2), and the cross-product of the personal and the environmental variable (*XY)*. Compared to a regular moderation analysis, this approach allows for a more nuanced examination of the different levels at which (mis)match can be achieved and the functional forms of the (mis)match. However, this model can only be examined when both predictor variables are commensurable (i.e., both variables are measured on the same measurement scale and represent the same content domain; Edwards & Parry, 1993). For example, in this study, we could test the full polynomial model for the examination of the interaction between personal performance-approach GO and the perceived institutional performance-oriented learning environment. However, we were also interested in the interaction between incommensurable variables, such as the interaction between personal mastery-avoidance GO and the perceived institutional performance-oriented learning environment. The examination of incommensurable variables has been made possible with the introduction of statistically simpler models that are nested within the full polynomial model (i.e., Rising Ridge and Flat Ridge models; Schönbrodt, 2015). Rising Ridge models assume (mis)match effects, but also take the impact of the level of the two predictor variables on the

outcome variable into account. In addition, Rising Ridge models can allow for a tilted ridge (RR model), a shifted and tilted ridge (SRR model) and a shifted and tilted ridge with an additional rotation (SRRR model). Flat Ridge models assume no main effect of the predictor variables on the outcome variable but do allow for (mis)match. Flat Ridge models can allow for a shift in the ridge (SSQD model) and shift and a rotation in the ridge (SRSQD).

Model selection

The polynomial models were run and plotted with the *RSA* R-package (Schönbrodt, 2016), allowing us to test for the best model among several candidate models including the full polynomial model, the Rising Ridge models, the Flat Ridge models and regular regression models (i.e., only *y* model, only y^2 model, additive model, interaction model, only x model, and only x^2 model). In order to select the best fitting model among the candidate models, we followed the guidelines laid out in Schönbrodt (2015) and examined both the relative plausibility of the tested models and the absolute plausibility of the models. As an indication of the relative plausibility of the models we examined the 1) corrected Akaike Information Criterion (AICc), 2) ΔAICc, 3) model weight, and 4) evidence ratio. The best model amongst the candidate models is indicated by the smallest value of the AICc and ΔAICc can be used to compare the candidate models (ΔAICc < 2 indicate model equivalence). We only report models with ΔAICc values that are smaller than 2. Finally, the model weight refers to the probability that the model is the best model while the evidence ratio indicates how many times a model is more likely than the best model. We examined the Comparative Fit Index (CFI; values >.95 indicate good model fit), the adjusted R_2, and the model significance to indicate the absolute measure of the model performance.

Three-dimensional surface plot

To visualize the outcome of the polynomial regressions, we created three-dimensional response surface plots using surface coefficients that are derived from the unstandardized regression weights (b_1 through b_5 in Table 3). These plots make it possible to interpret how 1) a match, 2) the degree of mismatch, and 3) the direction of the mismatch between personal achievement GO and the perceived institutional performance-oriented learning environment relate to FF. In these surface plots, the *x*-axis represents the personal achievement GO score, the *y*-axis represents the perceived institutional performance-oriented learning environment score, and the z-axis represents the FF score. In these three-dimensional figures, two lines are of interest; 1) the line of congruence (LOC) that runs from the front of the figure to the far back (where $x = y$) and the line of incongruence (LOIC) that runs from the left side of the figure to the right side of the figure (where $x = -y$). The slope and the curvature of these lines, defined by the four surface coefficients (a_1 - a_4), reveal how the (mis)match between the predictor variables relate to the outcome variable (see Brunet, Gunnell, Gaudreau, & Sabiston, 2015; Shanock, Baran, Gentry, Pattison, & Heggestad, 2010 for an overview of the interpretation of these coefficients). The slope of LOC is defined by the surface coefficient a_1 (= $b_1 + b_2$) and indicates how the match between the personal achievement GO and the perceived institutional performance-oriented learning environment relate to FF. It shows the levels of FF when the levels of the personal achievement GO and the perceived performance orientation in the institutional learning environment are the same across the continuum from low to high scores. The a_2 coefficient (= $b_3 + b_4 + b_5$) indicates whether there is a curvature along LOC. Thus, it indicates whether the relationship between the match and FF is linear or curvilinear. To examine how the mismatch between personal achievement GO and the perceived institutional performance-oriented learning environment related to FF, we examined the a_3 coefficient (= $b_1 - b_2$) and the a_4 coefficient (= $b_3 - b_4 + b_5$). The slope of LOIC is defined by the a_3 coefficient and indicates how the direction of the mismatch affects FF. Finally, the curvature of the LOIC is defined by the a_4 coefficient and indicates how the degree of the mismatch affects FF.

To facilitate the interpretation of the surface plots and to avoid problems with multicollinearity, we scale-centered the predictor variables (i.e., personal achievement GO and the perceived institutional

performance-oriented learning environment scores) by subtracting the midpoint of the scales. Additionally, we screened for influential cases using the Bollen and Jackman (1985) criteria; the results indicated that there were no influential cases.

Results

The means, standard deviations, intercorrelations, and reliability coefficients of all the variables in the study are reported in Table 1. The results of the correlational analyses show that female students experienced higher levels of FF and were more motivated to avoid doing worse than other students (i.e., performance-avoidance GO) and less motivated to outperform others (i.e., performance-approach GO) than male students.

Absolute level of achievement motivation effects

Hypothesis 1, concerning the absolute level of achievement motivation hypothesis was tested using correlational analyses. We expected that the perceived institutional performance-approach learning environment, personal mastery-avoidance, personal performance-approach, and personal performance-avoidance GO would be positively related to FF. Confirming Hypothesis 1, the correlational analysis showed that FF was positively related to the perceived institutional performance-oriented learning environment ($r = .23$, $p < .001$), personal mastery-avoidance ($r = .53$, $p < .001$), performance-approach ($r = .37$, $p < .001$), and performance-avoidance GO ($r = .44$, $p < .001$). An unexpected finding was the (weak) negative relationship between FF and personal mastery-approach GO ($r = -.11$, $p = .03$). As we found a relationship between FF and personal mastery-approach GO, we decided to run the polynomial regression analysis not only for the hypothesized joint impact of the perceived institutional performance-oriented learning environment and mastery-avoidance, performance-approach, and performance-avoidance GO, but also for the (non-hypothesized) joint impact of the perceived institutional performance-oriented learning environment and mastery-approach GO.

Model selection

To test whether the personal achievement GO's and the perceived institutional performance-oriented learning environment jointly related to FF, we ran four separate polynomial regression analyses for each interaction between the four personal achievement GO's and the perceived performance orientation in the institutional learning environment. We then examined which of the models (i.e., RR, SRR, SRRR, SSQD, SRSQD, only y, only y^2, additive, interaction, only x, and only x^2 model) best fitted the data.

The relative fit indices showed that for the joint impact of personal mastery-avoidance GO and the performance-approached oriented learning environment, the best model was the SRSQD model, followed by the additive model (ΔAICc = 0.45) and the interaction model (ΔAICc = 0.85). The AICc, and a model weight of 0.31 showed that the SRSQD model surpassed both the additive and the interaction model (see Table 2 for an overview of the model fit indices). In addition, the additive and the interaction model were respectively 1.25 and 1.53 times less likely than the SRSQD model. The absolute fit indices did not indicate a clear superior model amongst the candidate models. The SRSQD, additive, and interaction model showed a good model fit according to their matching CFI's values of 1 and their matching R^2 values of .31 ($p < .001$). Therefore, in order to test our match and mismatch hypotheses regarding the joint impact of mastery-avoidance GO and the perceived institutional performance-oriented learning environment, we computed the response surface coefficients based on the SRSQD model.

The relative fit indices show that for the joint effect of personal performance-approach GO and the perceived institutional performance-oriented learning environment, the best model according to AICc

Table 2. Model fit of RSA models and their goodness-of-fit indicators.

	Model	k	AIC_c	ΔAIC_c	Model Weight	Evidence Ratio	CFI	$R^2_{adjusted}$	*P* model
Mastery-avoidance × Perceived	**SRSQD**	**5**	**4563.57**	**0.00**	**0.31**	**NA**	**1.00**	**.31**	**<.001**
Institutional performance-oriented	Additive	4	4564.02	0.45	0.24	1.25	1.00	.31	<.001
learning environment	IA	5	4564.42	0.85	0.20	1.53	1.00	.31	<.001
Performance-approach × Perceived	**Additive**	**4**	**4956.29**	**0.00**	**0.36**	**NA**	**1.00**	**.16**	**<.001**
Institutional performance-oriented	IA	5	4957.95	1.66	0.16	2.30	1.00	.16	<.001
learning environment	SSQD	5	4958.31	1.93	0.14	2.62	1.00	.16	<.001
Performance- avoidance × Perceived	**Additive**	**4**	**4765.79**	**0.00**	**0.36**	**NA**	**1.00**	**.21**	**<.001**
Institutional performance-oriented	SRSQD	5	4766.69	0.91	0.23	1.57	1.00	.21	<.001
learning environment	IA	5	4767.33	1.54	0.16	2.16	1.00	.21	<.001
Mastery-approach × Perceived	**SSQD**	**4**	**3884.71**	**0.00**	**0.38**	**NA**	**1.00**	**.07**	**<.001**
Institutional performance-oriented	SRR	5	3886.45	1.73	0.16	2.38	1.00	.06	<.001
learning environment	SRSQD	5	3886.48	1.77	0.16	2.42	1.00	.06	<.001

Note. The order of the different set of models for each set of analysis is based on the model fit. Selected models are portrayed in bold; K = number of parameters; AICc = corrected Akaike Information Criterion; CFI = Comparative fit index; *R2* = variance explained of the model; *p* model = *p* value for explained variance of the model. Model abbreviations: additive = X + Y, Model with two linear main effects; IA = X + Y + XY, Moderated regression; SSQD, Shifted Squared Shifted Difference model; SRSQD, Shifted and Rotated Squared Differences model; SRR, Shifted Rising Ridge model; SRRR, Shifted ad Rotated Rising Ridge model.

and the model weight was an additive model, followed by an interaction model, and the SSQD model (See Table 2 for an overview of the model fit indices). The additive model did not surpass the other candidate models in terms of absolute model fit. However, the relative fit indices drove us to choose the additive model. This model showed good model fit with a CFI of 1, and a R^2 of .16, $p < .001$, and implies that the predictor variables independently contributed to the prediction of FF. Following the significance of the additive model, we subsequently inspected the surface plot in Figure 1C to confirm that the personal performance-approach GO score and the perceived institutional performance-oriented learning environment score operated independently of each other. Independent of the personal performance-approach GO score, we see that students experienced more FF as they perceived the institutional learning environment to be more oriented towards performance. We also see that, independent of the perceived performance-orientation of the institutional learning environment score, students also experienced more FF as they were personally more likely to adopt a performance-approach GO. As such, levels of FF were not dependent upon the (mis)match between personal performance-approach GO and the perceived performance orientation in the institutional learning environment.

The results of the relative fit indices showed that for the joint effect of personal performance-avoidance GO and the perceived performance-orientation in the institutional learning environment, the best model according to the AIC was an additive model, followed by the SRSQD and the interaction model. With a model weight of 0.36, the additive model surpassed the SRSQD (model weight = 0.23) and the interaction model (model weight = 0.16). In terms of absolute model performance, all three models perform equally well. However, due to the relative fit indices results, we chose the additive model. This model showed good model fit with a CFI of 1.00, and a R^2 of .21, p <.001, and implies that the predictor variables independently contributed to the prediction of FF. The surface plot of the additive model in Figure 1D shows that the effect of personal performance-avoidance goals on FF is independent of the level of the perceived performance orientation in the learning environment. We see that, independent of the perceived performance orientation of their institutional learning environment score, students experienced more FF as they were personally more likely to adopt a performance-avoidance GO. Vice versa, the effect of the perceived institutional performance-oriented learning environment was also independent of the personal performance-avoidance GO score. Thus, independent of the personal performance-avoidance GO score, we see that students experienced more FF as they perceived the institutional learning environment to be more oriented towards performance.

Finally, for the joint impact of the personal mastery-approach GO and the perceived institutional performance-oriented learning environment, the best model according to AIC and the model weight was

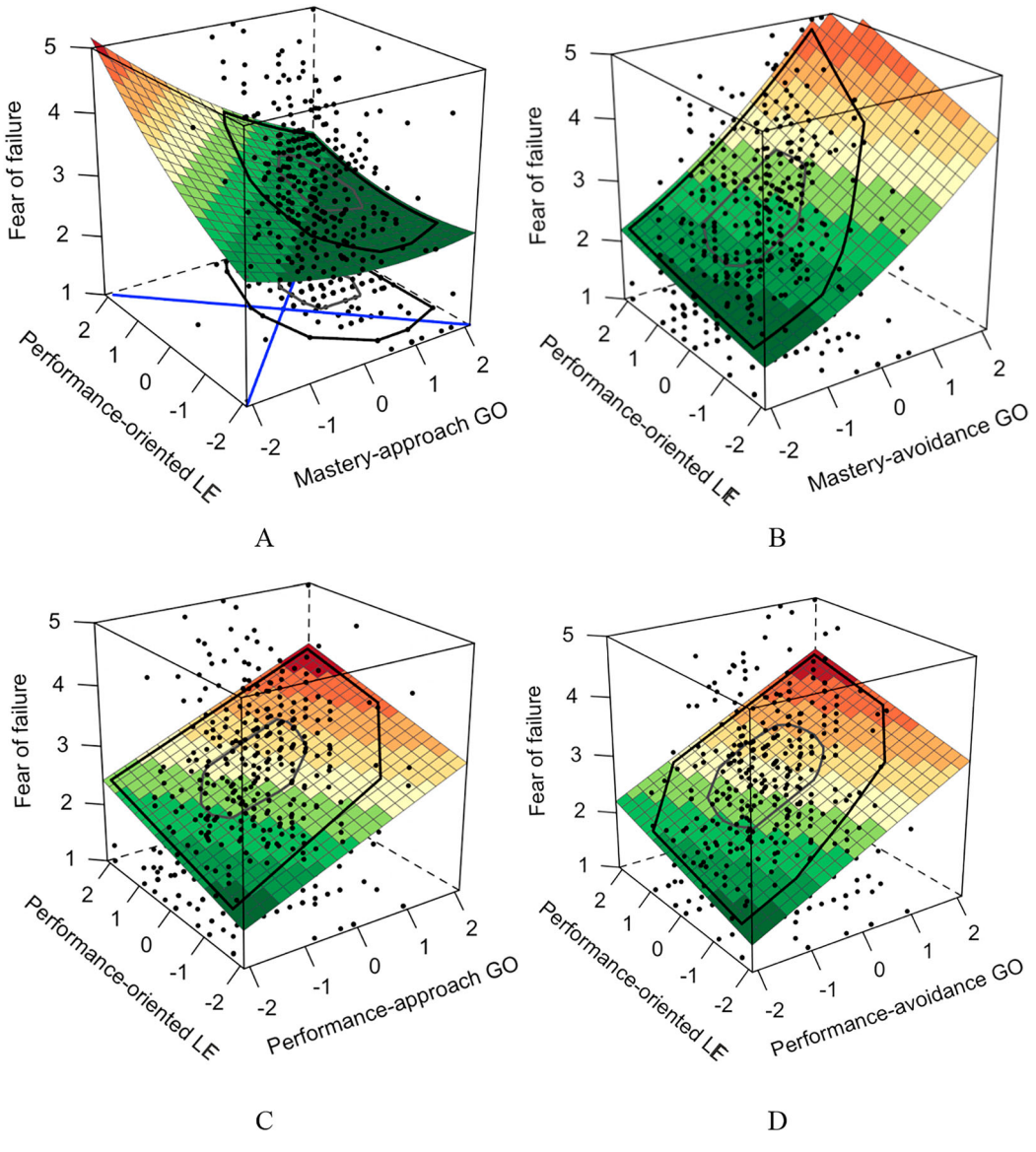

Figure 1. Response surface plots portraying the joint effects on Fear of Failure of (A) personal mastery-approach goal orientation and the perceived institutional performance-oriented learning environment (Performance-oriented LE), (B) personal mastery-avoidance goal orientation and the perceived institutional performance-oriented learning environment, (C) personal performance-approach goal orientation and the perceived institutional performance-oriented learning environment, and (D) personal performance-avoidance goal orientation and the perceived institutional performance-oriented learning environment.

the SSQD (followed by the SRR and the SRSQD model). The absolute fit indices revealed no differences in the model fit of the candidate models. Based on the relative fit indices, we chose the SSQD model with an R^2 of .07, $p < .001$. In order to test for the presence of match and mismatch effects regarding the joint impact of mastery-approach GO and the perceived institutional performance-oriented learning environment, we computed the response surface coefficients based on the SSQD model.

After the selection of the models (i.e., the SRSQD model for mastery-avoidance GO, the additive model for performance-approach and performance0-avoidance GO, and the SSQD model for mastery-approach model), we examined the response surface coefficients to test our match and mismatch hypotheses.

Degree of match effects

Hypothesis 2 concerning the degree of match effects, was tested by examining the slope (i.e., a_1) and curvature (i.e., a_2) of the line of congruence for polynomial regression models that indicated the presence of (mis)match effects. We expected that a greater match between personal mastery-avoidance, performance-approach, and performance-avoidance GO and the perceived institutional performance-oriented learning environment would be positively associated with FF.

The selected candidate model (SRSQD) for the joint impact of personal mastery-avoidance GO and the perceived performance-orientation in the institute, implies that only the match or the mismatch between personal mastery-avoidance GO and the perceived performance orientation in the institutional learning environment affects FF, but that the level of the two predictors does not affect FF. The significant positive slope ($a_1 = 0.89$, $p < .001$) on the LOC, indicates that FF increased as the scores on both personal mastery-avoidance GO and the perceived performance-orientation in the institutional learning environment increased together. However, the significant positive curve ($a_2 = 0.12$, $p = .04$) on this line indicates that this was a curvilinear association. The surface plot of the SRSQD model in Figure 1B shows this pattern; following the LOC from the front of the figure to the back we see that the color changes from dark green to orange. FF scores were lowest when both personal mastery-avoidance GO scores and the perceived performance-orientation in the institutional learning environment were low, and highest when both were high. Thus, in line with our expectations, the perceived performance-orientation in the institutional learning environment exacerbated the positive relation between personal mastery-avoidance GO and FF. However, unexpectedly this was a curvilinear effect.

Following the selection of additive models for the joint impact of performance GO (both approach and avoidance) and the perceived institutional performance-oriented learning environment, a_1 and a_2 were not examined for these regressions.[2]

The candidate model that best represented the joint impact of personal mastery-approach GO and the perceived performance-orientation in the institutional learning environment was the SSQD model. This model implies that only the match or the mismatch between personal mastery-approach GO and the perceived performance orientation in the institutional learning environment affected FF, but the level of the two predictors did not affect FF. The non-significant a_1 and a_2 values (see Table 3) imply that a match in personal mastery-approach GO and the perceived institutional performance-oriented learning environment is unrelated to FF. Thus, levels of FF dis not depend on the match between these two predictors.

To sum up, the degree of a match effect was only found for the joint impact of personal mastery-avoidance GO and the perceived performance orientation in the institutional learning environment on FF. However, unexpectedly this was a curvilinear effect. For these reasons, Hypothesis 2 was only partially confirmed.

Direction of mismatch effects

Hypothesis 3 concerning the direction of mismatch effects, was tested by examining the slope of the line of congruence (i.e., a_3) for polynomial regression models that indicated a presence of (mis)match effects. We expected that FF levels would be higher when there was a negative mismatch between personal mastery-avoidance, performance-approach, and performance-avoidance GO and the perceived institutional performance-oriented learning environment than a positive mismatch between personal mastery-avoidance, performance-approach, and performance-avoidance GO and the perceived institutional performance-oriented learning environment.

Following an extrapolation of the data, the slope on the line of incongruence (a_3) for the joint impact of personal mastery-avoidance GO and the perceived performance orientation in the institutional learning environment, reached significance, $a_3 = 0.44$, $p < .001$. The positive nature of the

slope seems to indicate that a positive mismatch resulted in higher FF levels than a negative mismatch. Thus, FF scores were higher if personal mastery-avoidance GO scores were high and the perceived performance orientation in the learning environment scores were low (far right of the plot), than vice versa (far left of the plot).

Following the selection of additive models for the joint impact of performance GO (both approach and avoidance) and the perceived institutional performance-oriented learning environment, a_3 did not reach significance for these regressions.

For the joint impact of personal mastery-approach GO and the perceived performance orientation in the institutional learning environment, the slope on the line of incongruence (a_3) reached significance = −0.63, p <.001). The negative nature of the slope indicates that a negative mismatch resulted in higher FF levels than a positive mismatch. Thus, FF levels are higher if students did not score high on mastery-approach GO and perceived the institutional learning environment to be highly oriented towards performance. Vice versa, FF scores were lower if students scored high on mastery-approach GO and did not perceive the institutional learning environment to be very performance-oriented. Accordingly, in the surface plot of the SSQD model in Figure 1A, the color changes from light green to dark green when following the LOIC to the lower-left corner.

In sum, the direction of a mismatch effect was only found for the joint impact of personal mastery GO's and the perceived performance orientation in the institutional learning environment. However, the results for theses regressions were contradictory as we found a negative mismatch for the joint impact on FF for personal mastery-approach GO and the perceived performance orientation in the institutional learning environment and a positive mismatch for the joint impact on FF for personal mastery-avoidance GO and the perceived performance orientation in the institutional learning environment. As such, Hypothesis 3 could not be supported.

Degree of mismatch effects

Hypothesis 4 concerning the degree of mismatch effects, was tested by examining the curvature of the line of congruence (i.e., a_4) for polynomial regression models indicated the presences of (mis)-match effects. We expected that a greater negative mismatch between personal mastery-avoidance, performance-approach, and performance-avoidance GO and the perceived institutional performance-oriented learning environment would be more positively associated with FF than a greater positive mismatch between personal mastery-avoidance, performance-approach, and performance-avoidance GO and the perceived institutional performance-oriented learning environment.

The results show that in none of the regressions, the curvature on the lines of incongruence reached significance (see Table 3). As such, no support was found for the degree of mismatch effects. Therefore, Hypothesis 4 had to be rejected.

Discussion

This study addressed the problem of fear of failure (FF) amongst university students by examining the joint impact on FF of an institutional learning environment that is perceived to stress performance and personal achievement goal orientations. In line with previous findings (e.g., Tsai & Chen, 2009), we found that an institutional learning environment that is perceived to be performance-oriented is positively related to FF. However, with this study we provide some evidence that this perception of an emphasis on performance in the institutional learning environment interacts with students' personal achievement GO.

Our results showed that an institutional learning environment that is perceived to have a strong performance-orientation aggravated the already positive relation between personal mastery-avoidance GO and FF. Thus, in line with our expectations, an exacerbation effect occurred. Moreover, this exacerbation followed a curvilinear pattern such that FF increased as the scores on both personal mastery-avoidance GO and the perceived performance-orientation in the institutional learning

Table 3. Polynomial regression coefficients and response surface analysis coefficients.

						Along LOC		Along LOIC	
			B			Match hypothesis		Mismatch hypothesis	
	b_1	b_2	b_3	b_4	b_5	a_1 Linear	a_2	a_3 Curvilinear	a_4
Mastery-avoidance x Perceived Institutional performance-oriented learning environment	0.66***	0.22***	0.07*	0.04*	0.01	0.89***	0.12*	0.44***	0.03
Performance-approach x Perceived Institutional performance-oriented learning environment	0.37***	0.19***	0.00	0.00	0.00	0.56***	0.00	0.17	0.00
Performance- avoidance x Perceived Institutional performance-oriented learning environment	0.45***	0.18**	0.00	0.00	0.00	0.63***	0.00	0.27	0.00
Mastery-approach x Perceived Institutional performance-oriented learning environment	−0.31***	0.31***	0.06	−0.11	0.06	0.00	0.00	−0.63***	0.22

Note b_1 is beta coefficient for the personal goal, b_2 is beta coefficient for the learning environment; b_3 is beta coefficient for personal goal^2; b_4 is beta coefficient for the cross-product of the personal goal and the learning environment; b_5 is beta coefficient for learning environment^2; a_1 = the slope on the Line of Congruence, a_2= the curve on the Line of Congruence; a_3= the slope on the line of Incongruence; a_4= the curve on the Line of Incongruence.
Significance *$p < .05$, **$p < .01$, ***$p < .001$.

environment increased together. In sharp contrast with the results for mastery-avoidance GO, personal performance GO (both personal-approach and personal-avoidance goals) operated independent of the perceived institutional performance-oriented learning environment. The perceived performance orientation in the institutional learning environment did not aggravate the relation between personal performance GO (either approach or avoidance) and FF. This finding is contradictory to the ideas put forward Murayama and Elliot (2009), but is in line with Linnenbrink's (2005) findings. It seems that a perceived performance orientation in the institutional learning environment and personal performance GO uniquely relate to FF.

Contradictory to our expectations, we found that the perception of a strong performance orientation in the institutional learning environment can vitiate the relation between a weak personal orientation towards the development of one's competence (i.e., a mastery-approach GO) and FF. However, although less strong, a strong personal orientation towards mastery-approach GO was able to attenuate the detrimental impact of a perceived strong performance orientation in the institutional learning environment. A possible explanation for this finding could be that having a mastery-approach orientation towards achievement tasks does not lead to inferences about one's own ability when social comparison information is provided in the learning environment (see Van Yperen & Leander, 2014 for a similar discussion). This attenuation effect is not in line with the three mismatch effects (i.e., mitigation, vitiation, and exacerbation) that Murayama and Elliot (2009) proposed. However, this finding is in line with the idea of a buffering hypothesis which states that personal mastery GO will buffer the negative effects of a performance-oriented context (Linnenbrink & Pintrich, 2001). Combining our results with Linnenbrink and Pintrich's ideas, we propose a fourth effect that can occur as a result of the mismatch between personal achievement motivation and the achievement motivation that is stressed in the learning environment. We propose that an attenuation effect can occur when the detrimental impact of a learning environment is dampened by the positive influence of a beneficial personal achievement orientation. Furthermore, the opposite results for mastery-approach and mastery-avoidance GO seem to imply that the valence component of mastery GO determines whether mastery GO's are a strength or a weakness in a perceived institutional performance-oriented learning environment.

The question we set out to answer in this study was: How does the (mis)match between a perceived performance-oriented institutional learning environment and students' achievement goal orientation relate to fear of failure? Based on the results of our study we can draw the following

overarching conclusion: an institutional learning environment that is perceived to stress performance likely elicit fear of failure but does not have the same impact on fear or failure for different achievement goal orientations. More specifically, this perception of a performance orientation in the institutional learning environment exacerbated the positive relation between personal mastery-avoidance GO and fear of failure, while personal mastery-approach GO attenuated the impact that the perceived performance orientation in the institutional learning environment has on FF. Personal performance GO (both approach and avoidance) operate independently from the perceived performance orientation in the institutional learning environment.

Limitations and suggestions for future research

This study is not without limitations, which we will address in the following section. Firstly, the learning environment a student is embedded in consists of multiple layers, which were not all addressed in the current study. We choose to only zoom in on the learning environment at the institution level as a whole. By doing so, we did not consider the learning environment of the classroom as embedded in the academic institution. In addition, this research was conducted at a small-scale institution with about 600 students and 90 staff members, making it an ideal location to study how policies and practices at the institution level affect students. As Ames already noted in 1992 it is important to examine "school-level policies and practices that can undermine or enhance teachers' efforts to establish a mastery motivational climate in the classroom" (p. 344). Therefore, it would be interesting for future studies to examine if and how these school- and classroom-level learning environments impact each other.

Secondly, our study employed a correlational design to examine fear of failure as an outcome measure of personal and contextual achievement motivation. Although Elliot and Church's (1997) theoretical model of achievement goal orientation assumes that FF precedes achievement goal orientation, examining whether achievement GO can precede FF provides "an opportunity to falsify and reject plausible alternative explanations of previously found associations between achievement goals and FF" (Conroy & Elliot, 2004, p. 274).

Theoretically, Elliot and Church (1997) proposed that achievement GO's are a manifestation of fear failure. However, causal evidence for this causal direction is scarce. As far as we know, Conroy and Elliot (2004) have conducted the only (quasi-experimental) study into the causal direction between achievement GO and fear of failure. In their study, they compared the model fit of models in which achievement GO predict fear of failure and models in which fear of failure predict achievement GO. All the models showed good fit. For the association between mastery-avoidance GO and fear of failure and the association between performance-avoidance GO and fear of failure, models in which fear of failure predicted these avoidance GO's showed a better fit than vice versa. However, for the association between mastery-approach GO and fear of failure, the model in which mastery-approach GO predicted fear of failure showed a better fit than vice versa. Finally, for the association between performance-approach GO and fear of failure, the model in which neither predicted each other showed the best fit. As such, it seems that still no strong conclusions about the direction of causality can be drawn from these results. Thus, although Elliot and Church's (1997) theoretical model of achievement motivation assumes that the causal sequence between FF and achievement GO is such that FF precedes achievement GO, examining causal sequences that are contrary this model is still necessary for theory advancement and falsification.

Thirdly, achievement GO can be operationalized as a relatively stable personality characteristic (i.e., a trait), that can be measured as a domain-specific characteristic, or as a situation-specific characteristic (i.e., state) that fluctuates from situation to situation. We chose to operationalize achievement GO as a relatively stable domain-specific characteristic that we measured in the first semester of the first academic year. This makes sense as we were interested to see how different personal characteristics interacted with the same learning environment. However, it would be interesting to see if state achievement GO's have a stronger impact on daily FF measures (with trait measures, we were already

able to find effects in the .07-.31 range). Longitudinal studies with state measures of achievement GO's and FF would enable researchers to shed some light on this matter. In addition, since studies have shown that the learning environment can induce a certain state achievement GO (e.g., Murayama & Elliot, 2009), we wonder whether the effects we found are less strong at the end of the academic year when students' personal achievement motivations have converged more with the achievement motivation in their learning environment due to long-term exposure to their learning environment. To answer this question, future studies could incorporate longitudinal designs in which they measure trait achievement GO's and the perceived achievement motivation in the institutional learning environment at the beginning of the academic year and state achievement GO and the perceived achievement motivation in the institutional learning environment ate the end of the academic year to see whether these effects are less strong at the end of the academic year as opposed to the beginning of the academic year. Moreover, future studies could examine whether taking on an interaction approach in the study of personal achievement motivation and the achievement motivation stressed in the learning environment makes more sense than a mediational approach in which the impact of the achievement motivation in the learning environment is mediated by the personal achievement motivation (see Murayama & Elliot, 2009 for a discussion).

Finally, researchers have proposed that academic institutions and classrooms can only be effective if they naturally motivate students to learn to love learning for the sake of learning and reward students to do so (e.g., Renchler, 1992). Just as we focused on the joint impact of personal achievement GO and a perceived performance orientation in the institutional learning environment, future studies can be performed to examine the joint impact of personal achievement GO and a perceived mastery orientation in the institutional learning environment.

Conclusion

With this study, we aimed to examine the potential detrimental effects of a perceived institutional learning environment that places a strong emphasis on performance and achievement. Our results showed that the perception of such an emphasis in the institutional learning environment is a feeding ground for fear of failure and that students' personal characteristics such as their achievement motivation can help attenuate or exacerbate the negative effects of these perceptions. Although our results show that a personal orientation towards mastery-approach goals can buffer against performance-oriented learning environments, educators must not rely solely on students' characteristics to alleviate them from the detrimental effects of their perceived learning environment. Based on previous studies, we know that student's personal achievement motivations can be induced by instructions and cues in the environment (e.g., Noordzij, Giel, & Van Mierlo, 2019). The aim of educational institutes should be to construct a learning environment that fosters students' well-being in order for them to flourish (i.e., a mastery-approach oriented learning environment) and help students develop a mastery-approach GO to deal with performance-oriented learning environments.

In sum, educational institutes and policy makers need to be careful that their desire to produce high achieving students that are ready to enter the labor market and be successful in their career does not come at the costs of their students.

Notes

1. The term performance-oriented learning environment could refer to both a performance-approach orientation, as well as a performance-avoidance orientation in the learning environment. In this study, we use the term performance-oriented learning environment to refer to a performance-approach orientation in the learning environment.
2. Although the significant (positive) a_1 values would indicate that the similarity between these predictor variables positively relates to FF, we cannot interpret these values as they were derived from the additive model. Therefore, these values are meaningless.

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