



Interest–Major Fit predicts study satisfaction and/or achievement? Comparing different ways of assessment

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ABSTRACT

Prospective students and higher educational institutions often share the matching goal to ensure an optimal fit between the demands of study programs and the student profile. A strong personal fit is meant to facilitate long-term study satisfaction and optimal performance. However, to truly understand the impact of such a fit, we must first reach a consensus on how to measure the construct. At this point, researchers and higher education practitioners are debating different avenues in this regard: In the past, the fit has often been measured by assessing vocational interests tied to potential occupations that are attainable through a study program (Interest–Vocation Fit). Here, we argue that more specific measures tailored to the respective major (Interest–Major Fit) have more predictive power. We compare the two operationalizations of fit as predictors of performance and study satisfaction in a sample of 455 German university students who participated in a longitudinal survey study. We found that the different measures of personal fit were associated with subsequent university GPA and study satisfaction. Moreover, we found that Interest–Major Fit was more closely associated with these outcome measures compared to Interest–Vocation Fit. We also found that only Interest–Major Fit has incremental predictive power for study satisfaction beyond high school GPA. These findings should be helpful to researchers interested in the intricacies of measuring fit and higher education practitioners aiming to develop diagnostic tools alike. Such tools may in turn assist prospective students in finding the major that caters best to their personal needs and interests.

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Introduction

In the complex process of student selection, universities and prospective students share a common goal: ensuring an optimal fit between the profile of the student and the content of the study program. Universities strive to pinpoint those candidates who will excel academically and hold a positive view of their chosen major. Simultaneously, prospective students seek majors that resonate with them. The conventional use of entry criteria, such as high school GPA, provides a valuable forecast of academic achievement (Westrick et al. 2021). However, it may not fully cater to students' need to find study programs that fit their personal interests. In line with Person–Environment Fit Theory (Edwards and Shipp 2007; Edwards, Caplan, and Van Harrison 1998), such an *Interest–Major Fit* should be strongly indicative of students' later well-being in the program (Bai and Liao 2019; Nye, Prasad, and Rounds 2021). The consequent inclusion of measures of Interest–Major Fit in the (self-)selection

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process requires additional insights into the optimal conceptualization of the construct (Kristof-Brown, Zimmerman, and Johnson 2005). Past research often applied broad operationalizations (e.g. Allen and Robbins 2010; Etzel and Nagy 2016) that focus more on the demands of work positions that are (somewhat) affiliated with a major than on the specifics of the respective study program. Such measures are probably best seen as indicating *Interest–Vocation Fit*. In line with research on limited associations particularly with (study) satisfaction (Ertl, Hartmann, and Wunderlich 2022; Tsabari, Tziner, and Meir 2005), we argue that this might not be the best way to operationalize fit in the higher education context. To provide empirical evidence for this assumption, we compare the predictive power of Interest–Major Fit in a narrower sense and Interest–Vocation Fit in a longitudinal study. In doing so, our research is an important contribution to a more nuanced understanding of Interest–Major Fit as a potential facilitator of study satisfaction and performance. Such an understanding is key for higher education administration in developing impactful diagnostic systems and may also be insightful for prospective students in search of ‘fitting’ majors.

Person–environment fit as a predictor of study satisfaction and achievement

When it comes to evaluating the predictive power of variations of Person–Environment fit in the context of higher education, we first have to answer the question on why Person–Environment fit should even matter for study satisfaction and achievement in the first place. The supposed effect of Person–Environment fit on well-being is meant to come to pass because individuals aim to experience that their personal values, passions, and interests align with their current environment (Edwards and Shipp 2007). If this alignment comes to pass, they will feel that they belong in the respective environment, which in turn fosters positive emotions and general experiences of well-being (Edwards and Rothbard 1999; Schmitt et al. 2008).

This idea that forms the very backbone of the Person–Environment fit theory has been explored in the higher education context in the past, mostly under the label of Interest–Major Fit (Allen and Robbins 2010). The concept follows the general idea that the students’ interest should fit the learning environment, for students to develop optimal psychological functioning. We argue that in practice the term ‘Interest–Major Fit’ is often inaccurate as most studies assessed fit with later occupations rather than with the current major. For better clarity, we only refer to Interest–Major Fit (congruence between interests and content of the major) if researchers used measures that took the actual major into account and refer to Interest–Vocation Fit (congruence between interests and content of the vocation) if the measures focused on occupational interest. Furthermore, we merely speak of ‘fit’ when we make general statements that should apply to both operationalizations.

A meta-analysis of 26 studies regarding the effect of Interest–Vocation Fit indicated a lack of research on fit within the higher education sector as the authors could only find one sample drawn from academia (compared to 36 samples drawn from occupational domains) with the existing study pointing to a negligible association with satisfaction of $r = -.03$ (Tsabari, Tziner, and Meir 2005). Since then, few studies have added to the picture, which, however, generally found small to moderate effects (Ertl, Hartmann, and Wunderlich 2022; Etzel and Nagy 2016; Nye, Prasad, and Rounds 2021) that partly depended on the way the score for Interest–Vocation Fit was calculated (Bai and Liao 2019). Investigations into Interest–Major Fit are even scarcer due to the dominance of Interest–Vocation Fit measures in the domain. Yet, emerging empirical research is promising as it indicates that Interest–Major Fit accounts for variance in study satisfaction and positive affect even when controlling for anticipatory fit and anticipated well-being measured before enrollment (Merkle, Messerer, and Dickhäuser 2024).

While the postulate that fit should be associated with study satisfaction is probably most plausible, research has focused more often on the potential importance for performance. Such research is based on the idea that experiences of fit bolster motivation and as such the willingness to invest time and energy into learning and performing well in the respective academic environment (Edwards and Shipp 2007; Feldman, Smart, and Ethington 1999). The most recent meta-analysis to date (that was

not limited to the occupational sector) identified 18 studies investigating the association between Interest–Vocation Fit and performance, which accounted for small to moderate associations (Nye et al. 2012). Furthermore, studies have shown some evidence that these effects indeed come to pass due to a heightened willingness to invest effort in learning (Nye, Prasad, and Rounds 2021) and that the explained variance goes beyond traditional predictors of achievement such as high school GPA (Nye et al. 2018; Tracey and Robbins 2006). To our knowledge, there is no empirical study to date that explored associations between more narrow conceptualizations of Interest–Major Fit and performance in higher education.

In sum, prior research indicates that fit can be predictive for performance. Yet specifically the absence of a similarly convincing result pattern for (study) satisfaction has led to some skepticism, given that Person–Environment Fit Theory emphasizes the importance of fit for well-being. Notably this critique has often focused on the fact that interests have been regarded as static rather than dynamic concepts in past studies, even though interests are likely also shaped by the (educational) context (see Su 2020). However, it may also be true that past research just did not use optimal measures of interest fit to unravel the relevance of fit for well-being in the learning environment in a specific study program.

Interest–Major Fit versus Interest–Vocation Fit

In past research, fit has often been operationalized as the congruence between interests in terms of the RIASEC model of vocational interests (Holland 1959) and the study program in question (e.g., Ertl, Hartmann, and Wunderlich 2022; Nye, Prasad, and Rounds 2021). This model distinguishes between Realistic, Investigative, Artistic, Social, Enterprising, and Conventional vocational interests. The assumed validity of congruence measures based in the RIASEC model somewhat hinges on the idea that vocational interests should also be represented in study programs that lead to occupations connected to these interests, which is not necessarily the case. In contrast, quite a few study programs are connected to several strongly differing vocational fields. Psychology students might for example later be equally suited to become clinical practitioners, scientists or data specialists. Similarly, there can be a disconnect between learning relevant knowledge bound to a major and using this knowledge in a more practical way. This is why we would argue that Interest–Vocation Fit as generally measured with RIASEC congruence indicators is not the same as Interest–Major Fit. While Interest–Vocation Fit might be predictive for happiness in a later job field, the prediction of study satisfaction could be more strongly anchored in ones' interests into the content that is actually taught in university.

This does not imply that Interest–Vocation Fit is not relevant to (prospective) students. Rather choosing and maybe also staying enrolled in a major can also be motivated through the prospect of later extrinsic rewards like an occupation with a high salary. Even though students may, thus, chose to neglect Interest–Major Fit, it stands to reason that this more momentary fit is more suitable to ensure positive outcomes in the here-and-now as it directly enhances the possibility to derive joy from the current situation (see also Janke 2020; Messerer, Karst, and Janke 2023). This sentiment is also somewhat mirrored regarding effects on performance as a very recent meta-analysis shows that the effect sizes for congruence measures are considerably lower in the academic than in the occupational sector (De Vries, Meeter, and Huizinga 2023).

Research questions

To provide further knowledge on the optimal way to operationalize fit in the context of higher education, this study aims to answer, whether Interest–Major Fit or Interest–Vocation Fit is better suited to predict students' achievement and their study satisfaction. Given the stronger alignment with the actual context, we assume that Interest–Major Fit is better suited to predict both university GPA (Hypothesis 1a) and study satisfaction (Hypothesis 1b) than Interest–Vocation Fit.

Furthermore, we aim to investigate whether Interest–Major Fit can predict university GPA and study satisfaction beyond high school GPA. This research question is of particular relevance to prospective students and higher education practitioners developing guidance systems: In general, it only makes sense to consider a variable in the study decision process if it has any informative value beyond other (more easily obtainable) variables such as past performance. Investigating whether Interest–Major Fit has incremental validity above high school GPA provides further evidence on whether respective measures should be included in the study decision process. In this regard, we hypothesize (Hypothesis 2a) that high school GPA is closely positively associated with university GPA while Interest–Major Fit has a relatively smaller effect. This is due to underlying personal variables, that influence both high school GPA and university GPA, e.g. intelligence, conscientiousness and learning strategies (Chamorro-Premuzic and Furnham 2008). In general, high school GPA has proven to be a very good predictor for grades at university (Han, Farruggia, and Solomon 2022; Westrick et al. 2021; as well as Janke and Dickhäuser 2018 for the German context). Regarding study satisfaction, we hypothesize that high school GPA has a weaker effect here than Interest–Major Fit (Hypothesis 2b). This hypothesis is strongly informed by the core of Person–Environment Fit theory, which postulates that personal happiness in an environment strongly depends on whether the environment caters to the individuals’ needs, values, and interests.

Method

We used data from an existing longitudinal study conducted at a public German university with an emphasis on social and economic sciences to investigate our research objectives. The university was a medium-sized institution, with roughly 12,000 students. University education in Germany is traditionally separated into three levels (bachelor, master, and doctorate). The major must be chosen before enrolling in a bachelor program and is not meant to be changed over the course of one’s studies. Only students at the start of the first stage of their studies were included in the study (bachelor level).

Student data was assessed at the very beginning of students’ first semester in their bachelor program (T1) and at the beginning of their second semester (T2). The overall longitudinal study consisted of six time points in total, also assessing student data after the third, fourth, fifth and sixth semesters. This study only utilizes measures from the first two time points as it aims to provide a deeper understanding of how entry criteria such as GPA and Interest–Major Fit predict a successful transition into higher education.

The university administration contacted the full cohort at each time point, and we also advertised the survey study via social media and in lectures that targeted freshmen. As compensation, the students either received 5€ or course credits for participating in psychological studies (only students of psychology or education). We asked the participants for permission to access their university GPA through student services at a later point in time. We assessed these additional data at the beginning of the participating students’ second semester (T2). The IRB of the University (EK Mannheim 17/2019) approved the assessment and pseudonymized matching of additional personal data (university GPA).

Sample

The sample consisted of university students, who participated at least once within the first and second semester ($N = 455$ students, $M_{\text{age}} = 19.5$ years, $SD = 1.9$ years, 54.1% female, 1 non-binary). However, we could only use the data of those students who were enrolled in a major for which a questionnaire to assess the specific Interest–Major Fit existed. The assessment of the specific Interest–Major Fit requires a questionnaire tailored for the specific major at the university and was therefore developed for this purpose. At the time of data collection, the questionnaire was only developed for the nine majors with the greatest number of students. Therefore, the

sample consisted only of students enrolled in one of the following nine subjects: Business Administration (30.3%), Law (11.9%), Economic and Business Education (9.5%), Economics (10.1%), Psychology (9.7%), Political Sciences (9.7%), Sociology (7.0%), Business Informatics (6.8%), Business Mathematics (5.1%).

Measures

For our analyses, we used data on the predictor variables (Interest–Major Fit, Interest–Vocation Fit, and high school GPA) that were collected at T1 to predict criteria (university GPA, study satisfaction) measured at T2.

Interest–Vocation Fit

To assess Interest–Vocation Fit we used a well-validated German scale to measure vocational interests (Allgemeiner Interessens-Struktur-Test; Bergmann and Eder 2019). This scale assesses six aspects of vocational interests according to the Holland model (Holland 1997): Realistic, Investigative, Artistic, Social, Enterprising and Conventional with 10 items per subscale. The items were assessed with a Likert scale ranging from 1 (I'm not interested in that at all; I don't like to do that) to 5 (I'm very interested in that; I'm very happy to do that). Sample items are: 'Running a business or enterprise.' (Enterprising) or 'look after or care for other persons' (Social; Bergmann and Eder 2019). The subscales acquired an acceptable reliability ($.83 < \alpha < .86$; mean $\alpha = .85$).

To assess the congruence between Interests and Vocation, we calculated the congruence index (C index; Brown and Gore 1994). This represents an extension of Holland's Congruence to three-digit codes with weights, which makes it more accurate and is therefore used often (Brown and Gore 1994). Three distance values are used which refer to three pairs of letters: the first, second, and the third letters of both codes. The three distance values are weighted and added up (following Brown and Gore 1994, 322).

$$C = 3 * X_1 + 2 * X_2 + 1 * X_3$$

The variables X_1 , X_2 , X_3 in the formula represent the three distance values of the three examined letter pairs (X_1 , for example, corresponds to the distance between the 1st letter of each of the respective 1st letters of the interest code and the major code). The distances within the pairs are each represented from '0' (opposite, e.g. C and A) to '3' (congruent, e.g. A and A). The weighted sum (C) can take all values from 0 to 18. Higher values stand for higher congruence.

Interest–Major Fit

We assessed study content related Interest–Major Fit using items that were designed for nine specific majors. To generate the items, experts of each major were involved as well as experienced and successful students of the respective majors. Those items were also answered by current university students who were asked to what extent the content occurs in their studies (to have a measure for the environment). The result was 6–20 items per major. For details about the item development, see Messerer et al. (2020). Sample items are: 'I am interested in how people make purchasing decisions' (Business Administration) and 'I am interested in how the nervous system and brain are structured and what functions they perform' (Psychology). Students answered these items on a Likert scale ranging from 1 (not at all) to 7 (very much). The subscales for each major generally acquired an acceptable reliability (mean $\alpha = .87$). The full inventory (with added translations into the English language) as well as the alphas for the specific majors can be found under the following link: https://osf.io/6fvmh/?view_only=cdf7f456f2f14b0fbf83b844564bca78. It must be noted that the presented items have been developed to assess Interest–Major Fit for specific study programs at one specific university. Given that study programs differ between higher education institutions (even if they tackle the same major), the inventory should be seen as a blueprint for the development of such tailored measures rather than as a finite item battery for assessing Interest–Major Fit.

Study satisfaction

We used a well-validated German self-report scale to measure study satisfaction (Fragebogen zur Studienzufriedenheit; Westermann et al. 1996, 2002). This questionnaire has often been used in previous studies (e.g. Scheunemann et al. 2022; Wach et al. 2016). The scale originally consisted of three subscales. However, only the subscale *satisfaction with the study content* truly captures the essence of study satisfaction in the sense that it identifies student's feelings of joy and satisfaction with the chosen major. The other two subscales dubbed *satisfaction with study conditions* and *satisfaction with coping with study-related* rather indicate dissatisfaction as they are only indicated by negatively worded items that would also be suitable to measure strain and distress. To ensure construct clarity (and comparability with other studies interested in study satisfaction), we, thus, only used the suitable subscale *satisfaction with the study content*. This subscale consisted of three items. A sample item for the subscale measuring satisfaction with study content is 'Overall, I am pleased with my academic experiences.' The items were measured on a Likert scale ranging from 1 (not true at all) to 7 (completely true). The internal consistency of the subscale satisfaction with study content was excellent ($\alpha = .85$).

University GPA

We derived the university GPA directly from the university services. All participating students consented that this data could be collected. The data were matched to the questionnaire data using pseudonyms. The university GPA reflected the average grade achieved in the exams of the first semester. We recoded the grades as in the German system usually 1 is the best and 4 is the worst grade. Now better grades mean higher values.

High school GPA

We asked the participants to report their high school GPA. Note that also for high school GPA, higher values reflect better grades. While self-reported grades may be biased estimates of actual grades, past research has found high correlations between reported and actual grades (Kuncel, Credé, and Thomas 2005 and particularly Sticca et al. (2017) for the German context).

Analyses

To test the first hypothesis (optimal operationalization of fit), we conducted two hierarchical regression analyses. In the first step, we predicted the relevant outcome variable (model 1: university GPA; model 2: study satisfaction) with Interest–Vocation Fit. In the second step, we then added Interest–Major Fit into the equation. To answer the second research question (incremental validity of Interest–Major Fit over high school GPA), we once again conducted hierarchical regression analyses. In the first step, high school GPA predicted the relevant outcome, followed by the inclusion of Interest–Major Fit into the model as a second step. All analyses were conducted with R version 4.0.3 (R Core Team 2020). Missing data were handled with the Full Information Maximum-Likelihood method.

Table 1. Descriptive statistics and zero-order correlations.

Scale	<i>M</i>	<i>SD</i>	Range	(1)	(2)	(3)	(4)
T1 = First semester							
(1) Interest–Major Fit	5.14	0.92	1–7				
(2) Interest–Vocation Fit	11.54	4.12	0–18	–.08			
(3) High school GPA	3.19	0.61	1–4	.15***	.21***		
T2 = Second semester							
(4) Satisfaction with study content	5.65	1.04	1–7	.27***	.10	.04	
(5) University GPA	2.85	0.62	1–4	.18**	.12	.55***	.13

Note: ** $p < .01$, *** $p < .001$. The depicted scale values are based on manifest mean scores. Range indicates the potential range.

Results

Descriptive statistics and zero-order correlations are depicted in Table 1. A first look shows that the C Index (Interest–Vocation Fit) was neither correlated with any of the outcomes (study satisfaction and university GPA) nor with the Interest–Major Fit – only with high school GPA. In contrast, the Interest–Major Fit was correlated with study satisfaction and university GPA. Interest–Major Fit was also correlated with high school GPA. Moreover, study satisfaction and university GPA were not significantly correlated.

Hypothesis 1: different measurements of Interest–Major/Vocation Fit

The conducted hierarchical regression analyses showed that Interest–Vocation Fit was not significantly predictive for study satisfaction in either model, and only weakly associated with university GPA in isolation (see Table 2). Interest–Major Fit was significantly predictive for both outcomes in the models with both predictors. The model with Interest–Vocation and Interest–Major Fit explained 6.3% of the variance of university GPA and 8.8% of the variance of study satisfaction. For both outcome variables, Interest–Vocation Fit alone explained only around 1% of the variance, so a considerable amount of explained variance was added when taking Interest–Major Fit into account as well.

Hypothesis 2: incremental effect of Interest–Major Fit beyond high school GPA

As expected, high school GPA predicted university GPA with about 40% variance explained (see Table 3). The model with added Interest–Major Fit as a predictor could not even explain 1% more

Table 2. Results of regression analyses for hypothesis 1.

		<i>Beta</i>	SE	<i>R</i> ²	AIC	BIC
University GPA						
Model 1				.014	416.92	429.29
	Interest–Vocation Fit	.12*	.009			
Model 2				.063	409.06	425.54
	Interest–Vocation Fit	.16**	.009			
	Interest–Major Fit	.21**	.044			
Study satisfaction						
Model 1				.010	734.05	746.41
	Interest–Vocation Fit	.10, n.s.	.018			
Model 2				.088	715.80	732.28
	Interest–Vocation Fit	.12, n.s.	.017			
	Interest–Major Fit	.28***	.071			

Note: n.s., not significant.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. Results of regression analyses for hypothesis 2.

		<i>Beta</i>	SE	<i>R</i> ²	AIC	BIC
University GPA						
Model 1				.398	339.61	351.97
	High school GPA	.63***	.064			
Model 2				.400	339.54	356.02
	High school GPA	.62***	.065			
	Interest–Major Fit	.08, n.s.	.036			
Study satisfaction						
Model 1				.002	736.01	748.38
	High school GPA	.05, n.s.	.111			
Model 2				.100	619.65	636.13
	High school GPA	.06, n.s.	.128			
	Interest–Major Fit	.32***	.090			

Note: n.s., not significant.

*** $p < .001$.

variance of university GPA and Interest–Major Fit was not a significant predictor in this regression. For study satisfaction, the high school GPA could not explain any of the variance in study satisfaction. The model with added Interest–Major Fit could explain 10% of the variance of study satisfaction. This is the same amount of explained variance as Interest–Major Fit can explain alone.

Discussion

The aim of the conducted research was to compare different approaches to Person–Environment Fit in the higher education context and to test whether Interest–Major Fit could contribute to the explanation of variance in academic performance and study satisfaction – beyond high school GPA. To this end, we compared a measure of fit based in vocational interests (hereinafter Interest–Vocation Fit) to a narrower operationalization based in specific university-related interests (hereinafter Interest–Major Fit) in their predictive power. Interest–Major Fit was measured with items especially tailored to the interest in the content of studying, while Interest–Vocation Fit was measured with items indicating vocational interests in terms of the RIASEC Model (Holland 1997). Interest–Major Fit explained more variance than Interest–Vocation Fit of university GPA as well as of study satisfaction. In contrast, Interest–Vocation Fit was even in isolation not predictive for study satisfaction at all and merely explained a small fragment of variance of university GPA. Furthermore, the specific Interest–Major Fit emerged as a relevant predictor for study satisfaction even under consideration of high school GPA. However, the measure did not significantly explain university GPA when also considering high school GPA. This indicates that the investigated measure of Interest–Major Fit is a relevant predictor for student well-being but not particularly for performance.

Theoretical implications

The present research illustrates that the predictive power of Interest–Major Fit depends on the respective operationalization of the construct. We find that operationalizations of Interest–Major Fit that focus on the fit between individual interests and the study content are predictive (particularly for study satisfaction). In contrast, operationalizations that focus on the personal fit with broader occupational interests that are supposedly tied to a study program (Interest–Vocation Fit) were not substantially predictive. This makes sense, given the core tenet of Person–Environment Fit Theory (Edwards and Shipp 2007; Edwards, Caplan, and Van Harrison 1998) that commensurate and more concrete dimensions are better suited to assess the congruence, and therefore ensure higher predictivity.

Our findings, thus, illustrate a strong limitation of prior investigations into Interest–Major Fit that often-used Holland's (1959) RIASEC model of vocational interests to operationalize the fit between the interests of a student and his/her major. To our understanding, past research more strongly echoes Interest–Vocation Fit than it echoes Interest–Major Fit. This is especially important as an incommensurate operationalization of Interest–Major Fit supposedly leads to an underestimation of the meaningfulness of this factor. As most other research used Interest–Vocation Fit as an indicative of Person–Environment Fit, it can be assumed that the effect of Interest–Major Fit on relevant outcomes has been underestimated for the higher education sector. For instance, prior research hardly found substantial associations between Interest–Vocation Fit and study satisfaction (see Ertl, Hartmann, and Wunderlich 2022). In contrast, our research indicates a clear and rather robust association.

Underestimating the relevance of fit for study satisfaction has very relevant implications. It not only leads to an incorrect process model of study success but also inhibits the use of adequate ways to give advice to prospective students. The differential result pattern and the diverging theoretical approaches make it likely that the different ways of assessing congruence are not just different operationalizations of Person–Environment Fit, but in fact two distinct constructs. This is underscored through the notion that we found no correlation between those two factors.

We could not find that Interest–Major Fit predicts the university GPA beyond the high school GPA. This is somewhat puzzling as prior research generally indicated stronger associations with achievement than with well-being (e.g. Nye et al. 2018; Tracey and Robbins 2006). It is possible, however, that the effect of Interest–Major Fit on performance becomes more pronounced over time. As high school GPA and Interest–Major Fit are correlated it could also be the case that individuals who achieve better grades are better at identifying their strengths and interests. In addition, in the German higher education system, some majors are restricted to individuals with a very good high school GPA. As such, the assurance of a high Interest–Major Fit at least partly depends on students' high school GPA. Therefore, it would be interesting to see whether the effects of students' Interest–Major Fit on performance are more pronounced and go beyond the effects of high school GPA in education systems that do not use high school GPA as a strict entrance criterion.

Study satisfaction was only associated with Interest–Major Fit and not with high school GPA if both variables were included in one model. Taken together with the finding that university GPA and study satisfaction were uncorrelated, this indicates differential psychological processes behind the development of achievement and well-being. While prior performance (i.e. high school GPA) may act as an important indicator of students' ability to perform well at university, this does not mean that high-performing students will also be satisfied with their major. When aiming to project whether students are going to like the content of their studies, Interest–Major Fit seems to be a more important factor. Comprehensive models of study success, thus, require in-depth analysis and thorough theorizing for each potential dimension of study success (e.g. motivation, performance, persistence, well-being).

It is intuitively plausible that Interest–Major Fit is more closely associated with study satisfaction than Interest–Vocation Fit. However, it needs to be tested if an Interest–Major Fit can also translate to satisfaction in a subsequent vocation or whether this is the time when Interest–Vocation Fit becomes more important. One may argue that a higher Interest–Vocation Fit is connected to retrospective satisfaction with the studies, if the result of the studies was an extrinsically motivated job (e.g. good working hours, high pay). Additionally, the satisfaction with the subsequent job could be higher when the interests of the person suit the vocation. This long-term view (which was not included in the current study) could potentially highlight the impact of Interest–Vocation Fit measured with Holland's RIASEC model. Further studies could investigate this question by conducting a longitudinal study which also covers the transition into the job.

Practical implications

According to our findings, measures of Interest–Major Fit – in terms of a congruence between personal interests and study content – are well suited to predict study satisfaction. This means that the use of such measures could benefit educational practitioners that aim to increase students' likelihood to develop well-being in their respective study program. Here, we want to focus on three areas specifically, which are diagnostic orientation tools, entry criteria, counseling, and teaching.

First, the provided knowledge is of particular importance when developing (web-based) orientation tools that are meant to guide the orientation process of prospective students. This is particularly true for higher education systems that lack an orientation period (such as the German higher education sector). Here, it is typically expected of students to ensure personal fit to a major before enrollment. Our research strongly indicates that it is worthwhile to inform prospective students about why an interest-based major choice is important and subsequently give them an opportunity to learn more about their personal interests and the content of different majors. Online Self-Assessments that assist students in this endeavor are common particularly in the German higher education. Yet these tools still often rely on measures of Vocation–Interest Fit rather than Interest–Major Fit (Janke and Karst *in press*). The development of Online Self-Assessments that rather access personal fit in terms of Interest–Major Fit seems warranted to provide prospective students with information that is likely more prognostic for their ability to maintain well-being during their studies.

Second, from the perspective of higher education institutions, our findings may signal the need to incorporate measures of Interest–Major Fit into selection procedures to ensure the well-being of prospective students. Yet, it is important to note that content-valid questionnaires will likely include items for which applicants can deduct whether they indicate a high or low fit to the program. This also means that it is considerable easier to facilitate ‘favorable’ test scores in the respective interest tests than within performance tests. Using scores from Interest–Major Fit tests as entrance criteria would, thus, strongly defeat the purpose as it hinders honest reflection on the respective items. In sum, it may be more advisable to require students to engage with these tools for self-reflection as a requirement for enrollment than to include derived scores as entrance indicators alongside for instance high school GPA.

Third, our findings may also be helpful for counselors advising students that have already enrolled in a certain major. If students are struggling with distress in their study program and are unhappy at university, it might be worthwhile to introduce them to self-assessments on their Interest–Major Fit. This is likely particularly helpful if students are not lacking general academic competencies but rather describe being bored/uninterested in the content of their major. Informing students that their fit to their major is more important in the here-and-now than their vocational interests and providing them with information on better fitting study programs, may help them in switching to a subject where they are more likely to maintain interest and well-being (see also Meyer, Leuze, and Strauss 2022 on the topic).

Finally, our findings also hold information for higher education instructors. Particularly, instructors may want to take students’ interests into account when developing course programs. More into detail, especially instructors of freshmen courses might be well advised to inquire about students’ interests and make it visible to them how the taught content connects to their passions in order to uphold or rekindle them.

Limitations and future research

The present research only took the first semester at the university into account. During this time span, we did not find any effects of Interest–Major Fit on university GPA if high school GPA was considered as well. However, a fit between the interests of students and their majors might still have long-term effects on university GPA (even beyond high school GPA). This could be the case as Interest–Major Fit is usually connected to other variables that impact achievement like motivation (Edwards and Shipp 2007). Delayed effects of Interest–Major Fit may come to pass because students who perceive that they belong into a certain major could be less likely to experience a decline in learning motivation and consequently maintain high performance over time. These effects may become particularly prominent over time as students develop a better understanding of their major and its content. Future studies may take such potential indirect long-term effects of Interest–Major Fit via learning motivation into account to provide an even deeper understanding of psychological processes behind the development of achievement (see Nye, Prasad, and Rounds 2021 for a respective study within the Interest–Vocation Fit framework).

Our study compares the predictive value of different variants of fit on study satisfaction and achievement. On its’ own, the presented research does not provide a deeper picture of potential factors that foster or hinder the development of fit as well as on variables that moderate whether fit facilitates effects. Further research for instance into the role of students’ family background (e.g. impact of first-generation or migration background) would certainly be of interest to provide a richer tapestry on the development of Interest–Major Fit.

Another limitation is that the study was conducted at only one university, located in Germany, which may limit the transferability of the results to other universities. This is a limitation because there are several majors at this university that do not directly lead to a certain job but offer a rather broad variety of possibilities. Future research could test our findings within a different education system and with a larger sample of universities that offer a broader set of majors including some that are more strongly tied to later occupations.

Finally, our study is bound to the notion that some parts of students' interests can be considered as static or at least as somewhat 'rank-stable'. This is an important requirement to consider early measured interests as predictors of later satisfaction and achievement. Yet, contemporary research has shown that particularly vocational interests are subject to change and refinement over time spent in higher education institutions (Quinlan and Corbin 2023). In the same vein, the development of joy and interest regarding ones' major can be considered a key goal of teaching. As such, future research may want to explore further to which degree major-related interests are truly stable and how much Interest–Major Fit depends on initial interests versus instruction focusing on interest development.

Conclusion

While Person–Environment Fit theory suggests that assessing the congruence between students' interests and their major may be helpful in projecting study success, the presented study suggests that it is important how this congruence is operationalized. Particularly, past research often relied on measures of Interest–Vocation Fit rather than assessing Interest–Major Fit tailored to the study content of the respective study program. Our results show that the latter operationalization of the congruence between students' interests and their study program is better suited to predict students' study satisfaction. In practice, this means that prospective students should be encouraged to choose a major according to their interests regarding the specific major (not only regarding the subsequent vocation) when making their study choice.

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References

- Allen, J., and S. Robbins. 2010. "Effects of Interest–Major Congruence, Motivation, and Academic Performance on Timely Degree Attainment." *Journal of Counseling Psychology* 57 (1): 23–35. <https://doi.org/10.1037/a0017267>.
- Bai, L., and H. Y. Liao. 2019. "The Relation between Interest Congruence and College Major Satisfaction: Evidence from the Basic Interest Measures." *Journal of Career Assessment* 27 (4): 628–44. <https://doi.org/10.1177/1069072718793966>.
- Bergmann, C., and F. Eder. 2019. *Allgemeiner Interessen-Struktur-Test Mit Umwelt-Struktur-Test (UST-3)—Version 3 AIST-3; Manual* (1. Auflage). Göttingen, Germany: Beltz-Test, Hogrefe.
- Brown, S. D., and P. A. Gore. 1994. "An Evaluation of Interest Congruence Indices: Distribution Characteristics and Measurement Properties." *Journal of Vocational Behavior* 45 (3): 310–27. <https://doi.org/10.1006/jvbe.1994.1038>.
- Chamorro-Premuzic, T., and A. Furnham. 2008. "Personality, Intelligence and Approaches to Learning as Predictors of Academic Performance." *Personality and Individual Differences* 44 (7): 1596–603. <https://doi.org/10.1016/j.paid.2008.01.003>.
- De Vries, N., M. Meeter, and M. Huizinga. 2023. "Effect of Interest Fit on Academic Success in Higher Education: Meta-Analysis and Systematic Review." Paper presented at the 20th Biennial Conference of the European Association for Research on Learning And Instruction (EARLI).

- Edwards, J. R., R. D. Caplan, and R. Van Harrison. 1998. "Person-Environment Fit Theory: Conceptual Foundations, Empirical Evidence, and Directions for Future Research." In *Theories of Organizational Stress*, edited by C. L. Cooper, 28–67. Oxford: Oxford University Press.
- Edwards, J. R., and N. P. Rothbard. 1999. "Work and Family Stress and Well-Being: An Examination of Person-Environment Fit in the Work and Family Domains." *Organizational Behavior and Human Decision Processes* 77 (2): 85–129. <https://doi.org/10.1006/obhd.1998.2813>.
- Edwards, J. R., and A. J. Shipp. 2007. "The Relationship between Person-Environment Fit and Outcomes: An Integrative Theoretical Framework." In *The Organizational Frontiers Series. Perspectives on Organizational Fit*, edited by C. Ostroff and T. A. Judge, 209–58. New York: Lawrence Erlbaum Associates Publishers.
- Ertl, B., F. G. Hartmann, and A. Wunderlich. 2022. "Impact of Interest Congruence on Study Outcomes." *Frontiers in Psychology* 13:816620. <https://doi.org/10.3389/fpsyg.2022.816620>.
- Etzel, J. M., and G. Nagy. 2016. "Students' Perceptions of Person-Environment Fit: Do Fit Perceptions Predict Academic Success beyond Personality Traits?" *Journal of Career Assessment* 24 (2): 270–88. <https://doi.org/10.1177/1069072715580325>.
- Feldman, K. A., J. C. Smart, and C. A. Ethington. 1999. "Major Field and Person-Environment Fit: Using Holland's Theory to Study Change and Stability of College Students." *The Journal of Higher Education* 70 (6): 642–69. <https://doi.org/10.1080/00221546.1999.11780802>.
- Han, C. W., S. P. Farruggia, and B. J. Solomon. 2022. "Effects of High School Students' Noncognitive Factors on Their Success at College." *Studies in Higher Education* 47 (3): 572–86. <https://doi.org/10.1080/03075079.2020.1770715>.
- Holland, J. L. 1959. "A Theory of Vocational Choice." *Journal of Counseling Psychology* 6 (1): 35–45. <https://doi.org/10.1037/h0040767>.
- Holland, J. L. 1997. *Making Vocational Choices a Theory of Vocational Personalities and Work Environments*. 3rd ed. Odessa: Psychological Assessment Resources.
- Janke, S. 2020. "Prospective Effects of Motivation for Enrollment on Well-Being and Motivation at University." *Studies in Higher Education* 45 (12): 2413–25. <https://doi.org/10.1080/03075079.2019.1612353>.
- Janke, S., and O. Dickhäuser. 2018. "Zur prognostischen Güte von Zulassungskriterien im Psychologiestudium für Studienerfolgsindikatoren [On the prognostic goodness of admission criteria in psychology studies for study success indicators]." *Psychologische Rundschau* 69 (3): 160–168. <https://doi.org/10.1026/0033-3042/a000383>.
- Janke, S., and K. Karst. in press. "Online Self Assessments as Guidance Systems for Self-Reflection and Decision Making in Higher Education – Broadly Implemented yet Poorly Understood." *Zeitschrift für Pädagogische Psychologie [German Journal of Educational Psychology]*.
- Kristof-Brown, A. L., R. D. Zimmerman, and E. C. Johnson. 2005. "Consequences of Individuals' Fit at Work: A Meta-Analysis of Person–Job, Person–Organization, Person–Group, and Person–Supervisor Fit." *Personnel Psychology* 58 (2): 281–342. <https://doi.org/10.1111/j.1744-6570.2005.00672.x>.
- Kuncel, N. R., M. Credé, and L. L. Thomas. 2005. "The Validity of Self-Reported Grade Point Averages, Class Ranks, and Test Scores: A Meta-Analysis and Review of the Literature." *Review of Educational Research* 75 (1): 63–82. <https://doi.org/10.3102/00346543075001063>.
- Merkle, B., L. A. S. Messerer, and O. Dickhäuser. 2024. "Will I Be Happy in This Major? Predicting Intrinsic Motivation and Subjective Well-Being with Prospective Students' Well-Being Forecast and Interest-Major Fit Forecast." *Social Psychology of Education* 27 (1): 237–59. <https://doi.org/10.1007/s11218-023-09835-6>.
- Messerer, L. A. S., H. Bürkle, K. Karst, and S. Janke. 2020. "Nutzung hochschulinterner Expertise zur Entwicklung von Online-Selbstreflexionstests für Studieninteressierte." *Das Hochschulwesen* 68 (3): 81–7.
- Messerer, L. A. S., K. Karst, and S. Janke. 2023. "Choose Wisely: Intrinsic Motivation for Enrollment Is Associated with Ongoing Intrinsic Learning Motivation, Study Success and Dropout." *Studies in Higher Education* 48 (1): 137–50. <https://doi.org/10.1080/03075079.2022.2121814>.
- Meyer, J., K. Leuze, and S. Strauss. 2022. "Individual Achievement, Person-Major Fit, or Social Expectations: Why Do Students Switch Majors in German Higher Education?" *Research in Higher Education* 63 (2): 222–47. <https://doi.org/10.1007/s11162-021-09650-y>.
- Nye, C. D., S. M. Butt, J. Bradburn, and J. Prasad. 2018. "Interests as Predictors of Performance: An Omitted and Underappreciated Variable." *Journal of Vocational Behavior* 108:178–89. <https://doi.org/10.1016/j.jvb.2018.08.003>.
- Nye, C. D., J. Prasad, and J. Rounds. 2021. "The Effects of Vocational Interests on Motivation, Satisfaction, and Academic Performance: Test of a Mediated Model." *Journal of Vocational Behavior* 127:103583. <https://doi.org/10.1016/j.jvb.2021.103583>.
- Nye, C. D., R. Su, J. Rounds, and F. Drasgow. 2012. "Vocational Interests and Performance: A Quantitative Summary of over 60 Years of Research." *Perspectives on Psychological Science* 7 (4): 384–403. <https://doi.org/10.1177/1745691612449021>.
- Quinlan, K. M. 2023. "How and Why Do Students' Career Interests Change During Higher Education?" *Studies in Higher Education* 48 (6): 771–783.
- R Core Team. 2020. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing. <https://www.R-project.org/>.

- Scheunemann, A., T. Schnettler, J. Bobe, S. Fries, and C. Grunschel. 2022. "A Longitudinal Analysis of the Reciprocal Relationship between Academic Procrastination, Study Satisfaction, and Dropout Intentions in Higher Education." *European Journal of Psychology of Education* 37 (4): 1141–64. <https://doi.org/10.1007/s10212-021-00571-z>.
- Schmitt, N., F. L. Oswald, A. Friede, A. Imus, and S. Merritt. 2008. "Perceived Fit with an Academic Environment: Attitudinal and Behavioral Outcomes." *Journal of Vocational Behavior* 72 (3): 317–35. <https://doi.org/10.1016/j.jvb.2007.10.007>.
- Sticca, F., T. Goetz, M. Bieg, N. C. Hall, F. Eberle, and L. Haag. 2017. "Examining the Accuracy of Students' Self-Reported Academic Grades from a Correlational and a Discrepancy Perspective: Evidence from a Longitudinal Study." *PLoS ONE* 12 (11): e0187367. <https://doi.org/10.1371/journal.pone.0187367>.
- Su, R. 2020. "The Three Faces of Interests: An Integrative Review of Interest Research in Vocational, Organizational, and Educational Psychology." *Journal of Vocational Behavior* 116: 103240. <https://doi.org/10.1016/j.jvb.2018.10.016>.
- Tracey, T. J., and S. B. Robbins. 2006. "The Interest–Major Congruence and College Success Relation: A Longitudinal Study." *Journal of Vocational Behavior* 69 (1): 64–89. <https://doi.org/10.1016/j.jvb.2005.11.003>.
- Tsabari, O., A. Tziner, and E. I. Meir. 2005. "Updated Meta-Analysis on the Relationship between Congruence and Satisfaction." *Journal of Career Assessment* 13 (2): 216–32. <https://doi.org/10.1177/1069072704273165>.
- Wach, F., J. Karbach, S. Ruffing, R. Brünken, and F. M. Spinath. 2016. "University Students' Satisfaction with Their Academic Studies: Personality and Motivation Matter." *Frontiers in Psychology* 7:55. <https://doi.org/10.3389/fpsyg.2016.00055>.
- Westermann, R., E. Heise, K. Spies, and U. Trautwein. 1996. "Identifikation und Erfassung von Komponenten der Studienzufriedenheit [Identification and measurement of components of student satisfaction]." *Psychologie in Erziehung Und Unterricht [Psychology in Education and Teaching]* 43: 1–22.
- Westermann, R., K. Spies, E. Heise, and S. Wollburg-Claa. 2002. "Student Evaluation of Instruction and Study Conditions. Theory-Oriented Development of Questionnaires." *European Education* 34 (1): 44–69. <https://doi.org/10.2753/EUE1056-4934340144>.
- Westrick, P. A., F. L. Schmidt, H. Le, S. B. Robbins, and J. M. Radunzel. 2021. "The Road to Retention Passes through First Year Academic Performance: A Meta-Analytic Path Analysis of Academic Performance and Persistence." *Educational Assessment* 26 (1): 35–51. <https://doi.org/10.1080/10627197.2020.1848423>.